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Translation

HANDBOOK FOR ENGINEER-ECONOMISTS OF SHIPBUILDING ENTERPRISES

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HANDBOOK FOR ENGINEER-ECONOMISTS OF SHIPBUILDING ENTERPRISES

Leningrad SPRAVOCHNIK INZHENERA-EKONOMISTA SUDOSTROITEL'NOGO PREDPRIYATIYA in Russian 1978 signed to press 13 Jul 78 pp 1-216

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[Annotation]

[Text] The handbook examines the basic questions of management, long-range and current planning on the basis of a tekhpromfinplan [technical, industrial and financial plan] of a shipbuilding enterprise. Widely represented are the methods of calculating various technical and economic indicators. Reference data are given used in planning the economic activities of a shipbuilding enterprise. The use of the book's materials can help in improving the level of economic work at an enterprise and production efficiency.

The handbook is designed for economists, managers, engineers and technicians at shipbuilding enterprises. It may also be useful for teachers and students at shipbuilding VUZes and faculties, particularly of an engineering-economics specialization.

FROM THE AUTHORS

The CPSU and all the Soviet people are directing their efforts at solving one of the most important tasks--providing an all-round rise in production efficiency and an improvement in the quality of work in all the elements of the national economy.

The successful solution to this problem is inseparably tied to raising the level of economic work directly at the industrial enterprises and production associations. The better economic work is organized, the higher the creative activity of all the workers in seeking out and utilizing production reserves, the more successfully the plans outlined by the party and government will be carried out for a new powerful rise in the economy and the material prosperity of the Soviet people.

An important condition for improving economic work is a rise in the level of economic knowledge on the part of economic personnel, workers, engineers, technicians and white collar personnel. The authors, in considering the specific features of shipbuilding, have endeavored to examine the most important economic questions in shipbuilding, and to examine them in a most accessible form for the workers of the enterprises, and for the instructors and students of the shipbuilding VUZes and technical schools.

The book examines and systematizes the basic questions relating to the managerial organization of a shipbuilding enterprise, economic work, the elaboration of a production program, the work of the auxiliary shops, production efficiency, standards and rates, capital construction, the use of fixed productive capital and production capacity, the planning of material-technical supply and working assets, the elaboration of the plan for labor and the wage fund, profit and profitability, the formation of the economic incentive funds, the elaboration of a financial plan, the organizing of internal economic accountability, and so forth. The handbook's materials basically reflect the structure and content of an enterprise tekhpromfinplan. The handbook for an engineer-economist at a shipbuilding enterprise has been prepared on the basis of the current sectorial, intersectorial procedural and instructional materials, and also practical experience.

The authors are hopeful that the technical and economic information provided in the book will help to better provide economic leadership, to improve the forms and methods of economic work, and to more fully utilize the internal production reserves and advantages of the socialist management system. For various reasons the handbook could not take up all the questions of economic work at a shipbuilding enterprise. The authors will be grateful to receive professional notes and requests.

The individual chapters have been written by the following persons: Chapters 1, 4, 5, 7, 8, 9, 10 by B. S. Dubko (including Chapter 8 jointly with V. Ch. Li); Chapters 11, 13, 14 and 15 by N. M. Zavarikhin; Chapters 6, 8 and 12 by V. Ch. Li (including Chapter 8 jointly with B. S. Dubko); Chapters 2 and 3 by F. S. Samsonov.

CHAPTER 1: THE ORGANIZATION OF MANAGEMENT AT A SHIPBUILDING ENTERPRISE

1. A socialist state shipbuilding enterprise, like any other socialist state production enterprise, is a basic element of the Soviet national economy. It must turn out a shipbuilding product of suitable quality for the needs of the continuously developing national economy.

A shipbuilding enterprise, in utilizing the means of production assigned to it by the state or at its disposal, carries out its production and economic activities in accord with the quotas of the national economic plan and under the leadership of the superior body. It operates on the basis of the principles of economic accountability, it possesses the rights of a legal entity, and independently enters into economic ties with other enterprises and organizations.[1]

2. A shop of a shipbuilding enterprise is the basic structural subdivision of a shipbuilding enterprise operating on the principles of internal economic accountability. In participating in the general process of production at the given enterprise, a shop carries out definite functions to manufacture the basic products or in the area of the technical or economic servicing of basic production and the enterprise as a whole. Depending upon the shop's purpose, they are divided into basic (production), auxiliary, service, subsidiary and ancillary.

Basic (production) shops carry out the production processes of manufacturing the basic product of the enterprise. Ordinarily they are organized along production lines such as preparatory, machining and assembly shops.

Auxiliary shops technically serve basic production and the enterprise as a whole. These include: Repair-machine, electric power, tool, modeling, repair-construction, and so forth.

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[1]The rights and duties of an enterprise are determined by the Statute Governing a Socialist State Production Enterprise approved by the Decree of the USSR Council of Ministers of 4 October 1965.

Service shops (systems) carry out the functioning of the economic servicing of basic production and the enterprise. These are the transport shops, the warehouse system, the computer and accounting machine stations, and the communications and signaling services.

Subsidiary shops (sections) manufacture crating for internal needs, and also prepare certain structural materials for the direct-labor method and other purposes.

Ancillary shops produce out of production wastes consumer goods and chipboard, certain building materials, and so forth.

The operational and economic activities of the shop are defined by a special statute approved by the enterprise leader.

3. A shop section is a production subdivision within a shop which performs a certain portion of technologically similar or a group of different operations in the production process. The sections are divided into production and auxiliary. The production sections can be organized by production features or in terms of the article produced or the same type of equipment.

The sections which are organized according to the production feature carry out only a certain type of operations relating to different products.

The product sections are set up for manufacturing a certain type of article or assembly, for example, in shipbuilding the shaft section, the assembly and welding of sections, and so forth. Here all operations are performed which comprise the production process on the given article. The organization of sections by the product feature is the most progressive, as it helps to introduce elements of assembly-line production and provides a significant economic effect (a reduction in the duration of the production cycle, a rise in labor productivity, the opportunity of combining professions, and so forth).

The following sections can be organized along the lines of the same type of equipment: Large lathes, small or medium sized presses, forging machines, and so forth.

4. The work area is the primary element in the production structure of the enterprise, the zone of the labor activities of a worker or group of workers (brigade) outfitted and equipped with everything necessary in accord with the nature of the jobs performed.

In addition to the production equipment (mechanisms) and attachments by which the various elements (operations) of the production process are performed, the work area has the necessary means for the equipping of the work area (production supplies, furniture, means of transport, and so forth).

The correct organization and serving of the work areas are a most important task of NOT [scientific organization of labor], since labor activity occurs precisely at the work area, and conditions are created which to a significant degree determine production efficiency.

Work areas can be stationary and mobile (route). In shipbuilding the work areas of many professions are mobile (route).

5. The management system of a shipbuilding enterprise is the aggregate of interrelated organizational, economic and technical measures related to controlling the production process at the enterprise.

The aggregate of particular production processes within the enterprise represents direct production (with its servicing) and is the object of management; the aggregate of information processes influencing production represents the management system or the managing object.

The relationship of the production process and the management process at the enterprise is shown in Fig. 1.

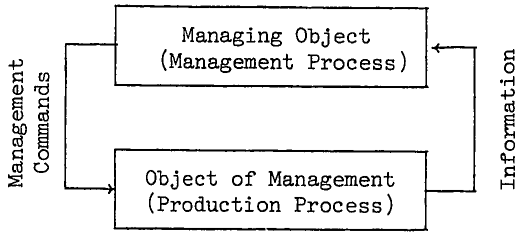

Fig. 1. Diagram of Production Management

The management system is a specific type of human activity aimed at regulating and coordinating the material processes for the purpose of obtaining the greatest production results with the least material, labor and monetary outlays on producing a unit of product. Consequently the people organized into the management personnel are one of the most important elements of the management system. For efficient production management, the workers of the management personnel at an enterprise should utilize various technical devices which perform various operations related to converting production information into optimum command decisions. The management system should be organized on the basis of current principles and methods for managing socialist production.

The organizing documents of the management system are:

a) The structural diagram of enterprise management;

b) The information system which encompasses all the paperwork of the enterprise and all methods and means of data processing;

c) The system of office work, as well as the statutes on the line elements and the functional subdivisions.

6. Principles and methods for managing socialist production *management* in the broadest understanding is the process of a specific influence on production by the planned shaping of its system, and providing its constant improvement and development.

The scientific bases for the management of socialist production were thoroughly worked out by V. I. Lenin, and in particular, he advanced and established the principles and methods for managing social production. The many years experience of socialist construction have shown their great vital force. The Communist Party, in consistently carrying out Lenin's management principles, has creatively developed them under the new conditions of economic construction, and has constantly improved the management system considering the acquired experience of socialist management both in our nation as well as in the fraternal socialist countries.

Among the most important principles for managing socialist production are: The unity of political and economic leadership, democratic centralism; one-man responsibility and collectivism in production management; the planned management of the national economy and the combining of territorial management and planning with sectorial; the correct recruitment, placement and indoctrination of the personnel; the combining of material incentive and moral encouragement; thriftiness based upon the maximum use of scientific and technical achievements in the national economy; control and verification of execution.

The process of production management is based not only on principles but also on methods of economic leadership. Combined in management practices are organizational-administrative, economic, indoctrinational and socio-psychological methods of leadership.

The organizational-administrative methods of production management are manifested as organizational and administrative effects on the controlled process of material production. They provide for the elaboration of optimum structures and decisions, the determining of the necessary resources, the time for carrying out production quotas, and the establishing of the persons responsible for this.

The indoctrinational methods of production management are aimed at the greatest possible development of creative initiative and high awareness among the enterprise employees by raising their ideological-political and cultural-technical level. The leader of each production section should clearly define the range of rights and duties for each worker, and instill in them independence in work and a feeling of responsibility for one's work

section. Political indoctrination holds an important place in the area of personnel indoctrination, and is carried out by the party, trade union and public organizations.

Economic management methods are related to the understanding and utilization of the economic laws of socialism expressed in the directive plan quotas and reflected in the "economic levers."

The directive plan quotas are approved centrally by the superior leadership bodies. With their aid the state provides a centralized economic effect on the development of the enterprises by employing a system of economic indicators which objectively measure the amount of work and the results of labor by the collectives, as well as the centralized allocation of resources required to carry out the plan quotas. The economic levers are economic accountability, prices, profit, the material incentive funds, costs, profitability, and so forth.

The sociopsychological methods are based upon an understanding and use of the patterns in the shaping and development of the human psyche, consideration of his individual traits and capabilities in performing one or another job (or in the position occupied), and on the use of moral incentives for labor. The study and use of the sociopsychological labor conditions of production collectives at the enterprises have a substantial impact on the development of the individual, and through it on production activity or labor productivity.

The creation of a good sociopsychological "climate" at an enterprise should be actually expressed in the elaboration and realization of plans for the social development of the enterprise production collectives.

7. Management functions. Social production which brings together the collective or workers cannot be carried out without management as this provides a unity of actions, coordination and purposefulness in the work of all its subdivisions. The folllowing functions of production management have been established:

a) General functions which arise out of the movement of the entire production organism. These are such functions by which, in the first place, the most important questions of production management are solved and which have a common nature for the entire enterprise, and, secondly, provide a unity of actions for all the component parts of the given production collective. These general functions include: Planning, the coordination and regulation of production, accounting and control;

b) Special functions which reflect the specific features of the given enterprise. These functions provide an organizing effect on the special aspects in the activities of the given enterprise. For example, the technological preparation of production, product quality control, leadership of the repair services, and so forth. The special functions of a technical,

production, economic and management nature make it possible to carry out the necessary organization of production in all its stages;

c) Auxiliary functions which provide for the servicing of the processes of general and special management. For example, office work, plant maintenance, security, forwarding, archives, and so forth. The necessary conditions are created by them for the normal activities of all the management elements.

8. Management bodies and levels. In terms of their involvement in the production process, management workers are divided into two categories: the line personnel providing the overall leadership of the enterprise, shop and section, and the functional personnel which assists the line personnel in preparing optimum decisions and instructions relating to production management.

The line personnel is given the right to direct the production and economic activities of the enterprise (shop or section), and here this personnel uses the principle of one-man responsibility and the granted right of authority.

The functional personnel provides for the collection and processing of production information, the preparation of the necessary decisions and instructions, thereby contributing to effective production management by the line personnel.

Along the horizontal the management personnel is divided into functional groups: Department, bureau, group; along the vertical into management levels: foremen, or leader of a section, shop or enterprise. The levels of the management personnel show a sequence of subordination for the management bodies from the bottom up. Thus, the foreman is the first level, the section chief (senior foreman) is the second, the shop chief is the third, and the director provides for the management of the enterprise as a whole. Each level (from the top down) issues planning quotas and indicators to the inferior level.

The composition and relationship of the line and functional management units are expressed in the enterprise management structure.

9. The management structure is an organizatioal form in which the management process is carried out on the basis of the delimitation of management functions by separate administrative subdivisions or management bodies. In the management structure the chain of command is established to the line leaders of both the functional management bodies as well as the production subdivisions.

The management structure characterizes the dividing of the enterprise into management stages. Thus, a shopless structure has two and three management levels (director--foreman; director--senior foreman--forman). A shop structure had three and more levels (director--shop chief--foreman; director--shop chief--section chief--senior foreman--foreman).

The enterprise management structure is established in the management scheme, the staff schedules and the statutes governing the rights, obligations and relationships of the structural subdivisions, as well as the job instructions for the executors. Regardless of the difference in the scale and types of production, the management functions at shipbuilding enterprises are basically homogeneous and express merely one or another combination of the management bodies.

The structure of the management staff at a shipbuilding enterprise is worked out considering the requirements of production, the individual features of shipbuilding work, and the internal and external ties.

As the basis for elaborating a rational production structure it would be possible to use the procedural instructions of the Scientific Research Institute for Labor as approved by the State Committee of the USSR Council of Ministers on the Questions of Labor and Wages, as well as the sectorial materials of the standard management schemes and staffs for a shipbuilding enterprise.

The organizational management structure of the enterprise and the staffs worked out in accord with the sectorial standard structures and staffs are approved by the enterprise director.

10. ASUP and its tasks. An automated enterprise management system (ASUP) is an organizational and technical complex which provides for the most efficient execution of production management functions on the basis of the broad use of mathematical economics methods and electronic computers.

The main task of the ASUP is to subordinate all the processes in the object of management to the main goal of the enterprise, that is, to increasing the output of proper-quality products with the least material, labor and monetary expenditures.

In working out and introducing the automated management systems for an enterprise (association) it is essential to be guided by the general sectorial procedural materials, including: 1) "General Sectorial Procedural Materials on Creating Automated Enterprise Management Systems." Part 1[2]; 2) "Instructional Guide on Working Out and Introducing Sectorial Automated Management Systems OASU"[3]; 3) "Procedure for Determining the Economic Efficiency of Automated Management Systems for Enterprises and Production Associations."[4]

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[2]The collection: "Avtomatizirovanyye Sistemy Upravleniya" [Automated Management Systems], Moscow, Ekonomika, 1972.

[3]Ibid.

[4]"Matodika Opredeleniya Ekonomicheskoy Effektivnosti Avtomatizirovannykh Sistem Upravleniya Predpriyatiyami i Proizvodstvennymi Ob"yedineniyami" [Procedure for Determining the Economic Efficiency of Automated Management Systems for Enterprises and Production Associations], Moscow, Statistika, 1976.

Table 1

Calculation of Technical and Economic Indicators Relating to Management [92]

Indicators and Calculation Formulas [a]	Explanation [b]
a) Rate of expenditures on enterprise management $C_y = P_y W_y \left(1 + \frac{d_{ny}}{100}\right) + C_e$	P_y--the normed average listed number of employees in the management personnel at the enterprise (association), persons; W_y--average annual wages of management employees, rubles; d_{ny}--rate of administrative management expenditures (office, business trip, postal and so forth) in percent of wages of management employees; C_e--annual total expenditures related to the upkeep and operation of management equipment (electric power, film, punch cards, repairs and so forth), without the wages of employees considered as administrative-management personnel, rubles.
b) Coefficient for technical equipping of engineer and management labor $K_t = \frac{F_b}{P_c F_y}$	F_b--balance sheet (actual) value of used mechanization for engineer and management labor, rubles; F_y--the equipping rate with mechanization (office equipment) as an average per engineer or management employee, rubles per person; P_c--the average listed number of engineer and management personnel at the enterprise, persons.
c) Use factor for mechanization of engineer and management labor $K_u = \frac{F_a}{F_n}$	F_a--the actual total time of using mechanization (office equipment) by engineer and management labor, hours; F_n--total normed (calculated) use time for this equipment in the given period, hours

continuation of Table 1

a	b
d) Mechanization factor for engineer and management labor $K_m = \frac{T_m}{\Sigma_T}$	T_m--volume of the given type of work in physical units or labor intensiveness as carried out using mechanization over the given period, norm-hours; Σ_T--the total amount of this same type of work in physical units or labor intensity and performed during the same period, norm-hours
e) Average weighted mechanization factor for all types of engineer and management jobs at the enterprise $K_{ms} = \frac{\sum_1^n K_{mi}P_i}{\Sigma P_i}$	K_{mi}--mechanization factor for type i job; P_i--number of workers employed in performing type i job; 1, 2, ..., n--total number of type i jobs
f) Level of technical equipping of engineer and management labor $Y_t = \frac{F_b}{P_y}$	F_b--balance sheet value of various types of mechanization (office equipment) for engineer and management labor at the enterprise for its subdivisions (departments, services), thousand rubles; P_y--average listed number of engineer and management personnel at the enterprise or in the corresponding subdivisions, persons
g) Number of engineer and management workers released as a result of introducing mechanization (office equipment) at the enterprise $E_n = \sum_{i=1}^n N_i E_{pi} q_z q_c$	N_i--the number of units of type i mechanization for engineer and management labor; E_{pi}--the number of workers released in introducing type i of mechanization, persons; q_z--the integral use factor of type i mechanization during the shift; q_c--the shift factor for the use of type i of mechanization during the day; 1, 2, ..., n--the number of i types of mechanization

continuation of Table 1

a	b
h) Proportional amount of expenditures related to the mechanization of management labor $$Y_z = \frac{C_e}{C_o}$$	C_e--expenditures on the upkeep and operation of all mechanization of management labor, rubles; C_o--total amount of expenditures on management at the given enterprise, rubles
i) Coefficient of management function centralization $$K_c = \frac{P_{zi}}{P_{oi}}$$	P_{zi}--number of engineers, technicians and white collar personnel employed in the plant management and performing function i, persons; P_{oi}--the total number of engineers, technicians and white collar personnel engaged in performing management function i at the enterprise (association) as a whole, including the staffs of these employees located in shops, sections and other subdivisions, persons
j) Quality coefficient for performance of management functions $$K_y = 1 - \frac{\sum_{1}^{n} t_{ni}}{\sum_{1}^{m} F_{to}}$$	$\sum_{1}^{n} t_{ni}$--total losses of working time in the various subdivisions over a definite period and caused by the delayed and improper execution of function i, hours; $\sum_{1}^{m} F_{to}$--the total working time fund of subdivisions i over the same time period, hours; 1, 2, ..., m--the number of i subdivisions; 1, 2, ..., n--the number of i management functions
k) Coefficient of economicness of management personnel $$K_e = \frac{A_n}{A_a}\frac{P_n}{P_a}$$	A_n--the number of subdivisions provided by the standard structure which correspond to the established rates of their formation by size; A_a--the actual number of structural subdivisions at the given enterprise; P_n, P_a--correspondingly the normed and actual number of management employees in all the structural subdivisions, persons (in the event $P_a < P_n$, their ratio is considered equal to 1)

continuation of Table 1

The given coefficient is designed for evaluating the degree to which the actual structure and size of the management personnel corresponds to the standard structure and normed size established for a specific enterprise (subdivision).

11. Technical and economic indicators of management. In the practical work of analyzing, evaluating and planning the measures for the scientific organization of labor of management employees, indicators are used and the calculation of them is given in Table 1.

12. Participation of the workers in production management. The management of state enterprises and associations is carried out on the basis of a correct combination of one-man leadership and collectivism in the discussion and resolving of basic questions relating to guiding the activities of the enterprise (association).

The socialist management system objectively gives rise to conditions for the involvement of the workers in production management. The right of worker participation in production management is reflected in the new USSR Constitution and legislation.

The party organizations of enterprises play the leading role in developing the creative activeness of the workers in management, and these bring together millions of workers, engineers, technicians and white collar personnel. The trade union committees of enterprises play an enormous role in developing the initiative of the workers and involving them in management. The rights of these committees are defined in the statute approved by the Ukase of the Presidium of the USSR Supreme Soviet.[5]

In the practices of socialist management, a whole series of effective forms has been elaborated for the direct involvement of the workers and the entire collective in discussing and resolving fundamental questions of enterprise activities.

The worker meetings and the permanent production conferences at the enterprises, in operating under the leadership of the trade union organizations, represent the most massive and effective form of worker participation in production management. They make it possible to find correct decisions, and they contribute to the political indoctrination of the workers and to mobilizing their creative efforts to carry out the tasks of communist construction.

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[5]See: VEDOMISTI VERKHOVNOGO SOVETA SSSR, No 39, 1971, Article 382.

The creative initiative of the employees of state enterprises is particularly sharply expressed in the mass movement inherent to socialist production, that is, the socialist competition.

The Komsomol organizations, the primary organizations of the All-Union Society of Inventors and Rationalizers (VOIR) and the scientific-technical societies (NTO) also participate actively in the labor life of the collective.

CHAPTER 2: THE ORGANIZATION OF ECONOMIC WORK AT A SHIPBUILDING ENTERPRISE

13. Economic work at a shipbuilding enterprise is one of the most important components of enterprise management, including planning, control, accounting, financial work, economic accountability and economic analysis. Its major purpose is to determine the economic efficiency of new technology, production methods and organization. Economic work at an enterprise is closely tied to the organization of production, labor and wages, to material-technical supply and the marketing of products, and to the technical development of the enterprise. Its basic task is to improve planning, accounting, control and the other economic levers for improving the economic indicators of enterprise operations. The solving of this problem should help to raise production, to rationally utilize labor, material and monetary resources, to improve product assortment and quality, to increase labor productivity, to reduce product costs, to increase profitability, and to improve the financial system.

Planning is one of the most important elements in economic work at an enterprise. It includes the elaborating of all the work indicators for each shop and production section in accord with the quotas of the state plan, and determines the most rational ways for carrying out the plan quotas. The plan indicators are figured considering the organizational and technical level achieved by the enterprise and the obligatory fulfillment of the technical development plan. Planning is not restricted to technical and economic indicators, but should include the elaboration of the calendar detailed and stage-by-stage schedule plans of production for all elements in operational production planning.

Another important element in economic work at an enterprise is *control* which is aimed at preventing all violations of the plan, the consumption and inventory standards, as well as losses and shortages. Control is closely tied to the organization of accounting. It should correctly reflect the entire course of work in carrying out the plan, the presence and movement of all assets, the financial results, the state and utilization of resources, and their safekeeping. The system of accounting at an enterprise includes bookkeeping, statistical and operational-technical accounting. Very important is the coordinating of all types of accounting, and the subordinating

of them to the requirements of operational management of the enterprise and its individual subdivisions. The primary documents used in accounting should be organized in such a manner that they record all deviations from the normal production conditions, and provide comparability of the actual data with the planned for all the essential areas.

Financial work as a most important element of economic work at an enterprise provides for the planned receipt of money from product sales, the use of bank credit and budget funds, as well as their correct channeling to pay for raw products and materials, wages, the retirement of obligations owed to the banks and the budget. The financial state of an enterprise depends upon the fulfillment of the production plan. At the same time financial work influences production, in exercising ruble control over the observance of planning and financial discipline and the ensuring of the set level of production profitability.

Of important significance in the economic work at an enterprise is *economic accountability* as a method of the planned running of the system on the basis of comeasuring expenditures with production results (in monetary terms) not only as a whole for the enterprise, but also for the shops, sections and brigades. Economic accountability is an active means for raising the level of economic work at the enterprise and its individual subdivisions.

Economic analysis is an essential and inseparable part of economic work at an enterprise, and includes a study of enterprise operations, an assessment of its results, the disclosure of unutilized reserves and their mobilization for the best fulfillment and overfulfillment of the plans. Operational economic analysis is an essential means for directing the work of all the enterprise subdivisions, and it helps to strengthen economic accountability and the observance of thriftiness. Economic analysis provides an opportunity not only to check and assess plan fulfillment, but also makes it possible to incorporate the necessary corrections and improve financial work.

Economic work at an enterprise is carried out by all the enterprise subdivisions, but it is directed by the bodies of the economic services, including: PEO [economic planning department], PDO [production dispatcher department], ONTIZ [department for the scientific organization of labor and wages], the financial department and the bookkeeping office. The remaining services work closely with them. In economic work an important role is played by the volunteer organizations and bureaus of economic analysis, norm setting, people's control, the technical and economic councils, and so forth.

14. The functions of an engineer economist. The professional content of the work done by an engineer economist is determined by his theoretical and practical skills required for carrying out a certain range of economic work. The general functions of an engineer economist stem from the tasks which the various economic services of an enterprise must carry

out. The basic ones are: Organizing work in the area of planning, norm setting and the analysis of economic operations; disclosing and utilizing internal production reserves; conducting economic research on individual questions of enterprise economics (labor productivity, costs, profitability, and so forth); calculating the economic efficiency of the capital investments, new equipment, production methods, the output of new types of products, the use of new forms and methods for organizing production and labor; the economic background studies for the further development of production specialization and cooperation; improving the existing system of labor expenditure standards; the consumption of raw products and materials and working assets; improving the systems of intraplant and intrashop planning; the introduction of intraplant economic accountability and using it to ensure strict observance of thriftiness in all stages of enterprise production activities; rationalization of the existing office work system used in planning and accounting; studying, generalizing and disseminating advanced experience of production innovators and the best organizing of economic work at the enterprise; the organizing of economic training among the workers, engineers, technicians and white collar personnel of the enterprise; providing daily procedural and professional help to the public economic analysis bureaus and groups.

In accord with the basic tasks, the specific functions of an engineer economist in the department of the plant administration or shop bureau are determined by his position (instructions).

An engineer economist takes an active part in the activities of an enterprise on a volunteer basis: In the management of the enterprise through the permanent production conferences (PDPS); in the work of the tecnnical economic council; in the work of the plant social organizations such as the NTO, VOIR, the BRiZ [Bureau of Rationalization and Invention], and so forth.

15. Long-range and current planning. The elaborating of long-range five-year plans is the leading and most important stage of planning. Its task is to convert the production association or industrial enterprise to a higher organizational and technical level, to replace the product range and improve the quality of the manufactured products, to bring about a substantial rise in labor productivity and production efficiency. The production collective of a shipbuilding enterprise works out a draft plan for its five-year period, in being guided by the control figures of the superior organization such as the all-Union or republic industrial association or the ministry. These figures define the place of the given enterprise in the work of the entire sectorial economic system. The figures for general economic growth are given through the control figures to the enterprises in the form of general indicators. The collectives of the enterprises, in accepting these figures as the basis, concretize their opportunities considering the detected internal production reserves, and assume additional obligations in the form of counterplans.

The superior economic body thoroughly examines the draft five-year plan of the enterprise with the participation of its leaders, and proceeding from the quotas for the sector as set in the national economic plan, approves the basic indicators which are a state planning quota for the enterprise (association).

A five-year plan of a shipbuilding enterprise contains 11 basic sections, including: I. Product production and sales. II. Technical development and organization of production. III. Indicators for improving economic efficiency of production. IV. Standards and rates. V. Capital construction. VI. Demand for basic material resources. VII. Labor and personnel. VIII. Costs, profit and profitability of production. IX. Economic incentive funds. X. Financial plan. XI. Social development of the collective.

The plan for the production and sale of products is the first and most important section. To a significant degree its indicators determine the economic results of the collective of the enterprise (association).

In compiling the draft plan for the production and sale of products, the enterprise proceeds from the control figures for the production of the most important product types (by range and assortment) which are issued by the superior organization, as well as from the system of existing economic ties. Relying on contracts with the consumer and client enterprises, the enterprise independently adjusts and supplements the control figures. Here in order to know its possibilities for expanding the production volume, the enterprises establish this by the calculations of production capacity. As the amount of capacity they use the maximum possible product output under the best conditions: With the complete utilization of equipment, progressive production methods, and providing a scientific organization of production and labor.

A consistent increase in production over the years of the five-year period can be achieved both by improving the utilization of existing machinery and equipment, as well as by completing and operating new capacity. All of this is reflected in the planning balance of production capacity at the enterprise on the basis of which the production program is drawn up and the output of commodity product is determined. The latter is calculated by multiplying each type of the planned product range by the established wholesale price. On the basis of the thus obtained overall cost of finished products, the volume of product sales is figured.

Broad opportunities for improving the planning of product output and sales can be found by creating production and industrial associations. These large economic structures establish stable ties between themselves, and for this reason in their plans they make more accurate provision for reciprocal deliveries of the required products and the rendering of services. The sales plan becomes sounder and more stable. The "commercial" or marketing and financial activities in many instances are shifted to the association, while the enterprises and production affiliates can focus their attention more fully on utilizing the internal production reserves, planning

technical development, and the introduction of scientific and technical achievements.

The incorporation of an additional indicator for evaluating enterprise operations, the fulfillment of quotas and obligations for product deliveries, introduces new features into working out the plan for the production and sale of products at them. The use of this indicator which provides monthly reporting on its fulfillment requires the preparation of a precise delivery plan, where the obligations of the supplier should be strictly fixed in accord with the approved plans for the production and sales of products and the concluded contracts, with the aupplier bearing responsibility to the clients for their fulfillment. Thus, in contrast to previous practices, the delivery plan has been turned from an internal working document of the marketing service to an important planning document which should be carefully coordinated with the production program of the enterprise and the association. This requires a complete and closer coordinating of production and marketing activities by the workers of all the plant services in the process of working out the plan of indicators in order to ensure strict observance of economic discipline.

Of great importance are the second and third sections of a plant five-year plan, the "plan for the technical development and organization of production" and the "plan for improving the economic efficiency of production." Since scientific and technical progress is the main factor which determines the accelerated course of economic activities in our times, the indicators of the second section of a five-year plan become the base ones for the other plan sections.

The elaboration of the plan for technical development and the organization of production provides broad scope for the engineers, workers and the entire collective to show technical creativity and to disclose new reserves and organize their finding.

Along with the measures to develop the technology and production methods and to improve product quality within this section measures are formulated to improve NOT, the management system and the organization of production at the enterprise, to protect nature and to make rational use of the natural resources.

One of the important sections in an enterprise five-year plan is the system of planning technical and economic standards and rates. The long-range standards and rates are worked out in accord with the planned measures to improve production efficiency, and they embody advanced experience. The soundness of planning depends largely upon the progressiveness of the standards and rates. Of primary significance is the correct norming of material expenditures (approximately 70 percent of the cost of shipbuilding products), but it is also essential to more accurately determine the standards for the use of equipment, labor expenditures, and so forth.

Inherent to each of the subsequent sections of the long-range plan (capital construction, material resources, labor and personnel, costs, profit and profitability of production, the economic incentive funds, finances, and the social development of the collective) are its own functions and tasks in developing and improving enterprise production efficiency.

16. The tekhpromfinplan, its composition and content. The tekhpromfinplan [technical, industrial and financial plan] is a full-scale program for all the production, economic and social activities of the enterprise collective aimed at carrying out the quotas of the five-year (annual) plan with the fullest and most rational utilization of the material, labor, financial and natural resources.

The new system of planning and economic incentive has introduced substantial changes into the content and nature of the enterprise tekhpromfinplan. At present, under the conditions of broad enterprise independence and the continuous rise in production efficiency, the demands are also rising for working out a tekhpromfinplan which would become an effective instrument in organizing the most effective activities of the collective.

Considering the demands made by the new management system, the USSR Gosplan has approved (Decree of 19 October 1977, No 125) a standard procedure for working out the tekhpromfinplan of a production association (enterprise).[1]

The tekhpromfinplan of a production association or enterprise in the shipbuilding sector is worked out for the following sections: I. Production and sales of products. II. Technical development and organization of production. III. Indicators for raising economic efficiency of production. IV. Standards and rates. V. Capital investments and capital construction. VI. Material and technical supply. VII. Labor and personnel. VIII. Costs, profit and profitability of production. IX. Economic incentive funds. X. Financial plan. XI. Social development of collective. XII. Conservation of nature and rational use of natural resources. XIII. Plan of external economic ties. XIV. Plan for creating automated management systems and computer subdivisions.

17. The shop technical and economic plan. Internal plant technical and economic planning is carried out by working out annual (with a quarterly breakdown) and quarterly (with a monthly breakdown) plans for the production and economic activities of each enterprise structural subdivision (shop).

The internal plant shop plans and the technical and economic indicators for the year being planned are worked out in two stages. In the first stage,

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[1]See: "Basic Procedural Provisions and the Procedure of Elaborating a Tekhpromfinplan," EKONOMICHESKAYA GAZETA, No 50 (December), 1977.

on the basis of the directive indicators of the enterprise tekhpromfinplan, the corresponding departments under the procedural leadership of the economic planning department and with the participation of the shops, worked out the basic planning quotas for each of the shops and these are coordinated with the final indicators for the enterprise. The most important indicators for the production activities of the shops are approved by the enterprise director, including: 1) The folume of gross product determined in the plan on the basis of the summary schedule for building ships and the specific shop-stages of the given shop; 2) commodity product which is determined in the plan from the cost of the fully completed shop-stages or machine-sets; 3) commodity output as the total value of payments for the partial completion of ships the obtaining of which by the plant to a decisive degree depends upon the work of the given shop; 4) the basic range of jobs in physical units and this in the annual plans is given in a consolidated form; 5) the number of employees; 6) labor productivity; 7) total wage fund; 8) cost of a unit of shop product; 9) the quotas for introducing new technology including plant-wide measures; 10) material incentive fund; 11) percentage of shop expenditures.

In the second stage of technical and economic planning, on the basis of the approved basic indicators, the shops work out a complete program of their production and economic activities for the year, and this is called the tekhekonomplan [technical and economic plan].

The tekhekonomplan is aimed at the fulfillment of the directive indicators set for the shop with a continuous rise in production efficiency and the fullest utilization of the production area and equipment.

The tekhekonomplan, the elaboration of which involves the shop collective, includes the following sections and documents: 1) The general plan indicators; 2) the stage schedule for ship construction; 3) the annual production plan; 4) a complete plan for gross product; 5) a full plan for commodity product; 6) the calculation of the wage fund by employee categories; 7) staff schedule for engineers, technicians, white collar personnel and junior service personnel; 8) a plan for improving the technical level of production; 9) a calculation of the planned cost of each unit and the entire commodity product of the shop; 10) an estimate of shop expenses.

The individual sections of the tekhekonomplan are coordinated with the corresponding functional departments of the plant administration, and the entire tekhekonomplan is approved by the economic planning department.

18. Directive technical and economic indicators of a tekhpromfinplan.

For shipbuilding enterprises, the directive indicators are the following:

a) For production--the volume of sold product in thousand rubles; commodity output (paid for) in thousand rubles and the production of the most important product types in physical units; here individually given are:

i) For shipbuilding: the construction and delivery of vessels in the number of units for all plans; the total percentage of the advancement of technical completion according to the plans as a whole for all the ships, as well as for the major auxiliary, seagoing and fishing vessels (with a building cycle of over 1 year);

ii) For ship repair and reequipping: the number of vessels undergoing repairs and reequipping; the volume of commodity output according to the plans, thousand rubles;

iii) For export deliveries (with the exception of shipbuilding); the total volume of sold product, thousand rubles, including to be sold for freely convertible currency; the delivery of products in units (sets) according to the established range;

iv) For the products of interplant cooperation (MZK): the total volume of sold product, thousand rubles; the delivery of products in units (sets) according to the established range;

v) For cultural and household commodities: the total volume of sold product, thousand rubles; the delivery of products in units (sets) according to the established range;

vi) For intersectorial deliveries (to other ministries): the total volume of sold product, thousand rubles; product delivery in units (sets) according to the established range;

vii) For other products: the tonnage of finished castings, forged and stamped pieces; delivery of products in units (sets) according to the established range;

b) For labor: the total wage fund, thousand rubles; labor productivity (product output per worker);

c) For capital construction: the total volume of centralized capital investments, including "reconstruction," and "technical reequipping," thousand rubles; the completion of fixed capital from the centralized capital investments, thousand rubles;

d) For introducing new equipment: the quotas for developing the production of new types of products and introducing new production processes, mechanization and automation of production having particularly important significance for the development of shipbuilding;

e) For material and technical supply: the volume of deliveries to the enterprise of raw products, materials and equipment allocated by the ministry in physical and monetary units;

f) For finances: the total balance sheet profit, thousand rubles; total profitability (to the total fixed productive capital and normed working

capital), percent; payments to the budget, including payments for the fixed productive capital and normed working capital, thousand rubles; the payment of the free profit balance, thousand rubles; allocations from the budget, including for: capital investments, thousand rubles; the running of children's preschool institutions, thousand rubles; the increase in the working capital rate, and so forth;

g) For the economic incentive funds: total, thousand rubles, including: material incentive fund, thousand rubles; the fund of sociocultural measures and housing construction; production development fund, thousand rubles.

CHAPTER 3: THE PRODUCTION PROGRAM OF A SHIPBUILDING ENTERPRISE

19. The content of a production program. The basic division of a tekhpromfinplan which defines the entire quantitative and to a significant degree the qualitative aspect of an enterprise's production and economic activities is the plan for the production and sale of products.

The production program is a list of products manufactured by the enterprise, the quantity of the products in physical and cost terms, and the output dates.

The production program serves as the initial basis for calculating the demand for materials, ship equipment and preassembled articles, as well as for labor and monetary resources. The product structure and volume set in it determine the nature of organizing the production process, and they create the prerequisite for the introduction and use of new equipment. The range, assortment and output dates of the products have a great effect on the use of enterprise capacity, the level of labor productivity, production costs and profitability.

All of this necessitates a careful setting of the production structure and volume, and raises a number of demands on compiling the production program.

These demands include: 1) the ensuring of high, steady growth rates of general and monthly product output; 2) the fullest utilization of the capacity of the enterprise and its shops; 3) a deepening of the process of general plant and intraplant production specialization and cooperation; 4) a rational distribution of produced product by calendar dates within the planning period considering the full utilization of the fixed capital and the creation of prerequisites for an even course of production.

20. Indicators of the production program and their measurement. The list of the industrial product manufactured by the enterprise is called the *range of the production program*; the quantity of the product produced by each type and as a whole for the enterprise is the *product volume*.

The enterprise's product volume is measured in physical and cost units. The physical units for the product volume are pieces, sets, tons, cubic

meters, and so forth. In shipbuilding, considering the extended building cycle of the vessels, specific physical units are used such as the percentage of the technical completion of the vessel and the advance of the technical completion of the vessel over a certain period.

A physical measurement can express the volume of only a uniform (same-type) product. But a shipbuilding enterprise builds vessels simultaneously under several plans, it manufactures scores of types of products, and delivers them under interplant cooperation to other enterprises, as well as produces several types of consumer goods and other products. It is possible to unify these diverse articles for determining the product volume as a whole for the enterprise only by a cost measurement of them and this is achieved through the wholesale prices of each product type. In practice for these purposes two types of prices are used: the wholesale prices current in the given year and fixed (comparable) prices. The latter type of prices is essential for comparing the product volume over a number of years and disclosing its dynamics.

The product volume of each enterprise is assessed not by one indicator, but rather by a group of interrelated indicators, each of which reflects the product volume in one or another type corresponding to the individual stage of its production or sales.

In industry there are the following types of product volumes: The volume of sold product, commodity product, incomplete production and gross product.

The volume of sold product represents the value of the finished products, semifinished articles and various products of the auxiliary shops sold on the outside, to one's own capital construction and to one's nonindustrial facilities. The volume of sold product also includes: the value of the work of an industrial nature carried out under orders from the outside or from one's nonindustrial facilities and organizations; the value of the major overhaul of equipment and transport, and equipment of one's own production listed among the fixed capital of the enterprise.

Thus, by the *volume of sold product* one understands the sold commodity product reflecting the results of the industrial and economic activities of a given enterprise.

The composition of the sold product differs from the composition of the commodity product over the corresponding period in the fact that the sold product does not include the value of the finished articles at the enterprise's warehouses as well as the value of the shipped articles the money for which has not been fully received at the payment or special loan account of the enterprise by the end of the planning period (year, month) as well as in the fact that the volume of sold product should include the value of the articles produced in the period preceding the planned one the money for which has been received by the enterprise during the planning period.

In contrast to the general industrial method, in shipbuilding *sold product* for large and medium vessels paid for in terms of partial completion is considered to be a vessel which has not been paid for but accepted by the orderer (at the moment of signing the act of acceptance).

For small vessels which are paid for by a single payment with 100 percent completion of the vessel, the determining of sold product corresponds to the general industrial method, that is, the vessel paid for by the orderer is considered to be the sold product.

The sold valuable materials (raw products, materials, intermediate products, fuel and so forth) which are not the result of the production activities of a given enterprise are not included in the volume of either the sold or the commodity product. Also not included as part of the sold product are the work and services of a nonindustrial nature (the products of the subsidiary facilities and agriculture, work of a construction nature, and so forth) which are planned and accounted for in the corresponding national economic sectors.

The planned total of sold product (P_s) is calculated proceeding from the production volume of commodity product using the following formula:

$$P_s = T_p + Z_s - Z_e$$

where T_p--commodity product in wholesale prices;
Z_s--balance of unsold product at start of planned period;
Z_e--balance of unsold product at end of planned period.

The volume of sold product is determined in the plan in the wholesale prices of the enterprises (without the turnover tax) effective in the planning period or in prices equivalent to them (retail minus the turnover tax, the trade and marketing rebates, the various zonal prices and so forth), that is, in the prices used for calculating the volume of commodity product.

For determining the planned growth rate of sales using these prices, the report data on the sales volume of the previous (base) year are recalculated using the methodology accepted in the year being planned.

As the prices current in the planning period, they use: a) the fixed wholesale prices in effect at the moment of compiling the plan when these prices do not change during the year being planned; b) the fixed wholesale prices to be introduced on 1 January of the year being planned and approved in the proper order; c) temporary prices the effective time of which does not lapse by the beginning of the year being planned; d) conditional contractual prices which are set in the event that by the moment of concluding the prices for the delivery of new product types, a temporary price has not been set and then only for those product types for which the setting of such prices is allowed.

With a change in the wholesale prices for the product after the setting of the production and sales plan, the indicators for the volume of sold product are reviewed and reset in the established manner.

The volume of commodity product at a shipbuilding enterprise includes the following: finished products manufactured and sold in the period being planned, as well as the products manufactured and delivered to the warehouse for sale in subsequent periods.

The volume of commodity product is defined as the total value of: The vessels built and delivered to the orderers; the finished and semifinished products which have been produced in the period being planned and are destined for outside (including for capital construction and the nonindustrial facilities of one's own enterprise); the finished machine building products manufactured under the subcontracting plan.

Commodity product is defined as follows: for vessels, by multiplying the current wholesale price by the number of completed vessels of the given design; for finished and semifinished products, proceeding from the current price and the corresponding quantity of the given product.

Commodity product includes the fully completed articles and semifinished products which meet the standards and technical conditions. Rejected products are not included in the volume of commodity, sold or gross product, if they have not been shipped to the outside.

The value of a vessel which has been completed and turned over to the orderer under the act of acceptance is considered to be the commodity product for an individual vessel.

The volume of commodity product T_p for the enterprise as a whole can be computed using the following formula:

$$T_p = \sum_{i=1}^{m} n_i P_i + M_t + Y_t,$$

where n_i--the number of vessels i delivered to the orderer;
P_i--the wholesale price of vessel i delivered to the orderer, thousand rubles;
M_t--commodity product of the machine building products, thousand rubles;
Y_t--commodity product of other products and services, thousand rubles;
m--number of classes (designs) of vessels.

The volume of commodity product is planned in the wholesale prices of the enterprises (without the turnover tax) existing at the moment of compiling the plan. The products manufactured under individual orders for which there are no approved wholesale prices are assessed at prices agreed upon in the delivery contract or at the planned prices. The value of the major overhaul

on equipment and transportation of the enterprise is assessed using the planning estimates for the enterprise repair and machine shop.

The total product volume produced by the enterprise regardless of the degree of its completion is termed the *gross product*. According to the plant method the gross product is considered to be the value of all the finished and semifinished products produced over the report period minus the value of the product used for internal production and consumed for industrial and production needs inside the given enterprise during the report period (regardless of whether the consumed product was produced during the report period or earlier), as well as the value of the work performed of an industrial nature (under outside orders, for industrial facilities and organizations of one's own enterprise, for major overhaul and capital construction).

The volume of the gross product for shipbuilding B_{ps} is planned proceeding from the wholesale price of each vessel and the planned percentage of the advance of its technical completion, and is determined by the formula:

$$B_{ps} = \sum_{i=1}^{n} P_i \frac{a_i}{100} .$$

The total volume of gross product at a shipbuilding enterprise consists of the gross product for shipbuilding, machine building and all types of industrial services:

$$B_s = \sum_{i=1}^{n} P_i \frac{a_i}{100} + B_m + Y_t,$$

where B_s--the gross product total for all vessels, for machine building and for all types of services, thousand rubles;
P_i--the wholesale price of vessel i, thousand rubles;
a_i--the advance of the technical completion of vessel i, thousand rubles;
n--number of vessels (of all designs) according to production plan;
B_m--the gross product of machine building in comparable prices, thousand rubles;
Y_t--the commodity product of other articles and services (the value of all types of industrial services performed both for the outside as well as for the home enterprise), thousand rubles.

The gross product of machine building includes the commodity product with the addition of the value of the increase (with a plus sign) or decrease (with a minus sign) for incomplete production. The formula for calculating gross product has the following form:

$$B_m = M_t + (P_e - P_s),$$

where B_m--gross product in comparable prices, thousand rubles;
M_t--commodity product in comparable prices, thousand rubles;
P_e--incomplete production at the end of the period being planned;
P_s--same for the beginning of the period being planned, thousand rubles;
(P_e-P_s)--change in the balance of incomplete production over the period being planned, thousand rubles.

For simplifying the calculation of gross product, it has been established that a change in incomplete production is considered only for products for which the production cycle exceeds 2 months. For all other machine building products and services, the volume of gross product is considered equal to the commodity product.

The technical completion of each vessel at the beginning and end of the period being planned is determined on the basis of a system of planning and accounting units employed for the internal plant planning and accounting of shipbuilding.

The official document which defines the composition of the indicators for sold, commodity and gross product is the Standard Instructions for Compiling the Reports of Industrial Enterprises on Plan Fulfillment for the Products as approved by the USSR TsSU [Central Statistical Administration] with the agreement of the USSR Gosplan and the USSR Ministry of Finances. At present, in effect are the provisions of the Standard Instructions approved by the USSR TsSU on 11 May 1971, No 4-104 (Moscow, Statistika, 1971).

Commodity output (sold output). The indicator of sold product in shipbuilding is characterized by significant unevenness. This is explained by the fact that the building cycle for medium and large vessels runs into many months and even years, and the wholesale price of the vessels is hundreds of thousands and millions of rubles. In building medium and large vessels, the product realized for them arises periodically after significant intervals of time. For this reason, along with the indicators of commodity and sold product, in shipbuilding an additional indicator is used, the commodity output (sold) which reflects the termination of the basic stages of building the vessels.

For each completed stage of building the vessel, a shipbuilding enterprise receives a certain amount of the value of the vessel from the client. The total of the received intermediate payments for the completed stages of building the vessel comprises the amount of the sold commodity output.

The volume of the sold commodity output at a shipbuilding enterprise consists of two parts: the value of the intermediate payments by the orderers for the partial completion of the vessels under construction when these payments have been deposited to its payment account, and from the sales volume of the remaining products.

Payment schedules are worked out for the payments for the vessels under construction and for planning the sold commodity output upon agreement between the shipbuilding enterprise and the orderer.

The approved list of payment stages with the indicating of the proportional significance of each of them in percent of the wholesale price is termed the *payment schedule*. The proportional significance of each payment stage is determined proportionately to the labor intensiveness of the group of jobs encompassed in the given stage. The number of payment stages depends upon the size and complexity of the vessel, and upon the duration of its construction; it varies from 10 to 100.

The *sold commodity output* for an individual vessel is the name given to the value of the intermediate payments paid by the orderer (with the exception of the last) from the moment the money is deposited on the enterprise's payment account.

The final delivery payment is included in the sold commodity output after signing the act of acceptance (regardless of the moment the last payment is made).

The volume of the sold commodity output in the plan is calculated in current wholesale prices of the enterprise as set in the plan for calculating the volume of commodity product. The planned growth rate in the volume of sold commodity output essential for figuring the planned amount of the economic incentive funds is determined in comparable prices. For this the sold commodity output of the base year is recalculated in the prices of the year being planned.

The procedure for calculating the volume of commodity output in a comparable estimate is given in Point 105 of the Instructions on Planning and Accounting for Production and Costs at Shipbuilding Yards.

21. Normed net product. At a majority of enterprises in the shipbuilding industry, as in other sectors, the production volume is measured on the basis of the indicator of gross product, as well as labor productivity, the return on investment, and the utilization of the wage funds is assessed. However, the production volume and the volume of gross product are not identical indicators.

Gross product characterizes the total value of the produced product, including the value of the consumed means of production and the newly created value. The production volume is only the portion of gross product which characterizes the result of the particular efforts of the employees at a given enterprise in manufacturing the product. The production volume in its amount equals the newly created value which in economic theory has gained the simplified name of net product, that is, the product created by the "live" labor of the employees of a given collective but which does not consider in its amount the value of the consumed means of production.

If an enterprise year in and year out produces the same range of products with a fixed proportional amount of each product in the total product volume, then the dynamics of the product volume and the production volume virtually coincide. In this instance gross product can with sufficient reliability serve as an estimate for the dynamics of the production volume, for calculating labor productivity and the return on investment, as well as for controlling the use of the wage fund.

At a majority of shipbuilding enterprises, product range and the proportional amount of the same products in the total product volume are constantly changing. Under these conditions the gross product indicator provides a distorted notion of the actual rise in the production volume and the other indicators stemming from it, since each type of product has its own unique ratio between the value of the consumed means of production and the newly created value. This circumstance leads to the appearance of "advantageous" and "disadvantageous" products from the viewpoint of achieving the set volumes of gross product and a labor productivity level. The "advantageous" products are those which in their total value have a high proportional amount of material expenditures with relatively low labor expenditures for manufacturing them.

The "varying advantage" of products requires that individual production leaders seek out "advantageous" products for incorporation in the plan of the forthcoming period. In the course of carrying out the set plan, work is artificially sped up for the "advantageous" orders, and with the overall limitation on the labor capabilities of the collective, this leads to a decline in the output of the "disadvantageous" articles.

As a result of such "assortment shifts," the gross product provides a distorted notion of the actual operating results of the enterprise for the most important areas of the dynamics of the production volume, the level of labor productivity, and so forth.

The essence of planning and calculating the production volumes on the basis of the net product indicator consists in the following. In the same manner that each article should have a wholesale price for determining the volume of gross product, for determining the volume of net product the appropriate rates should be established. The volume of net product is determined by multiplying the planned and actual output of products in physical units by the established rate of net product for each type of product. For this reason, the production volume set by the designated method is termed the normed net product.

For the shipbuilding enterprises, two types of net product rates have been set: 1) specific rates per unit of product which are employed for planning the products included in the enterprise plan in the form of a separate range; 2) specific rates employed for recalculating the gross product into the normed net product in planning relatively small products each type of which is indicated in the plan by one general name.

At shipbuilding enterprises, the volume of the normed net product is determined in the following manner: a) for the shipbuilding orders, the percentage of the advance of the technical completion of each vessel is multiplied by the corresponding net product rate; b) for machine building products which have a specific net product rate and for which a change in the balance of incomplete production is not considered in determining gross product, the quantity of uniform products is multiplied by the corresponding net product rate; c) for product (jobs) having a proportional net product rate, the volume of the gross product is multiplied by the corresponding proportional net product rate.

The indicator of normed net product is designed to assess the amount of work done by the enterprise itself and the dynamics of this. On the basis of this indicator, labor productivity and the return on investment are measured, and in addition the necessary wage fund of the enterprise's industrial-production personnel is determined.

22. The content of a shop's production program and its particular features. A shop production plan establishes the range and amount of work done by a shop; together with the plans of the other shops it provides for the fulfillment of the set plan for the production and sale of products by the enterprise. In the annual shop tekhekonomplan the production plan is broken down for the quarters. With the start of each quarter, this plan is adjusted and broken down by the months.

The gross product of a shop for the vessels includes the amount of work on fully completed production complexes, and for nonshipbuilding products, the amount of work for completed machine sets. If a machine building product has an extended manufacturing cycle, then its machine sets are divided into individual assemblies (subsets), and the amount of work on the completed assemblies is included in the shop's gross product.

The commodity product of a shop includes: for vessels the volumes of work on fully completed shop-stages, and for the nonshipbuilding products, the volumes of work for fully completed machine sets.

The value of the payment stages assigned to a shop for the vessels under construction with the addition of its commodity product for nonshipbuilding orders is considered to be the *commodity output of a shop*. In contrast to the commodity output of an enterprise, the value of the payment stages are included in the shop's report for this indicator from the moment of signing the certificate on completing the work for the given payment stage, and not from the moment of the depositing of the money in the enterprise's payment account.

In a shop's annual plan for production, the most important product range is considered to be the list of vessels to be built with the shop's participation during the year, including the head and delivery vessels, as well as the list and quantity of major machine building products the machine sets

of which should be manufactured by the shop without fail. In the quarterly production plans, the range of the most important products of the shop is given in a more detailed form, by shop-stages. In a shop's production plan for a month, the range of the most important products is detailed even further. It includes a list of the production sets which provide a work-front for adjacent shops, the receiving of payments and other important moments in the building of the vessel.

23. The method of compiling a production program. A production program, as was pointed out in §19, is a list of the products manufactured by the enterprise with the indicating of their quantity in physical and cost terms and the output dates. The indicators of a production program are: the range of produced product, its quantity in physical units and the indicators of the product volume (gross, commodity and sold product and commodity output). A sample form of an annual plan (program) for the production and sale of products at a shipbuilding enterprise is given in Table 2.

The plan for the production and sale of products for the year being planned is worked out on the basis of the following: The enterprise long-range plans, the directive quotas of the superior organization, the calculations of production capacity and the planning technical-economic standards and rates. The basic document which determines the indicators of the production program in shipbuilding is the summary shipbuilding schedule.

The summary schedule is worked out by the enterprise's economic planning department with the participation of the production dispatcher department, the technological service and the builders of the ships. It includes all the vessels to be built in the year being planned, regardless of the state of their completion. The summary building schedule for refrigerator vessels of the so-called cascade form is given in Table 3. Such a schedule is most convenient for depicting the building of the vessels using the flow-position method; with a more complicated program it is constructed in a line form.

From the graph it can be seen that during the year, seven refrigerator vessels will be under construction. Each vessel is recorded in the plan (see Table 2) in a separate line, and on the basis of the data of the summary schedule all the indicators characterizing the construction of the vessel are placed in the lines of the plan. For example, the vessel of the plant No 8 at the beginning of the year is 70 percent finished and should be delivered in April, that is, 100 percent complete at the end of the year. These data are inserted in columns 7 and 8. The difference between completion at the end and start of the year is 30 percent (100-70), and this amount is placed in column 9 "Advance of Completion." By multiplying the compared price of the vessel (12.8 million rubles) by the advance of its technical completion (30 percent), we obtain the volume of gross product for this vessel during the year, 3.84 million rubles (see column 10). Then from the graph we establish that in January-April, for ship No 8, 18 payments were to be received, Nos 33-50, and the total proportional amount of

Annual Plan (Program) for the Production and Sale of

(figures

№ п/п	product	Количество	Заводской номер судна	price 1000 R		tech. completion, %	
				сравнимая на 1/1 1975 г.	действующая	на начало года	на конец года
1	2	3	4	5	6	7	8
1	Рефрижераторы проекта А		8	12 800	12 800	70	100
			9	12 800	12 500	45	100
			10	12 800	12 500	10	100
			11	12 800	12 500	3	65
			12	12 800	12 500	—	40
			13	12 800	12 500	—	15
			14	12 800	12 500	—	5
	Total for A design					—	—
2	Изделия межзаводской кооперации (МЗК)		—	—	—	—	—
3	Изделия межотраслевой кооперации		—	—	—	—	—
4	Изделия народнохозяйственного плана		—	—	—	—	—
a	В том числе:						
b)	а) химическое оборудование		—	—	—	—	—
c)	б) каркасы тракторных прицепов	15 000	—	—	—	—	—
5	Изделия народного потребления, в том числе мебель деревянная		—	—	—	—	—
			—	—	—	—	—
6	Прочая продукция		—	—	—	—	—
a	В том числе:						
d)	а) по УКСУ		—	—	—	—	—
e)	б) капитальный ремонт		—	—	—	—	—
	Total	—	—	—	—	—	—

Key: [number at left margin] 1--A-design refrigerator vessels; 2--products of interplant cooperation (MZK); 3--products of intersectorial cooperation; 4--products of national economic plan; a--including; b--chemical equipment; c--tractor trailer frames; 5--consumer products, including wooden furniture; 6--other products; d--capital construction dept.; d--major overhauls; [numbers at top] 3--quantity; 4--plant vessel number; 5--comparable on 1 Jan 75; 6--current; 7--at year's start; 8--at year's end.

Table 2

Products by Shipbuilding Enterprise

conditional)

Продвижение готовности, %	Валовая продукция, тыс. руб.	commodity output: payment stages: номер этапа	commodity output: payment stages: удельное значение	commodity output: сумма, тыс. руб. (6)·(12)	Изменение остатков незавершенного производства	Товарная продукция*, тыс. руб. (10)—(14)	Изменение остатков нереализованной продукции, тыс. руб.	Объем реализации продукции*, тыс. руб. (15)—(16)
9	10	11	12	13	14	15	16	17
30	3 840	33—50	35	4 500	—	12 800	—	12 800
55	7 050	22—50	60	7 500	—	12 500	—	12 500
90	11 520	10—50	90	11 250	—	12 500	—	12 500
62	7 940	1—32	65	8 140	—	—	—	—
40	5 120	1—20	38	4 760	—	—	—	—
15	1 920	1—5	10	1 250	—	—	—	—
5	660	—	—	—	—	—	—	—
297	38 050	—	—	37 400	—	37 800	—	37 800
—	2 500	—	—	2 400	+100	2 400	—150	2 550
—	1 400	—	—	1 450	—50	1 450	—	1 450
—	1 900	—	—	1 875	+25	1 875	+50	1 825
—	550	—	—	575	—25	575	—50	625
—	1 350	—	—	1 300	+50	1 300	+100	1 200
—	1 800	—	—	1 800	—	1 800	—75	1 875
—	650	—	—	650	—	650	—25	675
—	375	—	—	375	—	375	—	375
—	150	—	—	150	—	150	—	150
—	225	—	—	225	—	225	—	225
—	36 025	—	—	35 300	—	45 650	—	45 875

Key: 9--advance of completion, %; 10--gross product, 1000 rubles; 11--stage number; 12--proportional amount; 13--total, 1000 rubles (6)·(12); 14--change in balance of incomplete production; 15--commodity output*, 1000 rubles (10)-(14); 16--change in balance of unsold product, 1000 rubles; 17--volume of product sales*, 1000 rubles (15)-(16).

* Calculation formula valid only for nonshipbuilding products.

Table 3

Summary Schedule for Building of Refrigerator Vessels

a Номер технологического этапа	b Краткое содержание этапа	c Удельное значение трудоемкости	d Нарастание трудоемкости судна	e Номер укрупненного этапа	f Удельное значение укрупненного этапа	g Нарастание трудоемкости укрупненного этапа	h Сроки постройки по кварталам и порядковый номер судна															
							I			II			III			IV						
							Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
1	Обработка металла	8	8	1-4	8	8	№11											№13				
2	Узловая сборка	10	18	5-9	9	17							№12									
3	Сборка секций	12	30	10-15	11	28																
4	—"— блоков	10	40	16-20	10	38				№10			№11					№12				
5	1-я позиция на стапеле	12	52	21-26	12	50																
6	2-я позиция на стапеле	13	65	27-32	15	65				№9			№10					№11				
7	1-я позиция на плаву	15	80	33-41	16	81																
8	2-я —"—	15	95	42-49	14	95					№8				№9				№10			
9	Сдача судна	5	100	50	5	100																
	total	100			100																	

Key: a--number of production stage; b--brief description of stage; c--proportional amount of labor intensiveness; d--increase in completion of vessel; e--number of payment stage; f--proportional amount of payments; g--increase in completion of payments; h--building times by quarters and vessel number; 1--metal working; 2--part assembly; 3--assembly of sections; 4--assembly of units; 5--first position on ways; 6--second position on ways; 7--first position afloat; 8--second position afloat; 9--delivery of vessel.

them is 35 percent of the current price of the vessel. These data are shown in columns 11 and 12. By multiplying the current price of the vessel (12.8 million rubles) by the proportional amount of the payments to be made (35 percent), we obtain a volume of commodity output for this vessel of 4.5 million rubles (see column 13). Since the vessel is to be brought up to 100 percent completion, then its cost according to the current price is shown in column 15 "Commodity Product" and simultaneously in column 17 "Volume of Product Sales," since for the vessels the moments of sale and the inclusion of the vessel in commodity product occur simultaneously, upon the signing of the act of acceptance for the vessel.

In an analogous manner, the indicators are inserted in the plan for the building of all other ships given in the summary schedule.

The plan indicators are formed somewhat differently for the production of nonshipbuilding products of the enterprise.

The order portfolio for products to be supplied under interplant cooperation is formed from the orders of other shipbuilding enterprises and these are drawn up by them on the basis of the known existing specialization. The order portfolio for the MZK products includes scores and hundreds of types. For this reason, to avoid a cumbersome plan, these products are usually indicated under one common name of "MZK products," but appended to the plan is a detailed breakdown of the entire product range with the indicating of the quantity, price and quarterly delivery date for each product (ship set).

The production plan is formed in the same manner for the products which are delivered under intersectorial cooperation and for the frames of tractor trailers.

The plan for the production of consumer goods is completely set by the ministry proceeding from the principle of its annual growth for the maximum possible satisfaction of consumer needs.

In calculating the volume indicators for nonshipbuilding products, individual calculations are used to determine the change in the balances of incomplete production and unsold product. These calculations are carried out for each product group of the enterprise, and their results are taken into account in determining the amount of commodity and gross product. As a rule, these changes in the balances are not shown separately in the plan for the production and sales of products, but they are in the given example (see Table 2, columns 14 and 16).

From the example of the MZK products it is possible to see how the amount of the volume indicators is set considering changes in the balances of unsold product and incomplete production.

First of all, on the basis of the delivery contracts for these products, the sales volume is determined, some 2.55 million rubles (see the table, column 17). By a separate calculation the change is shown for the balance of unsold MZK products, that is, the products at the enterprise warehouse or dispatched but not paid for, considering the clearing dates. Let us assume that these balances have declined by 150,000 rubles. The result of this calculation is shown in column 16. The commodity product for the MZK equals the sales volume plus (minus) the change in the balance of unsold product. In the given instance, commodity product equals 2.4 million rubles (2,550 - 150). Analogously to this, the gross product for the MZK products (see column 10) equals the volume of commodity product plus (minus) the change in the balance of incomplete production. If these balances have increased by 100,000 rubles (see column 14), then the gross product for the MZK equals 2.5 million rubles (2,400 + 100). The amount of the change in the balances of incomplete production is set by a separate calculation.

24. The procedure for working out the shop production plan. The initial materials for working out the shop production plans are the plant production program, the summary shipbuilding schedule and the registers for the planning and accounting units for building the ships as these indicate the degree of participation by each ship in building a vessel of the given design.

The ways shop participates in the fourth, fifth and sixth production stages of building the refrigerator vessels, in carrying out its work in assembling the units and in two positions of the ways assembly of the hulls. On the basis of this from the summary shipbuilding schedule (see Table 3) it is established that during the year the ship should participate in building vessels from No 9 through No 12, of which two vessels should be delivered to the orderer and for this reason be the most important product range of the shop.

At the start of the year vessel No 9 is 40 percent complete in terms of the work of the ways shop. Since it should be delivered to the orderer, the completion of the vessel by the end of the year is 100 percent, and the advance of completion is 60 percent. The gross product of the shop for this vessel is determined by multiplying the advance of completion by the total value of the shop's work in comparable prices. This is 2.1 million rubles (0.60 x 3,500). In a similar manner the volume of gross product is determined for the planned labor intensiveness.

The ways shop by its work provides the receipt of 17 payments by the enterprise for each vessel from the 16th through the 32d stage (Table 3). For vessel No 9 during the year being planned, payments from No 22 through No 32 were to be received, and the proportional amount of them is 25 percent of the current price of the vessel. With a current price of 12.5 million rubles, the commodity output of the ways shop for vessel No 9 will be 3.13 million rubles.

As was pointed out, the planning and accounting unit of a shop for commodity product is the volume of work in terms of completed shop-stages. Of the three shop-stages which the ways shop has for each vessel, on vessel No 9 the shop should complete the work for two shop stages (on the first and second ways positions). The value of the two shop-stages, for example 3.1 million rubles, is the commodity product of the shop.

In an analogous manner, the amount of work is determined for the remaining vessels, and the overall total is estimated for the indicators of the shop shipbuilding program.

The ways shop, as a rule, does not participate in the work of the plant of manufacturing nonshipbuilding products. For this reason the range of its work, in addition to the shipbuilding program, may include work only in manufacturing fittings for the prototype vessel and for internal plant circulation.

25. Planning nonshipbuilding orders and ship repairs. The nonshipbuilding orders are planned on the basis of the production plan of the work and an estimated costing for each order. From these documents the labor intensiveness and cost of the work are determined for each shop involved in manufacturing the order as well as for the enterprise as a whole.

The beginning and end of carrying out the work are set in accord with the directive or contractual dates. For large nonshipbuilding orders, a schedule is drawn up for carrying out the work relating to the order, and for series orders a starting-up and output schedule. The total output volume for nonshipbuilding products for the period being planned is expressed in wholesale prices and labor intensiveness. The nonshipbuilding orders (including products for interplant cooperation) with a manufacturing cycle of over 3 months are broken down into planning and accounting units for the purposes of planning and operational accounting of the gross product for the shop and the enterprise.

The accounting of gross product for a previously stipulated range of nonshipbuilding orders is carried out on the basis of special monthly account statements which determine the gross product as the algebraic total of commodity product with a change in the balance of incomplete production in the sholesale cost.

Auxiliary production is planned for the following sections: a) major overhaul and medium repairs on equipment; b) the demand for tools and universal fittings; c) the output of product from the power shop; d) the work of the transport shop and floating equipment.

The fulfillment of plans for auxiliary production is worked out and accounted for by the corresponding enterprise services using the current provisions.

Work related to the manufacturing of fittings (special tools, special attachments, models and dies) for building the prototype and series vessels are

planned under a separate fittings order. The value of manufacturing the fittings is included in the price of the prototype vessel. With the partial or complete manufacturing of fittings, after the delivery of the prototype vessel, the cost of the fittings is incorporated in the cost of the subsequent series vessels.

Expenditures on fittings are planned and accounted for as follows: for gross product in terms of the completeness of the individual articles or structural assemblies of the fittings (apart from the percentage of the advancement of the vessel's completion); for commodity product, simultaneously with the delivery of the prototype vessel in the cost of which the fittings have been included.

Ship repairs after the establishing of the range and volume of work on the basis of the flaw detection lists and statements are broken down into planning and accounting units. After this the ship repairs at a shipbuilding enterprise are planned and accounted for analogously to the planning and accounting of the building of new vessels.

26. Economic analysis of the fulfillment of the production program. The basic tasks of analyzing product production and sales during the report period include: a) assessing the degree of tautness in the plan; b) assessing the level of plan fulfillment and determining the amount of deviations; c) assessing the influence of the individual units of the enterprise and the individual aspects of its operations on the results of plan fulfillment (deviations); d) the drawing up of conclusions and proposals on using reserves in ensuring the fulfillment of taut plan quotas in subsequent periods.

Economic analysis is carried out by employing various methods. The main ones are the comparison method and the breakdown method.

The *comparison method* consists in comparing the actual amount of a specific indicator with the planned amount or with the actual amount of this indicator in a previous period or for the corresponding period in the preceding year, as well as with the corresponding operating indicators of other enterprises (shops or sections). For example, the actual amount of the shop's gross product for March 1976 (hypothetical figures) was 1,583,000 rubles with a plan of 1,530,000 rubles, in February 1956, the gross product of the plan was 1.5 million rubles, and in March 1975, 1.48 million rubles. By the comparison method for these data, the following preliminary conclusions can be drawn:

1) In March 1976, the shop overfulfilled the plan for gross product, as the percentage of fulfillment for the monthly plan was:

$$(1583 : 1530)\ 100 = 103.5\%;$$

2) The shop increases product output, since in relation to February 1976, the increase in gross product equaled:

$$(1583 - 1500) : 1500 \cdot 100 = 5.5\%;$$

and in relation to the corresponding period of 1975 (to March 1975):

$$(1583 - 1480) : 1480 \cdot 100 = 7\%.$$

By the comparison method it is possible to establish how the plan was fulfilled for a specific indicator, and what its dynamics was in comparison with other periods. But it is still impossible to draw final conclusions on the basis of this method, since it makes it possible to see only the external aspect of the question, and does not provide an answer to the main questions in economic analysis as to from what and under the influence of what factors the corresponding results have been obtained.

The breakdown method is the basic one in analytical work, as it provides an understanding of the basic factors behind various positive or negative changes in work, that is, it provides an understanding of the internal economic essence of the given phenomenon. Using this method in the course of analysis, the examined indicators are broken down into their component parts, each of which is analyzed separately, its influence on the indicator as a whole is established, and the reasons for this influence and the place of their manifestation are ascertained. Let us examine the previous example which involves an analysis of the fulfillment of the gross product plan by a shop, in using the breakdown method. For this, in addition to the data on gross product, let us take the following indicators: The range of the shop's production program, the labor intensiveness of the product, and the number of working days.

The range of the shop's production program according to the plan and by actual fulfillment is given in Table 4.

Having broken down the fulfillment of the shop's gross product plan into the individual product types (two designs of vessels and other work), we learn that the work range plan was not fulfilled and the overfulfillment of the gross product plan by 3.5 percent was achieved by a substantial overfulfillment of the work plan for the A design vessel. The nonfulfillment of the work range plan is a negative fact in the shop's operations.

By subsequent analysis it is possible to establish what was the cause of this nonfulfillment: either a consequence of the delayed supply of the ways shop with the products from other enterprise shops for the B design vessel, because of which the shop was forced, to avoid worker stoppages, to have them work on the A design vessel, or as a result of the reorganization of the shop's operations. Let us now examine how the given structural shift influenced the actual results of the shop's operations for gross product. For ascertaining this influence it is essential to break down the labor intensiveness of the shop's production program (see Table 4).

Table 4

Shop report plan for gross product and labor intensiveness for March 1978
(for consolidated product range, figures hypothetical)

№ п/п	type of product	estimate of product unit		plan			report			plan fulfillment, %	
		1000 R	1000 norm/hr	a Продвижение технической готовности, %	b Валовая продукция, тыс. руб.	c Трудоемкость работ, тыс. норм-ч	a Продвижение технической готовности, %	b Валовая продукция, тыс. руб.	c Трудоемкость работ, тыс. норм-ч	b Валовая продукция, тыс. руб.	c Трудоемкость работ, тыс. норм-ч
1	A-design ships	3000	210	30	900	63	33	990	69,3	110	110
2	B-design ships	1920	300	25	480	75	23,4	450	70,2	94	94
3	other work	—	—	—	150	30	—	143	28,6	95,3	95,3
	total	—	—	—	1530	168	—	1583	168,1	103,5	100,06

Key: a--advance of technical completion, %; b--gross product, 1000 rubles; c--labor intensiveness of work, 100 norm/hours.

Having studied the report plan for the labor intensiveness of the production program, it is possible to be certain that the vessels of the A and B designs have a differing "advantage" in terms of the amount of gross product per norm-hour:

a) In building an A design vessel for each planned norm-hour there are 14.3 rubles (3 million rubles : 210,000 norm-hours);

b) In building vessels of the B design, the cost of one planned norm-hour is 6.4 rubles.

Thus, if in fulfilling the gross product plan for vessels of the A plan by 110 percent and for vessels of the B plan by 94 percent the total plan fulfillment as a whole is 103.5 percent, then in the labor evaluation the situation with the fulfillment of the plan changes substantially, and is just 100.06 percent. This means that in practical terms the plan has been just fulfilled. Here the significant overfulfillment of the plan by the shop (by 3.5 percent) is a consequence of a product range "shift" within the composition of the actually performed work in comparison with the plan. In the given instance this shift has occurred toward the material intensive and "advantageous" product (the A design ships): the plan for the ships of the A design was overfulfilled by 10 percent, but was not fulfilled for the labor-intensive and "disadvantageous" products (for the vessels of the B design and for other work).

Above, in using the comparison method, it was established that in March the shop increased product output by 5.5 percent in comparison with February 1976, but in comparison with the corresponding period of the previous year (with March) by 7 percent. On the basis of these data a preliminary conclusion was drawn that the shop is increasing product output. Let us check the correctness of this preliminary conclusion in using the breakdown method.

The three compared months contained a different number of work days: 23 days in March 1976, 21 in February 1976, and 22 in March 1975. Let us determine the average daily output of gross product. It was:

In March 1976, 1583 : 23 = 68,700 rubles;
In February 1976, 1500 : 21 = 71,500 rubles;
In March 1975, 1480 : 22 = 67,300 rubles.

The data on the average daily output of gross product fully refute the tentative conclusion that in March the shop increased product output in comparison with the previous month. Formally the product volume in March was 83,000 rubles more than in February, but this was a consequence of a circumstance which did not depend upon the shop, namely there were two more working days in March than in February. In actual terms the average daily output of gross product in March was 3.9 percent less than in February:

$$\frac{68.7 - 71.5}{71.5} \cdot 100 = -3.9\%.$$

As for the increase in product output in comparison with March 1975, this was actually affirmed, but not to the same degree as this was tentatively assumed. According to the preliminary estimate, this increase was 7 percent, but considering the number of work days, just 2.8 percent:

$$\frac{68.7 - 67.3}{67.3} \cdot 100 = 2.8\%.$$

From an analysis of the fulfillment of the production program, the following conclusions can be drawn:

1. The plan of March 1976 in terms of gross product was formally fulfilled by 103.5 percent, but here the plan for the work range was not fulfilled. The structural shift which occurred toward the "advantageous" jobs was the basic factor providing the fulfillment of the plan for gross product by 103.5 percent. The related calculation made for the planned and actual labor intensiveness of the production program showed that the shop plan was fulfilled by just 100.06 percent in terms of its labor measurement.

2. In comparison with February 1976, the volume of the shop's gross product in average daily terms declined by 3.9 percent, and in comparison with March 1975, it increased but only by 2.8 percent, and this was clearly insufficient.

3. An evaluation of the shop's work for March 1976 cannot be considered satisfactory.

The given example of analyzing the fulfillment of a shop production program provides a concrete notion of the methods of analytical work and the sequence of carrying it out. An analysis is made in approximately the same manner for the other aspects of the production and economic activities of the enterprise and its subdivisions.

In shipbuilding, the most important indicators in the analysis are: the duration the ships are on the ways, the coefficient for the use of the shipbuilding berths and outfitting quays, the coefficient for rhythmical product output, and so forth.

27. The rhythmical coefficient. In evaluating the operations of the basic production shops, the rhythmicalness of their operation during the month is considered. By the rhythmicalness of production one understands the steadily repeating fulfillment of the same or increasing amount of work stipulated by the production program on the part of each enterprise subdivision (section or shop). The indicator of rhythmicalness is expressed by the rhythmical coefficient which is determined by the ratio of the actual fulfillment of the volume of work (in the established units of measurement) in a finite planning period (month, 10-day period, day, shift or hour) to the plan quota, and an overfulfillment of the quota is not taken into account.

Rhythmical work under shipbuilding conditions means even work during the month to produce the gross product. Rhythmicalness (evenness) of production in shipbuilding during the month (considering the particular features of the employed planning and accounting units) is assessed on the basis of the data for the 10-day periods using the formula:

$$K_r = \frac{\Sigma D}{\Sigma D_a},$$

where K_r--the rhythmical (evenness) coefficient;
D_a--the actual fulfillment of the plan for the 10 days, %;
D--the actual fulfillment of the plan for the 10 days, not counting overfulfillment, %.

The use of the given formula is illustrated by the example given in Table 5.

Table 5

Data for Calculating Rhythmical Coefficient for the Month for a Shop
(figures hypothetical)

Indicators	Unit	10-Day Periods			ΣD_a, ΣD
		1	2	3	
1. Gross product plan	norm-hour	150,000	150,000	150,000	--
2. Report	norm-hour	135,000	140,000	170,000	--
3. Actual fulfillment D_a	%	90	93	113	296.0
4. Actual fulfillment of plan for 10 days not counting overfulfillment D	%	90	93	100	283

$$K_r = \frac{283}{296} = 0.96$$

28. Systems of planning and accounting units. For intershop operational planning for production and accounting of the fulfillment of the work plan at shipbuilding enterprises, a system of planning and accounting units (PUYe) is used and these units characterize a certain amount of work related to building the ship as expressed in norm-hours.

The system of planning and accounting units for building a ship reflects the production sequence in the passage of the individual structural elements of the vessel through the stages of the production process. The planning and accounting units used for planning the commodity product of the shops and

its cost are called the basic PUYe. The basic PUYe are chosen depending upon the dimensions, displacement, design features, cost, series run and duration of building the vessels. Here the decisive criteria for selecting the basic PUYe are: a) the duration of the complete fulfillment of work within the volume of the given PUYe should not exceed 1 or, as an exception, 2 months; b) the presence (possibility) of working out the initial documentation for planning the costs of the given PUYe (lists of materials, semi-finished products, purchased products, labor intensiveness and wages); c) the possibility of mechanized bookkeeping of product costs for the expenditure stages broken down for the selected basic PUYe.

With the simultaneous building of several designs of vessels at the enterprise, a basic PUYe can be established for each of them. With a varying proportional contribution of the enterprise shops in the labor intensiveness of the work on the vessel as a whole or for the production stages, various PUYe can be set as the basic PUYe for the vessels of one design for the different shops. In accord with this, at the enterprises of the shipbuilding sector, as the basic PUYe, the following are used: Shop-vessel, shop-stage, group-shop-stage, and production set.

A *shop-vessel* is employed, as a rule, for shops with a small proportional amount of work in building the ship, when the duration of the work does not exceed 1 month. In this instance in planning and accounting for costs, expenditures for the shop-vessel are incorporated in that production stage the work of which predominates in the given shop.

A *shop-stage* is a component of the production stage, representing the volume of work done by one shop-section in the total volume of work relating to the production stage. The shop-stage, as the basic PUYe (payment PUYe) is employed for shops for which the duration of work relating to the shop-stage does not exceed 1-2 months.

A *group-shop-stage* is a component of the shop-stage bringing together into groups the primary PUYe (production sets) for one design section of the vessel. A group-shop-stage as a basic PUYe is employed for shops where there is a very significant volume of work relating to the shop-stage.

A *production set* is an aggregate of similar jobs performed by one shop section (desirably by one foreman) in a strict production sequence and within the limits of the time for carrying out the production stage. A production set is the primary PUYe of the group-shop-stage for one design section of the vessel, and is carried out without production breaks.

For planning the MZK machine building and other nonshipbuilding products, it is recommended that a machine-set be used as the basic PUYe. A *machine set* is the name given to the amount of work of each shop for the range of parts (assemblies) assigned to it in the quantity required for a product or batch of products relating to one order.

Detailed instructions on the procedure and sequence for working out the PUYe are given in the basic provisions on breaking down the work into PUYe in building the vessels.

CHAPTER 4: THE ORGANIZATION AND PLANNING OF WORK OF THE ENTERPRISE AUXILIARY SHOPS (SERVICES)

A. Maintenance Service

29. The system of planned preventive repairs (PPR). The PPR system lies at the basis of organizing repairs and maintenance on equipment, and this is a complex of diverse jobs relating to technical maintenance and repair on equipment and carried out according to a previously compiled plan for the purpose of preventing premature wear and emergency equipment failures as well as for maintaining the equipment in a working state.

The PPR system includes: a) routine maintenance on the equipment such as lubricating, cleaning and wiping, that is, work done during each shift by the production workers themselves; b) maintenance between repairs which is the inspecting and adjusting of equipment, the eliminating of minor defects, the adding of oil to tanks and other jobs performed by the machinists, electricians, lubricators and production workers on duty; c) inspections or testing for precision, the washing out of assemblies and parts, and the changing of oil in lubricating systems, minor repairs, ascertaining the amount of work in forthcoming repairs to be performed by special schedules of the department of the chief mechanical engineer; d) planned repairs which differ in their scope and periodicity and are performed by specialized brigades from the shops or repair bases which are under the chief mechanical engineer.

30. Types of planned repairs on equipment. Planned repairs in the PPR system include: Minor repairs, medium repairs and major overhauls.

Minor repairs is the name given to the type of repairs whereby individual worn out parts are replaced, fastenings are tightened, mechanisms are adjusted, oil is changed and other analogous jobs are performed.

Medium repair includes the partial disassembly of the equipment, a major overhaul of individual assemblies and mechanisms, the replacing of worn out parts, assembly and adjustment of the equipment for precision.

Major overhaul is the greatest repair in terms of scope and complexity during which the equipment is completely disassembled and all the worn out parts and units are replaced.

Unplanned repairs which arise because of equipment failures or other reasons are carried out under a separate schedule and list of work.

Expenditures on maintenance between repair and minor repairs are covered from current (operating) expenses, and those for medium repairs and major overhauls from amortization deductions. Expenditures on equipment modernization, if these are not covered by amortization deductions, are paid from the production development fund.

All repair work is carried out at the time intervals established by the PPR system or the periods between repairs (the period between two planned repairs).

The period of a unit's operation between two major overhauls (or from the moment of installation to the first major overhaul) is termed the repair cycle. The period of operating a unit (equipment) between repairs and a planned inspection (or between two inspections) is called the inspection period. The quantity and alternation of repairs and inspections in the repair cycle is called the cycle structure and this is strictly controlled for the corresponding equipment groups. Certain types of repair cycle structures are given in Table 6 as an example.

Table 6

Types of Repair Cycle Structures

Equipment	Alternation of Repairs	Number of			
		Repairs			Inspections
		Major	Medium	Minor	
1. Metal cutting weighing up to 10 tons	K-O-M-O-M-O-C-O-M-O-M-O	1	2	6	9
Same, produced since 1967	C-O-M-O-M-O-C-O-M-O-M-O-K	1	1	4	6
2. Presses: mechanical and friction	C-O-O-M-O-O-M-O-O-C-O-O-M-O-O-M-O-O-C-O-O-M-O-O-M-O-O-K	1	2	6	18
Hydraulic	K-O-O-M-O-O-M-O-O-M-O-O-C-O-O-M-O-O-M-O-O-M-O-O-K	1	1	6	16
3. Molding machines with a capacity up to 300 kg	K-O-O-M-O-O-C-O-O-M-O-O-K	1	1	2	3

Note. K--major overhaul, C--medium, M--minor, O--inspection. The numbers of the same types of repairs in the repair cycle are shown by the figures.

31. Standards of the PPR system. The basic standards for the PPR system are: The repair cycle, the repair period, the inspection period, labor intensiveness of repairs, and maintenance between repairs.

The duration of the repair cycle, the repair and inspection periods is set for each equipment group depending upon the number of hours or shifts worked by it. When records are not kept at the enterprise for the hours worked, the designated standards are set by the calendar time for the operating of the equipment (machines) considering its use factor in time or any other equivalent amount characterizing the number of working hours of the equipment.

For determining the duration of the repair cycles, the repair and inspection periods, the data of the sectorial standards are used, and if these are absent, the YeSPPR standards.[1]

The PPR system also provides for the use of the corresponding labor and material standards. For these purposes each equipment model is described by a category of repair complexity and this depends upon the design and operating features of the given equipment, and establishes its complexity category in relation to the accepted standard.

For planning calculations of the volume and labor intensiveness of repairs, along with the repair complexity category, the concept of a "repair unit" is employed and this is designated by r. The repair unit represents the labor intensiveness of repairs on a unit of the first repair complexity category, that is, R. For an individual unit, the repair complexity category R and the number of repair units r corresponding to this unit coincide.

Repair complexity categories have been established for all the basic models of production and materials handling equipment and these are given in the corresponding YeSPPR tables.

The labor intensiveness rates for all types of repairs on production and materials handling equipment per unit of repair complexity, as used at shipbuilding enterprises, are given in Table 7.

The standards for maintenance between repairs are worked out in terms of a certain type of production or types of equipment. They indicate the number of repair units which can be served by one worker (machinist, lathe operator, repairman, oiler, and so forth) on a work shift. The standards for

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[1] "Yedinaya Sistema Planovo-Predupreditel'nogo Remonta i Ratsional'noy Ekspluatatsii Tekhnologicheskogo Oborudovaniya Mashinostroitel'nykh Predpriyatiy (YeSPPR)" [Unifired System of Planned Preventive Repairs and the Rational Operation of Production Equipment at Machine Building Enterprises (YeSPPR)], Moscow, Mashinostroyeniye, 1967.

Table 7

Time Rates per Unit of Repair Complexity (in hours) for Production and Materials Handling Equipment

Work	Types of Repair and Work for Technical Maintenance						
	a	b	c	d	e	f	g
Machining	0.35	0.4	1.0	0.75	4.0	16.0	23.0
Turning	--	--	0.1	0.1	2.0	7.0	10.0
Other (painting, welding and so forth)	--	--	--	--	0.1	0.5	2.0
Total	0.35	0.4	1.1	0.85	6.1	23.5	35.0

Key: a--Washing; b--Accuracy check; c--Inspection before major overhaul; d--Inspection (plan); e--Minor repair; f--Medium repair; g--major overhaul

Notes: 1. The rates are given for equipment which has been operated less than 20 years. For equipment which has been in use over 20 years, the rates for performing machining and turning work can be increased by 10 percent. 2. The rates for turning work provide for the production of stair parts manufactured centrally within the limits of up to 10 percent of the total consumed quantity; in obtaining from outside over 10 percent of the total consumed number, the rates should be correspondingly reduced. 3. For forging and stamping equipment above 5 tons, with the absence of permanent materials handling equipment in the shop (cranes, jibs, and so forth) which can handle the assembly of equipment parts and units, the time standards per repair unit for machining work can be increased by 20 percent.

maintenance between repairs for series and single-unit types of production per worker per shift are given (for consolidated calculations of the number of auxiliary workers) in Table 8.

32. The organization of repairs on production and materials handling equipment. The organization of repairs at an enterprise requires the carrying out of the following measures: 1) compiling the specifications for replacement parts and units indicating their quality characteristics and number per unit; 2) the working out of blueprint albums for replacement parts to be manufactured and repaired at the enterprise (for the types of equipment); 3) the elaborating of production methods for replacement parts for carrying out repairs; 4) preliminary manufacturing and receiving through centralized supply of spare parts and the organizing of their storage; 5) establishing the required standards of planned preventive repairs (in the absence of standard ones); 6) the working out of instructions

Table 8

Standards for Maintenance between Repair for Production and Material Handling Equipment per Worker per Shift for the Conditions of Series and Individual Types of Production

Equipment	Lathe Operators	Machinists	Oilers	Saddlers
	Standard in repair units			Standard in physical units of equipment*
1. Metal cutting:				
a) Light and medium (except automatic and semiautomatic machines)	1,650	500	1,000	300
b) Automatic and semiautomatic machines	1,650	400	900	300
c) Heavy and special-made	900	350	500	200
2. Mechanical (automatic lines)	1,350	350	900	--
3. Woodworking	1,350	250	450	150
4. Foundry	750	150	500	250
5. Forging	900	200	500	250
6. Press	1,350	300	600	300
7. Materials handling	350	200	--	--

*Equipment using belt drives.

Notes: 1. In mass and large-series production the standards for maintenance between repairs can be reduced by 15 percent. 2. For grinding and sharpening machines and other equipment using abrasive, the standards can be reduced by 5 percent. 3. For equipment operated over 20 years, the standards can be reduced by 10 percent.

on equipment maintenance and the carrying out of repairs; 7) the compiling of flaw lists and costings for the types of repairs and type of equipment.

For consolidated planning of the length of stoppages (for metal cutting, woodworking, forging-stamping, foundry and materials handling equipment) during repairs, the standards recommended by the PPR system (Table 9) can be used.

Table 9

Standards for the Duration of Equipment Stoppages in Repairs (in days) per Unit of Repair Complexity

Types of Work	Standard for All Equipment* with the Work of a Repair Brigade		
	One Shift	Two Shifts	Three Shifts
Accuracy check as independent operation	0.1	0.05	0.04
Minor repair	0.25	0.14	0.10
Medium repair	0.6	0.33	0.25
Major overhaul	1.0	0.54	0.41

*Metal cutting, woodworking, forging-stamping, foundry and materials handling.

33. The planning of repairs. The initial base for working out the long-range, annual and operational (quarterly and monthly) equipment repair plans are the standards of the PPR system.

The basic document for the long-range repair plan is the plan schedule drawn up for the entire repair cycle. For heavy and special-made production equipment, in the long-range plan schedule they show separately each unit of equipment, and for the remainder it is possible to give total data for the type of equipment (Table 10).

The data of the long-range plan schedule are used for determining over the long run the number of workers, the quantity and range of machines engaged in repairs and manufacturing spare parts for the production equipment.

The annual calendar plan for equipment repairs is a component part of the enterprise tekhpromfinplan (Table 11). On the basis of it each month (or quarterly) for each subdivision of the repair service, an adjusted operational equipment repairs plan is drawn up.

The adjusted operational plans which establish the specific dates for putting the equipment in repair and the time of equipment stoppages should be approved by the services of the chief production engineer and operational productional planning to avoid lapses in the fulfillment of the production program by the enterprise.

The planning technical and economic indicators used in the PPR system are determined by calculation (Table 12).

Table 10

Five-year schedule plan for equipment repairs (figures hypothetical)

equipment	1976				1977				1978				1979				1980			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1. Уникальное и тяжелое	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Парогидравлический пресс	—	—	—	—	—	—	—	—	к/29	—	—	—	—	—	—	—	—	—	—	—
3. Расточной колонковый станок Д/III 250 мм и т. д.	—	—	—	к/28	—	—	—	—	—	—	—	—	с/18	—	—	—	—	—	—	—
total																				
I. Металлорежущее			к 40/500 с 50/350			к 36/400 с 60/450				к 65/650 с 80/350				к 25/550 с 55/500				к 50/550 с 56/400		
II. Кузнечно-прессовое			к 20/250 с 15/100			к 25/300 с 20/200				к 18/230 с 18/210				к 12/210 с 22/200				к 25/300 с 16/130		
total																				

Note: The numerator gives the type of repair and quantity, the denominator shows the down time in calendar days.

Key: 1--unique and heavy; 2--steam hydraulic press; 3--column boring machine, spindle length 250 mm, and so forth; I--metalcutting; II--forging-stamping.

Table 11

Annual schedule plan for the repair of equipment in shop for 1978 (figures hypothetical)

1	2	3	4	5											6			7	8	
Инвентарный номер	Наименование оборудования и модель	Категория сложности	Дата и вид последнего ремонта	Виды ремонтных и профилактических работ, их трудоемкость, норма-ч											Всего работ, норма-ч			Простои в рабочих днях	Место выполнения капитального среднего ремонта	
				I	II	III	IV	V	VI	VII	VIII	IX	X	XI					ремонтно-механический цех	цеховая ремонтная база
															9	10	11	12	13	
970	14 Токарный шестишпиндельный автомат 1225-6 и т. д.	21	$\frac{M}{VIII-77}$	—	—	—	$\frac{C_1}{493}$	—	—	—	—	—	—	$\frac{M_3}{128}$	420	189	12	6.9	×	—

Notes: 1. The letters M and C designate, respectively, minor and medium repairs. 2. Figures indicate total expenditures in norm-hours on carrying out given type of repairs.

Key: 1--stock number; 2--equipment name and model; 3--difficulty category; 4--date and type of last repair; 5--types of repair and preventive jobs, their labor intensiveness, norm hours; 6--total jobs, norm-hours; 7--stoppages in workdays; 8--place of carrying out major or medium repairs; 9--mechanical; 10--turning; 11--other; 12--repair machine shop; 13--shop repair base; 1225-6 six-spindle automatic lathe, and so forth.

The planned expenditures for repairs are calculated using costing items: 1) basic materials; 2) purchased semifinished products, spare parts and articles; 3) wages of basic repair workers; 4) expenditures on the upkeep and operation of equipment; 5) shop expenditures (of the repair machine shop); 6) general plant expenses (in carrying out major overhauls and medium repairs on equipment and with a repair periodicity of over 1 year).

Table 12

Indicators for Repair Service

Indicators and Calculation Formulas	Explanation
a) Volume of repairs in units of repair complexity $N_{ru} = \Sigma n_{oi} r_i$	n_{oi}--number of units of type i equipment; r_i--complexity category of type i equipment
b) Labor intensiveness of repairs by types of repair $T_r = N_{ru} t_n$	N_{ru}--total volume of repairs (given type of repair) in units of repair complexity; t_n--calculated labor intensiveness of 1 unit of repair complexity for given type of repair, norm-hours
c) Equipment stoppages in repairs (in days) with given method and organization of repairs $D_r = \frac{HR}{phmK_1K_2}$	H--the rate of labor intensiveness for machining work per repair unit of the corresponding type of repair, hr; R--group of equipment repair complexity; p--number of simultaneously working repair workers; h--duration of work shift, hr; m--number of work shifts; K_1--coefficient for fulfillment of standards by repair workers; K_2--coefficient for use of working time

[continuation of Table 12]

Indicators and Calculation Formulas	Explanation
d) Annual consumption of repair materials (alloyed steel, steel castings, nonferrous metals and so forth) $M_a = \Sigma N_k q_k + \Sigma N_c q_c + \Sigma N_m q_m$	ΣN_k, ΣN_c, ΣN_m--the total number of repair units for equipment to undergo, correspondingly, major, medium and minor repairs during year; q_k, q_c, q_m--the material consumption rate, correspondingly, for major, medium and minor repairs on equipment per repair unit, kg
e) Planned number of repair workers by types of repair $P_r = \frac{T_r}{F_u K_f}$	T_r--labor intensiveness of all repair jobs by types of repair, norm-hour; F_u--available time fund of one average listed worker, hr; K_f--planned coefficient for fulfillment of standards
f) Planned number of workers employed in maintenance between repairs $P_o = \frac{N_{ru}}{A_m} CK_c$	N_{ru}--total volume of maintenance in repair units (ru); A_m--the planned maintenance rate in repair units; C--the number of operating shifts for equipment (units); K_c--conversion factor for the present number of workers into the listed
g) Labor productivity of repair workers engaged in carrying out medium repairs and major overhauls, in repair units $P_t = \frac{N_{ck}}{P_{ck}}$	N_{ck}--total volume of medium repairs and major overhauls, in repair units; P_{ck}--number of repair workers carrying out medium repair and major overhaul on equipment
h) Cost of repairs related to one repair unit $C_{ru} = \frac{C_r}{N_o}$	C_r--expenditures on carrying out all types of repairs, rubles; N_o--number of repair units of operating equipment

34. Ways of improving and reducing the cost of repairs. The basic ways for improving and reducing the cost of repairs are: 1) centralization of major overhauls at specialized shops (bases) and enterprises; 2) improving the level of the technical equipping of repairs by making greater use of mechanical tools; 3) creating a complete set of spare parts and the monitoring of their inventories; 4) improving the system of standards in the repair services; 5) improving planning and accounting of repairs; 6) improving material and technical supply for repairs; 7) organizing the manufacturing of spare parts without deviation from the technical requirements; 8) improving the organization of maintenance between repairs; 9) improving the systems of wages and material incentives for the repair workers; 10) working out and introducing standard and group production processes for repairs; 11) introducing internal plant economic accountability in the enterprise repair services.

B. Power Facilities

35. The PPR system in power facilities consists of technical maintenance and planned repairs on power equipment.

Technical maintenance is a range of jobs to maintain electrical equipment in a workable state during the process of operation. This is carried out during the period between two regular repairs, and is one of the chief measures to ensure the reliable and continuous operation of power equipment.

In accord with the purpose, content and periodicity of carrying out the work, technical maintenance is divided into routine and planned technical maintenance.

Routine technical maintenance is carried out by the operating personnel during work breaks without disrupting the production process, while planned maintenance is performed at the dates stipulated by the technical operating rules and by the schedules of the department of the chief power engineer (OGE).

Planned repairs in the PPR system of the power facilities are carried out in two types: routine repairs and major overhauls.

The PPR system for power equipment is organized on the basis of the rates for the duration of the repair cycle and the period between repairs.

The labor intensiveness of repairs and the amount of repair work in repair units are calculated depending upon the repair complexity category of the power equipment. The concepts of "repair complexity category" and "repair unit" are analogous to the concepts for the PPR system of the production equipment with the sole difference that for evaluating the repair of power equipment using standards to which the first category of repair complexity has been given, different units are employed. For example, for electrical

production equipment, the standard is an asynchronous squirrel-cage protected electric motor of the AZ1-4 type with a rated power of 0.6 kilowatts; for power engineering, gas, compressor and refrigeration equipment, the standard unit is a 2K-6 type centrifugal single-stage pump; for sanitation-engineering equipment it is an exhaust unit with a power of 7.0 kilowatts without dust cleaners and with not more than 10 air intakes; for communications and signaling equipment it is a six-number telephone concentrator.

An annual schedule plan for technical maintenance and repair of power equipment is drawn up using the following form:

a Шифр оборудования	b Наименование оборудования	c Инвентарный номер	d Категория сложности ремонта	Плановая сменность работы оборудования e	f Виды технического обслуживания и ремонта по месяцам												g Продолжительность ремонта, сут
					I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	

Key: a--equipment code number; b--equipment name; c--inventory number; d--repair complexity category; e--planned shift factor of equipment; f--types of technical maintenance and repair by month; g--duration of repair, days.

36. Standards and calculated indicators for the PPR system in the power facilities. For the purposes of planning and accounting for repairs, the following standards are used: a) the duration of repairs (Table 13); b) for technical maintenance (Table 14); c) for inspections and cleaning of power equipment (Table 15); d) the time of repair of electrical engineering equipment (Table 16); e) the time for repair of thermal engineering equipment (Table 17); f) consumption of spare parts (Table 18); g) basic planning indicators in PPR system for power facilities (Table 19). The estimate of expenditures on carrying out planned major overhauls on power equipment is grouped by analogous costing items of expenditures as in the PPR system for production equipment.

37. Planning the demand for power and fuel. Planning the demand of a shipbuilding enterprise for the various types of energy and fuel is based upon the balance method. The initial data for elaborating the power balances are: The production program of the enterprise, the progressive standards for the proportional consumption of energy per unit of product or per thousand rubles of gross product, the energy consumption rates for internal needs (for the production of various types of energy), the limits

Table 13

Standards for Duration of Equipment Repairs (in days) with Single-Shift Work of Repair Brigade

Repairs	Norm for Duration of Repairs per Repair Unit, days		
	Thermal power, compressor and pump equipment	Ventilating units	Electrical engineering equipment
Routine	0.41	0.41	0.445
Major	1.14	1.14	1.0

Notes: 1. The duration of repair is rounded off to a higher figure with a major overhaul up to an entire day and with routine repair up to an entire day. 2. With a complication of repairs, at the discretion of the chief power engineer, the designated standards can be increased up to 15 percent.

on the consumption of energy for operating needs (heating, lighting, ventilation and other auxiliary needs), the energy loss rates in the plant networks.

The energy balances are included in the group of the material balances of the shipbuilding enterprises, and help to organize the more efficient use of energy and fuel at the enterprise.

The demand of the enterprise for energy resources is determined for the types of energy, the parameters of the energy sources, the energy processes, the specific purpose, the consumed energy and for the objects of energy consumption. The overall formula for calculating the total demand for energy resources is:

$$\Sigma E = nN_t + E_p + E\ell + E_h + E_v + E_o + E_w + E_{ot},$$

n--the planned volume of product output (in corresponding units);
N_t--the planned consumption rate of energy for production processes per unit of product (or per thousand rubles of gross product), kilowatt-hours;
E_p, $E\ell$, E_h, E_v, E_o, E_w, E_{ot}--the consumption of energy, respectively, for power, lighting, heating, ventilation, outside delivery, losses in plant networks, and other needs.

In planning the energy resources of an enterprise, the long-range and current energy balances are used.

Table 14

Standards for carrying out work of planned technical maintenance on power equipment per worker per shift

equipment	nature of working conditions	worker profession					
		a	b	c	d	e	f
		standards, ru					
electrical engineering	clean and dry rooms	1100	--	--	--	--	--
	cold working shops & assembly shops	1100	--	--	--	--	--
	hot working shops	730	--	--	--	--	--
	woodworking shops	610	--	--	--	--	--
	equipment installed outside area	500	--	--	--	--	--
furnace lining	--	--	--	--	--	--	2000
mechanical part of furnaces	--	--	860	--	--	1100	--
thermal power equipment	cold metalworking shops, assembly and wood-working shops	--	--	1050	--	--	--
	hot metalworking and galvanizing shops	--	--	860	--	650	--
ventilating units and systems	machine shops	--	--	--	1050	--	--
	forging-pressing	--	--	--	830	--	--
	woodworking	--	--	--	710	--	--
	foundry and galvanizing shops	--	--	--	710	--	--

Key: a--electricians; b--mechanics; c--sanitary engineering mechanics; d--ventilation mechanic; e--lathe operators; f--furnace liners.

The long-range balances are drawn up for a 5-year period, and are used in planning the development of production and the power facilities of the enterprise. In compiling the long-range balances, consideration is given to the changes envisaged by the long-range production development plan in the production processes, in the production volume, the product range, in the volume and structure of subcontracting arrangements, and so forth.

Table 15

Time Standards for Inspections and Cleaning of Electrical Equipment

Equipment	Time Standards per Repair Unit, norm-hour	
	Planned Inspections	Planned Cleanings
Electrical engineering	0.2	0.3
Thermal power	4.5	--
Compressor and pump	4.5	--
Pipeline networks	4.5	--
Ventilation units	1.0	1.4

Table 16

Time Standard in Hours for Repair for Electrical Engineering Equipment

Equipment	Jobs	Time Standard in Norm-Hour per Repair Unit	
		Routine Repairs	Major Overhaul
Electrical engineering	Mechanical and other	3.5	10.0
	Turning	0.5	2.0
	Total	4.0	12.0
Electric furnaces	Lining	2.5	7.0
	Other	0.5	3.0
	Total	3.0	10.0

The current power balances are drawn up for the year with a breakdown for the quarters. These are the basic form of planning the consumption and use of power resources at the enterprise.

The most important task in working out the current power balance is to establish the planned demand of the enterprise for energy and fuel for carrying

Table 17

Time Standard for Repair of Thermal Power Equipment

Equipment	Repair	Time Standard per Repair Unit, Norm-Hour				
		All Work	Including			
			Mechanical, Facing, Rolling	Welding	Turning	Other
Boilers and auxiliary boiler equipment	Routine	16.0	10.5	1.0	3.5	1.0
	Major	40.0	26.0	2.5	9.0	2.5

Table 18

Rate of Spare Parts Expenditure on Equipment Repairs

Equipment	Standard, Rubles per Repair Unit	
	In series and small-series production	In series, large-series and mass production
Thermal engineering	10.0	10.0
Electrical engineering, communications and signaling equipment	1.0	2.0

out the production program, as well as for establishing and calculating the other technical and economic indicators in the enterprise tekhpromfinplan. The scheme for compiling a particular electric power balance for the enterprise is shown from a hypothetical example (Table 20).

The required amount of electric power for production purposes is determined by multiplying the approved consumption rate by the quantity of planned product units in the planned period.

The amount of electric power required for power processes in the planning period is determined depending upon the capacity of the engines and units installed in the shops. The annual consumption of electric power, in kilowatt-hours, for these purposes is determined by the formula:

Table 19

Basic Planning Technical and Economic Indicators in the PPR System for the Power Facilities

Indicators and Calculation Methods	Explanation
a) Planned labor intensiveness of repairs on given group of power equipment, by types of repair: Routine $T_t = \tau_t \Sigma r_t$, Major $T_k = \tau_k \Sigma r_k$	τ_t, τ_k--time rate per repair unit, respectively, for routine repair and major overhaul, norm-hours; r_t, r_k--total quantity of repair complexity units, respectively, for for routine repairs and major overhauls according to repair schedule, repair units
b) Required number of workers for carrying out work related to technical maintenance on power equipment $P_m = \Sigma r \left(\frac{K_s}{N} + \frac{\tau_o m_c + \tau_r t_r}{F_u K_f} \right)$	Σr--total number of repair units of maintained power equipment; N--the technical maintenance rate per worker, repair units (Table 14); K_s--shift coefficient for the operation of the maintained power equipment; τ_o, τ_r--time standard per repair unit, respectively, for inspection and cleaning of power equipment, norm-hours; m_o, m_r--average number of inspections and cleanings per year according to annual schedule; F_u--available time fund of worker for technical maintenance, hours; K_f--coefficient for fulfillment of standards
c) Required number of workers for carrying out planned repairs on power equipment $P_{pr} = \frac{\alpha\beta(T_t + T_k + T_m)}{F_u K_f}$	α--coefficient considering auxiliary time on repair work (becoming acquainted with specifications, receiving materials, tools and so forth); β--coefficient considering increase in amount of work on unplanned repairs (established by OGE);

[continuation of Table 19]

Indicators and Calculation Methods	Explanation
	T_t, T_k, T_m--labor intensiveness of repairs, respectively, for routine, major and modernization (carried out simultaneously with a major overhaul), norm-hours
d) Required amount of materials for planned repairs on given type of power equipment $Q_m = R_e(n_t N_t + n_k N_k)$	R_e--category of repair complexity for given type of power equipment; n_t, n_k--number of repairs, respectively, routine and major; N_t, N_k--standard for expenditure of given material per repair unit, respectively, with routine repairs and major overhauls
e) Total annual demand for given material for repair and technical maintenance of power equipment $Q_a = \alpha\beta Q_m$	α--coefficient considering consumption of material on technical maintenance (α=1-1.15); β--coefficient considering expenditure of material on unplanned repairs (β=1-1.3)

$$E_p = \frac{MF_e CK_\ell K_n}{K_{n\ell} K E_f},$$

where E_p--the annual demand of electric power for power processes in the shops, kilowatt-hours;
M--the installed capacity of the electric motors of the fleet of equipment and material handling devices, kilowatts;
F_e--the effective time fund of equipment operation, hours;
C--the number of equipment operating shifts, days;
K_ℓ--the equipment load factor (K_ℓ=0.65-0.75);
K_n--the coefficient for the simultaneous operation of equipment (0.5-0.65);
$K_{n\ell}$--the coefficient considering losses in networks ($K_{n\ell}$=0.95-0.97);
E_f--efficiency of electric motor (E_f=0.80-0.85).

The amount of electric power needed for lighting, heating, ventilating, service and other needs is determined by the standards for auxiliary services or by a direct calculation.

Table 20

Partial Electric Power Balance of Enterprise
(figures hypothetical)

Elements of Balance	Electric Power, mil. kw. hrs.	Note
Demand		
1. Effective use:		
1) for production purposes	24.3	
2) for power processes in shops	8.2	
3) for lighting	0.78	
4) for water supply	0.9	
5) for heating, ventilating and service needs	1.90	
6) for compressed air and air blast	0.55	
Total effective use	36.63	
2. Delivered outside	15.0	Construction organization
Total effective use considering delivery outside	51.63	
3. Losses at plant:		
1) in electric networks	1.10	
2) in transformers, electric motors, electric pumps, compressors	1.50	
Total losses at plant	2.60	
Total consumption	53.23	
Supply Sources		
1) Enterprise electric plant	15.10	
2) Receiving electric power from network of regional TETs	38.13	
Total delivery	53.23	

The amount of electric power planned to cover the network losses is determined on the basis of the loss rates.

The fuel balance is compiled for its individual types and a summary for the enterprise as a whole. As a consequence of the diversity of the fuel and its varying heating value, its demand in the balance is measured in conditional fuel units of 7,000 kilocalories per kilogram. Natural fuel is recalculated into fuel units using the formula:

$$E_c = \frac{Q}{7,000},$$

where Q--the lower effective heating power of the given type of fuel, kilocalories per kg (Table 21).

Table 21

Heating Value of Various Types of Fuel

Fuel	kcal/kg	Fuel	kcal/kg
Wood	2,000-2,700	Anthracite power gas	1,050
Peat	2,000-4,000	Same from coke	800
Unclean brown coal	2,500	Dry charcoal	8,000
Lump brown coal	5,000	Oil	10,000
Brown coal in pellets	4,300	Kerosene	10,800
Coke	5,500-7,200	Gasoline	11,000
Alcohol, 95%	6,700	Tar	9,500
Household gas	4,200	Coal tar	8,200-8.500
		Natural gas	8,000

38. Indicators describing power-to-labor ratio at enterprise. In the planning and analysis of the power facilities at an enterprise, indicators given in Table 22 are frequently utilized.

C. Tool Department

The basic tasks of the tool department are: a) uninterrupted supply of the shops and work areas with the necessary quantity and assortment of highly efficient tools and attachments; b) the creating and maintaining of the necessary level of complete inventories of tools and attachments at the enterprise; c) the obtaining of a high quality product by employing the corresponding production fittings and tools; d) a systematic reduction in the tool consumption rates per unit of product; e) the organizing of the repair and rebuilding of worn out tools and attachments; f) the organization of proper storage and accounting of in-coming tools; g) the organizing of daily technical supervision over the operation of the tools and fittings.

Table 22

Indicators for the Power Available to Labor and Production

Indicators and Calculation Formulas	Explanation
a) Proportional consumption of energy (fuel) for a conditional unit of end product $Y_e = E_p : Q_p$	E_p--the consumption of the energy resource; Q_p--product quantity (in accepted units)
b) Coefficient of potential power-to-labor ratio $K_{pe} = \frac{\Sigma N_w}{P_n}$	ΣN_w--total power of energy units installed at enterprise (prime movers, electric motors, electrical equipment), kilowatts; P_n--number of workers in the largest shift
c) Coefficient for planned (actual) power-to-labor ratio $K_{p\ell} = \frac{E_a}{P_{pa}}$	E_a--mechanical and electrical energy planned for consumption (actual consumption) in production, kilowatt-hours or kilocalorie; P_{pa}--planned (actual) average listed number of workers in same period or number of worked man-hours
d) Electricity-to-labor ratio	Determined in the same manner as the power-to-labor ratio with the sole difference that in the numerator one uses the power of only the electric receivers or the amount of consumed electric power
e) Coefficient of the power intensiveness (electric intensiveness) of the product $K_{en} = \frac{E_a}{Q_a}$	E_a--actually expended mechanical (electrical) energy on production, kilowatt; Q_a--amount of produced product, in accepted units (tons, pieces, thousand rubles of product, and so forth).

[continuation of Table 22]

Indicators and Calculation Formulas	Explanation
f) Coefficient of the amount of power (electricity) available to production $K_{pr} = \frac{\Sigma N_w}{C_{fc}}$	ΣN_w--total power of power (electric) units at enterprise, kilowatt; C_{fc}--value of fixed productive capital at enterprise or its component part

39. Planning the supply of tools and production fittings for the enterprise. Planning tools and production fittings encompasses the establishing of the following: a) the assortment and quantitative demand of the enterprise for tools and fittings; b) the sources for covering demand; c) the actual balances of tools and fittings at the start of the period being planned. The demand for tools and fittings is determined by the planned consumption and planable change in the circulating stock. The supply plan is drawn up in the form of a balance. It reflects, on the one hand, the demand for tools and fittings for basic and auxiliary production, experimental work, new equipment and operating needs, and on the other, the sources for covering the demand (receipt by allocation, own production, rebuilding and repairs, and actual balances at the beginning of the period being planned).

Of great importance for sound planning is the correct norming of the expenditure of production fittings and tools for the period being planned. Consumption norming provides an opportunity to establish the expendable stock of production fittings and tools for the program, and inventory norming makes it possible to set the circulating stock.

The total demand of an enterprise for tools I for the period being planned is determined for each type of tools using the formula

$$I = I_n + I_w - I_a$$

where I_n--the normed consumption fund of tools for the entire period being planned, units;
I_w--the normed circulating stock of tools, pieces;
I_a--the actual availability of the given tool at the start of the period being planned, pieces.

The calculating of the demand of the consumption fund starts by establishing the product range and the standards for the wearing out of production fittings and tools.

In mass and large-series production, the basic range of the employed fittings and tools is set from the operational flow sheets for the machining of the parts (products) and the part lists for production equipping. Under the conditions of single-unit and small-series production, the planned range of fittings and tools is set from the existing equipment and the description of the tool employed in performing typical jobs previously.

An approximate quantitative calculation of the consumption and circulating stocks of production fittings and tools needed by the enterprise for ensuring its uninterrupted operation during the period being planned can be carried out using the formulas of Table 23.

Table 23

Methods for Calculating the Demand for the Consumption and Circulating Stocks of Fittings and Tools for a Program and for Production Inventories

Methods and Calculation Formulas	Explanation
Consumption Stock	
a) Consumption of cutting tools for the program for mass and large-series production $I_{cm} = \frac{Nt_m}{T_w(1-\eta)}$	N--number of parts (products) to be processed in the planned period using the given tool, units; T_m--machine operating time of the given tool in machining one part (product), hour; T_w--operating time of tool (durability standard) until complete wearing out, hour; η--coefficient of accidental loss of tool (0.03-0.10)
b) Consumption of attachments (fittings) for program $I_{cf} = \frac{Nt_m}{T_s(n+1)}$	T_s--the service life (durability standard) of an attachment until its next repair, hour; N--acceptable number of repairs on given attachment until complete wearing out
c) Consumption stock of cutting tool (of one type) for program in individual and small-series production	T_i--the calculated number of operating hours of group i of equipment, hour; Y_{mi}--proportional amount of machine time in the work of the equipment of group i;

[continuation of Table 23]

Methods and Calculation Formulas	Explanation
$I_{cs} = \frac{\sum_{i=1}^{n} T_i Y_{mi} Y_{pi}}{T_w}$	Y_{pi}--the proportional amount of use of the given tool in the machine time of group i of equipment; n--number of equipment gruops in which the given tool is used
d) Calculated time for use of cutting tool (durability standard) until complete wearing out $T_w = (m+1)t_{st}\beta$	m--the number of possible resharpenings (determined depending upon the size of the cutting edge of the tool and the amount of its wearing down in one resharpening); t_{st}--the operating time of the tool between two resharpenings, hours; β--correction factor considering the premature wear on the tool as a consequence of the chipping of the working edge or breaking (0.80-0.85)
e) Tool consumption per thousand rubles of gross product $I_{cg} = \frac{C_t}{G_p}$	C_t--value of tool consumed during report period, including expenditures on sharpening and repair, rubles; G_p--volume of the gross product for the report period, thousand rubles
f) Consumption of abrasive tools $I_{ab} = \frac{NT_m}{T_w}$	N--number of parts (products) to be machined in plan period, units; T_m--machine time per operation, hour (minutes); T_w--time until complete wearing out of disc (taken from manual), hour
g) Coefficient for the use of cutting tools $K = \frac{\sum_{i=1}^{n} t_{ai}}{T_w n_i}$	t_{ai}--machine time actually worked using given tool for group i of equipment during report period, hour; T_w--calculated machine time for work of tool until complete wearing out according to standards, hour;

[continuation of Table 23]

Methods and Calculation Formulas	Explanation
	n_i--quantity of given tool consumed over report period for group i of equipment, units; n--number of equipment groups for which the given tool is used
Circulating Stock a) General plant tool circulating stock $I_c = \sum_1^n I_{wt} + I_{cis}$	I_{wt}--total shop circulating stocks of tools; I_{cis}--the stock of tools at the CIS [central tool store]; n--number of shops
b) Shop circulating stock for each type of tool $I_{wt} = n_{qa} + n_r + n_{tis}$	n_{wa}--quantity of the tool at work areas, units; n_r--quantity of the tool in repair (sharpening, testing), units; n_{tis}--the quantity of the tool in the operating store of the TIS [tool issuing store] (including also the reserve inventory), units
c) The quantity of the tool at the work areas $n_{wa} = rm(1 + a)$	r--the number of work areas using the given tool; m--the average quantity of tool units employed simultaneously at one work area; a--coefficient for reserve inventory (0.3-0.5)
d) Quantity of the tool in repair (sharpening, testing) $n_r = \frac{T_s}{T_p} rm$	T_s--sharpening cycle of the tool (counting from the moment replaced at the work area to its return to the storeroom), hour; T_p--periodicity of issuing the tool from the TIS to the work areas, hour;

[continuation of Table 23]

Methods and Calculation Formulas	Explanation
e) Quantity of the tool in the operating supply of the TIS (including the emergency supply) $n_{tis} = n_{con}(1 + a_k)$ or approximately 20-30 percent of the tools at the work areas	n_{con}--consumption of tool in interval between two regular deliveries from the CIS, units; a_k--coefficient for tool reserve stock at the TIS (0.2-0.3)
f) Tool supply at the CIS $S_{cis} = nc(2 + a_r)$	n--number of issues of the given type of tool from the storeroom between regular redeliveries; c--average quantity of tools for each issue by the shop issuing storeroom, pieces; a_r--coefficient for the storeroom reserve supply (0.2-0.3)

Note. As a consequence of the absence of complete data under the conditions of single-unit and small-series production, the consumption of one or another type of production fittings (tools) for the program is determined roughly in terms of the calculated number of equipment operating hours or per 1,000 rubles of gross product using the previous rates.

D. Transportation Facilities

40. Composition and classification of means of transport. Internal plant transport at a shipbuilding enterprise is a portion of its fixed productive capital, and includes the transport facilities and devices, the moving tracked and untracked means of transport, water transport and materials handling equipment (Table 24).

The chief task of internal plant transport is to provide the continuous movement of basic and auxiliary materials, parts, elements, finished products, production wastes and other freight on the territory of the enterprise in accord with the requirements of the production process.

In terms of the operating sphere, the means of transport are divided into external, intershop and intrashop. The external transport provides the link between the enterprise and the receiving-delivery points of public transportation (railroad stations, harbors and airports) and the local

Table 24

Classification of Means of Transport

Transport	External	Intershop	Intrashop
A. Continuous action: Railroad	steam locomotives, diesel locomotives, shunting locomotives, cars, gondolas, flatcars, tank cars, special cars		narrow-gauge cars
trackless	motor vehicles: traction units, tractors and various trailers		hand cars on vehicles
	--	battery operated and internal combustion engine plant trucks, loaders, trolleys	
water	tugs, launches, barges	--	
lifting mechanisms	--	lifts, railroad cranes, truck and tractor cranes	stationary, overhead and gantry cranes, jibs, mobile cranes, tackles, winches and elevators
	--	monorail tracks with hoists, electrified and hand with tackles	
B. Periodic action: Special	telfer and cableways with rope and mechanical traction		--
conveyers	--	belt, chain, plate, scraper conveyers, carriers, augers and other devices	
gravity chutes	--	interfloor chutes	troughs, slipways, trays, roller conveyers

enterprises and partners. Intershop transport handles the moving of basic and auxiliary materials, parts, elements, preassembled products and other freight between the shops, the basic warehouses and the building quays.

The intrashop transport (general shop and interprocess) is used for carrying out transport operations within the shop.

The external and intershop transport as a rule is under the enterprise transport shops, and the intrashop is under the corresponding shops. Many technical and economic indicators of the enterprise depend upon the efficient work of internal plant transport.

41. Freight turnover and freight traffic. Data on freight turnover and freight traffic are used as the basis of designing and organizing internal plant transport. *Freight turnover* is the total volume of freight moved on the territory of the enterprise, shop, warehouse and so forth per unit of time, for example, during a year, quarter, month or day. The freight turnover is the total amount of the freight deliveries, that is, the amount of freight transportable per unit of time between two receiving and dispatching points.

The freight turnover of an enterprise is divided into external and internal. The external freight turnover is comprised of the transporting of freight arriving on the territory of the enterprise and dispatched from it, while the internal is comprised of the intershop transporting of various freight.

The *freight traffic* is the name given to the quantity of freight moved in a certain direction between two points, the point of departure and destination. The calculating of the freight turnover and freight traffic starts by establishing the range and volume of freight to be transported between the corresponding subdivisions in the forthcoming period being planned.

The volume of freight to be transported is calculated for each individual freight delivery. The data on the freight turnover and freight traffic is recorded in input-output freight turnover tables (Table 25), which are drawn up for the individual shops and warehouses, and then for the enterprise as a whole. These are used as the basis for the balance of the arrival and dispatch of freight, with the exception of individual freight deliveries, when in terms of the conditions and the nature of production, the incoming freight turnover may not equal the outgoing freight turnover.

42. Selection and calculation of means of transport by freight traffic. For calculating the required amount of means of transport, all the freight to be transported for internal and external freight traffic is classified into three basic categories: Loose, liquid and piece. Each of these categories is differentiated into groups in terms of the uniformity of the requirements made upon transporting. Depending upon the nature of the freight, its weight and size characteristics, the most acceptable types of transport, rolling stock and crating are selected.

Table 25

Input-Output Matrix for Freight Turnover, tons
(composition of shops and figures not actual)

	sender	recipient 1 Станция «Заводская»	2 3 Литейный	2 4 Кузнечный	2 5 Механический	2 6 Сборочно-сварочный	2 7 Деревообделочный	8 Склад топлива	9 Котельная	10 Главный магазин	11 Склад металлолома и т. д.	total
1	Станция «Заводская»		8 000	5 000	2 800	600	1 500	13 000	—	16 000	—	47 200
2	Цех:											
3	литейный	2 000		1 400	4 000	—	—	—	—	600	500	13 900
4	кузнечный	2 000	—		3 000	1 500	—	—	—	800	300	8 600
5	механический	2 500	500	400		4 500	—	—	—	1 700	800	14 500
6	сборочно-сварочный	2 000	—	—	200		—	—	—	300	1 200	16 900
7	деревообделочный	400	150	—	—	150		—	—	300	—	2 700
8	Склад топлива	—	1 100	1 700	—	—	—		11 000	—	—	13 000
9	Котельная	—	—	—	—	—	—	—		—	—	400
10	Главный магазин	930	—	—	450	13 500	200	—	—		—	15 000
11	Склад металлолома и т. д.	800	2 000	—	—	—	—	—	—	—		2 800
	total	12 600	13 900	8 800	14 400	16 900	2 700	13 000	11 000	15 000	2 800	185 200

Key: 1--Zavodskaya station; 2--shop; 3--foundry; 4--forging; 5--machine; 6--assembly welding; 7--woodworking; 8--fuel storage; 9--boiler room; 10--chief store; 11--scrap metal storage, and so forth.

The calculation of the required amount of means of transport is carried out for the average or maximum daily freight turnover. The average daily freight turnover Q_a is determined by the ratio of the annual freight turnover to the number of working days of the transport during the year ($Q_y : D_t$).

The maximum daily freight turnover is determined considering the possible uneven arrival and departure of the freight (both during the year as well as per day) using the formula

$$Q_{max} = Q_{ak},$$

where k--the coefficient of unevenness (for outside incoming freight from 1.3 to 1.5; for freight dispatched to the outside network from 1.1 to 1.3; for internal plant deliveries from 1.0 to 1.2). The maximum daily freight turnover is used as the basis for calculating the quantity of required cars, motor vehicles, battery operated plant trucks and other means of transport. It is also the basis for determining the length of the loading and unloading fronts, for example, the length of the railroad tracks (or trestles) allocated for the unloading of incoming (in a simultaneous batch) freight in cars.

The required amount of means of transportation, rolling stock and crating is calculated using the formulas given in Table 26.

43. Planning the operation of transport shops. The system of current planning for the operation of transport shops includes: technical-economic, operational (calendar planning) and the dispatcher system.

Technical and economic planning consists in working out the annual plan for the operation of internal plant transport. This plan defines: The total freight turnover of the enterprise and the volume of freight handling work; the demand for the means of transport and cargo handling mechanisms; the required amount of materials for repair and operating needs; the number of personnel; the wage fund, the cost of transport deliveries (loading and unloading work) and the most important technical and economic indicators. The basis of the annual planning for the operation of internal plant transport is the enterprise tekhpromfinplan.

Operational (calendar) planning consists in working out the monthly or shorter-period shipping plans. The annual plans determine only the approximate shipping volumes which are later adjusted in working out the monthly and daily shift plans which are the bases for operational planning of internal plant shipments.

Daily shift plans are drawn up broken down for the individual routes and specific amounts of freight handling work indicating the types of freight, the points of departure and delivery, the time for carrying out the work, and so forth. With stable freight flows, the daily shift schedules for internal plant transport and the operation of the materials handling

Table 26

Calculation Formulas for Required Quantity of Means of Transport, Rolling Stock and Crating

Indicators and Calculation Formulas	Explanation
a) Quantity of means of transport (motor vehicles, tractors, battery operated and internal combustion engine plant trucks, and so forth) handling a certain freight flow $n_a = \frac{q_{max} t_{rt}}{F_d R_m K_\ell K_d}$	q_{max}--daily maximum freight flow, tons; t_{rt}--the time of one round trip (considering the loading time, the run in both directions and unloading), hours; F_d--the daily operating time fund of the transport equipment, hours; R_m--the capacity of a transport unit, tons; K_ℓ--the coefficient for the use of the capacity of a transport unit (established depending upon the nature of the freight (0.7-0.9); K_d--coefficient considering accidental delays in time (repairs, fueling, recharging of batteries, track failure, and so forth) (0.85-0.95)
b) Number of locomotives for each type of deliveries $n_\ell = \frac{T_\ell m_c}{F_\ell P_c K_d}$	T_ℓ--the time of one locomotive round trip, hours; M_c--the daily number of shipments calculated in cars considering capacity; F_ℓ--daily operating time fund of a locomotive; P_c--the number of cars dispatched per trip; K_d--coefficient considering accidental delays in time (0.85-0.95)
c) Number of cars for each type of delivery with around-the-clock operation $n_c = \frac{m_c T_\ell}{24 K_d}$	m_c, T_ℓ, K_d--see above; 24--number of hours in the day

[continuation of Table 26]

Indicators and Calculation Formulas	Explanation
d) Time of one locomotive round trip $T_{\ell} = t_{\ell} + 2t_{ru} + t_u + t_r$	t_{ℓ}--loading time; $2t_{ru}$--run time in both directions, considering time expenditures on station track and servicing; t_u--unloading time; t_r--reserve running time for locomotive in moving from one point to another (set as equal to the run of a locomotive with a consist)
e) The quantity of continuous transport equipment (conveyers, transporters and so forth) essential for mechanizing the given freight flow, $n_t = \frac{q_{max}}{F_t N_{pr}}$	q_{max}--daily maximum freight flow, tons; F_t--the daily time fund of the given mechanism, hours; N_{pr}--hourly productivity of the given mechanism, tons per hour
f) Quantity of production crating, in units $n_{pc} = \frac{Q_y dK}{WD_w}$	Q_y--the annual volume of the freight flow, tons; d--freight storage standard and amount of stock, days $d = d_1 + d_2$, where d_1--the freight storage standard at the enterprise warehouse, warehouse reserve in days; d_2--the size of the stock of the given semifinished product in the production shops; K--coefficient considering the crating in movement within the enterprise and under repair (K = 1.15-1.20); W--the average capacity of the crating, tons; D_w--the quantity of work days in a year

equipment are long-term standard plans. With unstable freight flows, these reflect the current demand of the enterprise for shipments and freight handling work carried out under single orders from the shops.

Table 27

Major Indicators for the Operation of Internal Plant Transport

Indicators	Calculation Method
Turnaround time of railroad cars of the fleet of the Ministry of Railroads in loading operations on sidings, hours	Planned turnaround of cars is set by contract between the enterprise and the railroad administration. Actual turnaround is the ratio of the number of car-hours on the enterprise tracks to the quantity of processed cars
Same for own fleet of cars, hours	Ratio of number of car-hours in operation to the number of car-loadings performed
Productivity of means of transport, ton-km	Ratio of ton-km carried out to quantity of transport units in working fleet
Average daily run of means of transport, km	Ratio of distance traveled by all means of transport to the quantity of transport units in the order
Fleet use factor	Ratio of the number of machine-hours in the order to the number of machine-hours of the inventory fleet
Run use factor	Ratio of number of kilometers traveled with a load to total run in kilometers (with load and unloaded)
Use factor for motor vehicle tonnage	Actual quantity of transported freight in tons divided by the product of the nominal load capacity of a transport unit and by the quantity of the trips made

[continuation of Table 27]

Indicators	Calculation Method
Use factor for operating time of intershop transport equipment	Ratio of effective operating time over accounting period to calendar time in the same period
Fuel consumption by types of machines per 100 km of run (kg or liter)	Planned--according to the current established standards or specifications data. Actual--by actual consumption per 100 km of run
Shipping costs of 1 ton-km, rubles	Total of all operating expenditures (including amortization) divided by quantity of ton-km carried out
Cost of 1 vehicle-hour, rubles of vehicle [sic]	Same divided by number of vehicle-hours in schedule
Cost of shipping 1 ton of freight, rubles	Total of all operating expenses divided by quantity of transported tons
Cost of 1 ton of freight handling work, rubles (separately for that done by hand and that by equipment)	The ratio of the total of all expenditures for freight handling work to the quantity of handled tons of freight

The *dispatcher system* consists in control over the observance of the permanent operating schedules of the means of transport, the carrying out of the daily shift quotas and the regulating of the operation of internal plant transport.

The transport activities and the degree of utilizing the means of transport are characterized by a series of technical and economic indicators, the most important of which are given in Table 27.

E. Warehouse Facilities

44. Classification of warehouse facilities. Warehouse facilities at shipbuilding enterprises are classified depending upon: a) their role

Table 28

Dates for Quantitative and Qualitative Acceptance of Product

Types of acceptance	Delivery			
	Out-of-town		Same town	
	for central regions	for distant regions	at supplier warehouses	at purchase (receiver) warehouse
Quantitative: in crating	not later than 10 days after arrival	not later than 30 days after arrival	upon receiving for gross weight of each piece and number of pieces	by number of commodity units and by weight net in each piece not later than 10 days after receipt of product
without crating	upon opening of car, container, barge, and so forth		upon receipt by number of commodity units (pieces, bales and so forth)	by quantity of commodity units at moment of turning over product
Qualitative	not later than 20 days after arrival	not later than 30 days after arrival	upon conditions of parties	not later than 10 days after receivng product

Table 29

Technical and Economic Indicators for Warehouse Facilities

Indicators and Calculation Method	Explanation
a) Planned (actual) turnover rate of materials in days $D_t = \frac{Q_{ai}T_p}{P_m}$	Q_{ai}--the established average materials stock standard, tons; T_p--the duration of the period being planned, days; P_m--consumption of the given material for period being planned, tons
b) Use factor for area (volume) of warehouse $K_u = \frac{S_u}{S_t}$	S_u--usable area of warehouse, $m^2(m^3)$; S_t--total area of warehouse, $m^2(m^3)$
c) Average load per m of warehouse (usable) area $q_c = Q_{ai} : S_u$	See above
d) Natural loss of material $Y_m = \frac{(P_r + P_b)T_a Y_n}{100T_{st}}$	P_r--consumption of material over report period, ton; P_b--balance of given material at given date, ton; T_a--average storage period, months; Y_n--measurement of loss (by natural loss rates), %; T_{st}--storage life for which the natural loss rate is set, months
e) Annual operating expenses (costs) for internal warehouse handing of 1 ton of material $C_t = \frac{C_a}{Q_t}$	C_a--total annual operating expenses, rubles; Q_t--quantity of processed (loaded, unloaded) material during year, tons
f) Total annual operating expenses $C_a = W_a + P_e + P_m + A_m + P_r + A_w$	W_a--annual expenditures on basic and supplementary wages and social security deductions, rubles;

[continuation of Table 29]

Indicators and Calculation Method	Explanation
	P_e--annual expenditures on electric power (fuel), rubles; P_m--expenditures on zuxiliary materials, rubles; A_m--annual deductions for amortization of machines and equipment, rubles; P_r--expenditures on routine repair of machinery and equipment, rubles; A_w--annual deductions for amortization and repair of warehouse and other installations assigned to warehouse, rubles

in the production process and jurisdiction as supply warehouses under the material and technical supply service and delivering production raw products, materials, purchased semifinished and preassembled products; production warehouses which are under the production dispatcher service and designed to store own-produced semifinished products and production fittings; marketing warehouses which are under the marketing department and are designed for storing finished products; b) the nature and range of the stored materials into: universal warehouses (main stores) designed for storing ship preassembled equipment, fittings and various scarce materials, and specialized warehouses used for storing uniform materials (the warehouse for lumber, rolled sheet, tools, and so forth); c) the service sphere, into: general plant (central) warehouses and shop; d) design features, into: covered (heatable and unheated) warehouses, semicovered warehouses (sheds) and open (equipped and unequipped).

The quantity, type and location of the warehouse facilities are determined proceeding from the particular features of the enterprise general plan, its production structure, the production process, the scale and type of production, as well as upon the nature of the ties of the enterprise with the outside suppliers of materials.

45. Dates for the quantitative and qualitative acceptance of freight. All materials arriving at enterprise warehouses are subjected to quantitative and qualitative acceptance. By the decree of the State Arbitration Committee under the USSR Council of Ministers of 15 June 1965, No B-85, the dates for the quantative and qualitative acceptance of freight are set depending upon the territorial location of the supplier and the type of crating (Table 28).

46. Calculation of the warehouse area. The area of a warehouse is divided into the usable which is directly occupied by materials or equipment for their storage, and operational which is designed to provide normal operation of the warehouse (receiving-sorting, issuing and weighing areas, passageways and service facilities).

The total area of a warehouse S_w is determined (roughly) by the load method using the formula

$$S_w = \frac{Q_{max}}{q_t k_u},$$

where Q_{max}--the maximum storage rate for the supply of the material, tons;
q_t--the tolerable load per m^2 of warehouse floor, tons;
k_u--use factor for the total warehouse area (determined by the ratio of the usable warehouse area to the total. For freight stored in stacks, k_u=0.40-0.70; for freight stored on racks, k_u=0.3-0.4).

The area occupied by passageways is determined depending upon the type of materials, the nature and type of employed warehouse equipment for mechanizing freight handling work and the transport.

Usually this area is 30-70 percent of the usable area of the warehouse. The service areas of the warehouses are designed proceeding from a rate of 4.6-6 m^2 per worker.

47. Basic technical and economic indicators for warehouse facilities. For describing the operation of warehouse facilities, separate technical and economic indicators are used, and the method of calculating these is given in Table 29.

CHAPTER 5: PLANNING A RISE IN PRODUCTION EFFICIENCY

48. The plan for technical development and the organization of production. In long-range and current planning, the basic document which determines the increase in production efficiency is the plan for technical development and the organization of production. This is determined by technical progress which consists in the continuous development of new equipment, the introduction of progressive production methods, the mechanization and automation of the production processes, and an improvement in the organization of production and management.

The initial data for working out the plan are: 1) the scientific and technical forecasts relating to the most important problems of the development of the sector, the association and enterprise; 2) the control figures and quotas from the superior organizations on the state and development of production of the new types of products, and the introduction of new production processes which are of particularly important significance in the development of the sector; 3) the results of completed scientific research by the sectorial institutes and design bureaus; 4) the results of analyzing the technical and economic indicators for the production level at the given enterprise or association in comparison with the overall level of technical development in the sector and the scientific and technical achievements; 5) licenses, patents and proposals of inventors and production rationalizers, and the results of completed scientific research by the engineer enterprises of the enterprise and association.

For coordinating the plan for the technical development and organization of production with the other sections of the five-year (current) plan and complete accounting in the plans for economic efficiency from the use of scientific and technical achievements, the efficiency calculations should be carried out for the years of the period being planned considering the introduction of new equipment, the demand for additional capital investments and other expenditures on the development and introduction of new equipment. Here the designated calculations must determine the influence of the introduction of the measures on the basic technical and economic indicators of the five-year (current) plan, including: 1) the rise in the production volume and the increase in the proportional amount of superior quality

products; 2) the rise in labor productivity, the savings of the number of workers of production planning personnel (PPP) and the wage fund; 3) the reduction in product costs; 4) the rise in production profit and profitability; 5) the improvement in the use of fixed productive capital and production capacity.

The plan for the technical development and organization of production is worked out for the following subsections: 1) the development of new types of products and an improvement in the quality of the produced product; 2) the introduction of progressive production methods, mechanization and automation of the production proceses; 3) the improvement in production management, planning and organization; 4) the scientific organization of labor of workers, engineers, technicians and white collar personnel; 5) scientific research and experimental design; 6) indicators for the technical and economic level of production and the produced product (see §56); 7) standardization of the most important types of products (articles); 8) the conservation of nature and the rational use of natural resources.

The results of calculating all the subsections of the five-year (annual) plan being planned are reduced to a common form (Table 30) which reflects all the technical and economic indicators for the measures to be introduced under the plan for the technical development and organization of production, and are to be accounted for in the independent indicators for the operation of the enterprise, association and ministry.[1]

49. Indicators for the technical and economic level of production and the produced product in shipbuilding. As the general indicators for the technical and economic level of production and the produced product, the five-year plans use the following system of indicators (Table 31).

Along with the general indicators for the technical and economic level of production and the produced product, provision is also made for specific indicators which take into account the sectorial features. Such indicators should describe: 1) the quality and structural changes of the produced product; 2) the level of the technical base and use of equipment; 3) the material intensiveness of production; 4) the volume of production for products employing the most important efficient production processes and pro-progressive equipment; 5) labor productivity in physical units.

50. Planning a rise in the economic efficiency of production. A rise in the efficiency of social production is the basic task of the economic policy of our state and is an objective economic category of developed socialism which is inseparably linked with its economic laws and communist

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[1]For a detailed description see the sectorial procedural instructions on the elaboration of five-year plans.

Table 30

Summary Technical and Economic Results from the Introduction of Measures Under the Plan for Technical Development and the Organization of Production in 19___ (Form 05-11)

Наименование подразделов (форм) и показателей эффективности	Шифр (№ строк)		Год пятилетки	Количество мероприятий	Планируемые капитальные затраты, тыс. руб. a				Результаты расчета эффективности внедрения в плановом году b			
					Всего	в том числе по источникам финансирования			Экономия от снижения себестоимости товарной продукции, тыс. руб.	Снижение материальных затрат, тыс. руб.	Относительное высвобождение численности, чел.	Годовой экономический эффект, тыс. руб.
						фонд развития производства	кредит	другие источники				
A	B		01	02	03	04	05	06	07	08	09	10
d Внедрение прогрессивной технологии												
total												
e В том числе по годам пятилетки												
. . . . .												

Note. As a result one determines the rise in the basic technical and economic indicators for production from introducing measures under the plan for technical development and the organization of production (labor productivity, decline in product costs, production proritability, return on investment and overall increase in production capacity).

Key: A--name of subsections (forms) and efficiency indicators; B--code (line No); 01--year of five-year plan; 02--number of measures; 03--total; 04--production development fund; 05--credit; 06--other measures; 07--savings from reduction in costs of commodity product, rub.; 08--reduction in material expenditures, 1000 rub.; 09--relative release of employees, persons; 10--annual economic effect, 1000 rub.; a--planned capital expenditures, b--results of efficiency calculation from introduction in planned year; c--including by financing sources; d--introduction of progressive production methods; e--including by years of five-year plan.

Table 31

Technical and Economic Indicators of the Production Level

Indicators	Unit
1. Products the technical and economic indicators of which either meet the highest achievements of Soviet and foreign science and technology or surpass them (superior category)	Types, sizes, names in % of the total quantity of types, sizes and names of the produced product
2. Sales volume of these products	Million rubles, % of total volume of product sales
3. Products the technical and economic indicators of which do not meet the modern requirements, are obsolete and are to be modernized or taken out of production (2d category)	Types, sizes and names in % of the total amount of types, sizes and names of the produced products
4. The sales volume of these products	Million rubles, % of total volume of sold products
5. Obsolete products to be taken out of production	Types, sizes and names in % of total quantity of types, sizes and names of produced products
6. Products being developed by production for the first time	Same
7. Products produced up to 3 years inclusively	Same
8. Production volume of these products	Million rubles, % of total volume of sold product
9. Increase in the volume of sold product by introducing new technology	Million rubles
10. Degree of mechanization and automation of labor:	
a) Number of workers performing job by fully mechanized method	Thousand persons, % of total number of workers
b) Number of workers to be transferred in the period being planned from manual labor to mechanized and automated labor in basic production	Thousand persons, % of number of workers engaged in manual labor in basic production
c) In auxiliary production	Thousand persons, % of total number of workers engaged in manual labor in auxiliary production

[continuation of Table 31]

Indicators	Unit
11. Absolute decline in the number of workers engaged in manual labor in basic production and auxiliary jobs (for the year being planned)	Thousand persons, % of number of workers engaged in manual labor in corresponding production and auxiliary jobs
12. Relative reduction in number of workers due to measures of increasing the technical level of production	Thousand persons, % of total relative savings of personnel
13. Reduction in the cost of commodity product in the period being planned due to measures which raise technical level of production	Million rubles, % of total volume of reducing the cost of commodity product in the period being planned
14. Rise in labor productivity due to increase in technical level of production	%
15. Rise in use factor of production capacity and production equipment	%
16. Rise in share of progressive machines, equipment and instruments in the productive capital	Thousand rubles, % of total volume of productive capital
17. Increase in share of product manufactured by new equipment	Million rubles, % of total savings from decline in the cost of comparable products
18. Reduction in proportional expenditures of raw products, materials, fuel and energy per unit of commodity product	
19. Increase in profits from introduction of new equipment	Million rubles, % of total volume of net product or to volume of sold product [sic]
20. Expenditures included in capital investments for introduction of new equipment and raising the technical level of production and product output	Million rubles

construction. The basic factors involved in increasing the efficiency of social production are: The rapid introduction of scientific and technical achievements; the acceleration of scientific and technical progress; the

improving of the forms of the organization of labor and production; improving the use of productive capital (capital investments) and production capacity; improving the methods of economic management. The realization of these factors is a most important task at each production association and enterprise.

Of important significance is the optimizing of the plans on the basis of the broader use of mathematical economics models and electronic computers and the use of progressive standards and rates.

For the purposes of raising the scientific and technical soundness of the plans for all levels of national economic planning, a unified system of indicators is used and this was approved by the Decree of the USSR Gosplan, No 48, of 22 April 1974.

Production efficiency at the shipbuilding enterprises (associations) is planned on the basis of the principles which are common to all the elements of the national economy, that is, by correlating the production results (the effect) with the expenditures or the employed resources.

Planning a rise in the economic effectiveness of production is directly linked to the elaboration of all the sections of the five-year (annual) plan. The high growth rates for the economic efficiency of all production are based upon high growth rates of labor productivity which are provided for in the labor section; on the growth rates of production profit and profitability; on raising the return on investment, increasing the effectiveness of capital investments provided in the capital construction section; on improving the utilization of raw products and material resources, and so forth.

For assessing the efficiency of production, a system of general and differentiated indicators is used. The general indicators characterize the overall level and dynamics of production efficiency at the enterprise or association, while the differentiated ones describe the degree of utilizing individual types of resources, for example, live labor, fixed capital, material expenditures, and so forth.

The system of such indicators for assessing the economic efficiency of production as used in the production associations and enterprises is given in Table 32.

In the course of drawing up both the long-range and current plans, the efficiency indicators should be computed for the end of the plan period. A comparison of the calculated indicators with the indicators for the start of the plan period makes it possible to show the dynamics of efficiency and its influence on a change in the production results.

The formulas for calculating the influence of the indicators for a rise in production efficiency on the overall results of the operation of an enterprise or association are given in Table 33.

Table 32

System of Indicators for Planning Rise in the Economic Efficiency of Production

general indicators for rise in production economic efficiency	indicators for rise in efficient use of labor	indicators for rise in efficient use of fixed productive capital, working assets & cap. investments	indicators for rise in efficient use of material expenditures
growth rate of production: a) net product b) commodity (gross) product	growth rate of labor productivity: a) for net product b) for commodity (gross) product	return on investment--production per ruble of average annual value of fixed prod. capital a)for net product b) for commodity (gross) product	material expenditures (without amortization) per ruble of commodity (gross) product material expenditures on production of most important types of produced product
production of net product per ruble of expenditures relative savings in: a) fixed productive capital; b) normed working capital; c) material expenditures (without amortization) d) wage fund expenditures per ruble of commodity (gross) product for full costs overall profitability	share in increase in product from increase in labor productivity a) for net product; b) for commodity (gross) product savings in live labor of annual employees (in comparison with conditions of base year)	turnover rate of working assets--production per ruble of average annual value of normed working capital: a) for net product b) for commodity (gross) product ratio of increase in net product (profit) to the capital investments which have ceused this rise proportional capital investments: a) per unit of introduced production capacity b) per ruble in rise in commodity (gross) prod. repayment time of capital investments (ratio of cap. investments to total profit rise obtained from these capital investments	

Table 33

Influence of a Rise in Efficiency on the Overall Results of Enterprise Operations

Indicators	Explanation
a) Increase in net, commodity (gross) product from rise in labor productivity $I_{pr} = \left(1 - \frac{P_p}{G_p}\right) 100$	P_p--rise in personnel, %; G_p--increase in net, commodity (gross) product in period being planned, %
b) Indicators for production of net, commodity (gross) product per ruble of expenditures $G_p = \frac{P_n}{C}$	P_n--the volume of net, commodity (gross) product (individually for the periods), rubles; C--total expenditures (costs) on producing the product (separately for the periods), rubles
c) Relative savings (overexpenditure) in fixed productive capital $E_{fc} = F_{f\ell}K_i - F_{fp}$	$F_{f\ell}$, F_{fp}--the average annual value of the fixed productive capital in the base and planned year, rubles; K_i--index for the growth of the production volume of net, commodity (gross) product in year being planned in comparison with base year
d) Relative savings (overexpenditure) in normed working capital $E_{wc} = F_{wb}K_i - F_{wp}$	F_{wb}, F_{wp}--average annual value of normed working capital, respectively, in base and planned periods
e) Relative savings (overexpenditure) of material outlays $E_m = M_{eb}K_i - M_{ep}$	M_{eb}, M_{ep}--material expenditures on production of commodity (gross) product, correspondingly, in base and plan periods

[continuation of Table 33]

Indicators	Explanation
f) Relative savings (overexpenditure) in wage fund (wages and material incentives) $E_{wt} = F_{cb}K_i - F_{cp}$	F_{cb}, F_{cp}--the wage fund (wages and material incentives), respectively, in base and plan periods
g) Relative savings in live labor (in annual workers) $E_h = P_{hb}K_i - P_{hp}$	P_{hb}, P_{hp}--number of industrial-production personnel, respectively, in base and plan periods
h) Level of overall (absolute) efficiency Here the following calculation variations are possible: $E_a = \frac{P_n}{F_f + F_c + F_w}$; $E_a = \frac{P_n}{C + E_n F_{pr}}$; $E_a = \frac{P_n}{P_n W_a + E_n F_{pr}}$	P_n--the volume of net, commodity (gross) product separately for the periods, thousand rubles; F_f--fixed productive capital (separately for the periods); F_c--working capital (separately for the periods); F_w--wage fund (separately for the periods); C--product costs (separately for the periods); E_n--standard efficiency coefficient (0.15); F_{pr}--productive capital (separately for the periods); P_n--the number of employees (separately for the periods); W_a--average wages of one employee (for periods)

The relative savings in resources is determined for the years of the five-year plan as the ratio to the previous year as well as to the base year in a running total. The savings for the individual types of resources involved in the production of net commodity (gross) product is compared with the corresponding savings during the previous analogous period.

The rise in total production profitability should be achieved primarily from a rise in profit as a result of reducing product costs and lowering the capital intensiveness. Expenditures per ruble of commodity (gross) product are calculated by dividing the expenditures for the full costs of the commodity product by the product volume.

The planned cost of commodity product is calculated by determining the influence of the technical and economic factors on the change in expenditures in comparison with the level of the preplan (base) year. The relative share of the increase in product due to a rise in production efficiency can be determined from the formula:

$$\left.\begin{array}{l}\text{Rise in production volume on}\\ \text{basis of increase in efficient}\\ \text{use of resources}\end{array}\right\} = 100 - \frac{\text{growth of expenditures}}{\text{growth of production volume}} 100\%.$$

51. Determining the efficiency of introducing new equipment.[2] The economic efficiency of using new equipment, inventions and rationalization proposals in the national economy is characterized not by any one universal indicator but rather by a group of basic and supplementary ones.

The basic indicators which determine the economic efficiency of new equipment include: The amount of capital investment; product costs; the annual economic effect; labor productivity; the profitability of new equipment to be introduced.

The list and nature of the supplementary indicators in each specific instance is determined by the content of the new equipment. These indicators are economic, technical-economic and technical.

The supplementary indicators can include: Labor intensiveness, metal intensiveness, the length of the production cycle, the turnover rate and amount of working assets, the quantity of equipment, the working conditions and labor safety, the level of mechanization and automation, capital intensiveness, and so forth. Here, while in calculating the economic efficiency of new equipment the basic indicators are required, of the supplementary ones only those are considered which undergo change or are necessary for a fuller assessment of the new equipment.

The effectiveness of developing and introducing new equipment is determined by comparing the value and physical indicators for the new equipment with a certain standard or base. The choice of the base (standard) for comparison depends upon the purpose of the economic analysis: a) if the question is of creating and introducing new equipment, then as the base they employ the indicators of the best equipment designed in the USSR (for foreign equipment which could be purchased in the necessary quantity or developed in the USSR on the basis of acquiring a license); b) if it is necessary to

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[2]See: "Procedure (Basic Provisions) for Determining the Economic Efficiency of Using New Equipment, Inventions and Rationalization Proposals in the National Economy," EKONOMICHESKAYA GAZETA, No 10, 1977.

work out or select the most efficient variation of a production process, mechanization or organization of the production process, then the basis for comparison should be the indicators of the best variations which are to be replaced; c) if it is necessary to determine the real amount of the economic effect which would be obtained from introducing the new means of labor under the specific conditions of the given enterprise, then as the base one uses: in existing production, the equipment or methods of manufacturing the product existing in the sections, shops or at the enterprise prior to introducing the new means of labor; in new production, the equipment or methods of manufacturing the product which are most acceptable under existing production.

In determining the annual economic effect, it is essential to employ for the base variation the technical indicators which will be achieved in the calculated year.

The determining of the annual economic effect is based upon a comparison of the calculated expenditures for the base and new equipment. The calculated expenditures are the total of the cost and the standard profit

$$O = C + E_n K,$$

where O--the calculated expenditures of a unit of product (work), rubles;
C--the cost of a unit of product (work), rubles;
E_n--the normed coefficient for the efficiency of capital investments (0.15);
K--the proportional capital investments into productive capital, rubles.

In assessing the economic effectiveness of the new equipment being introduced (planned), it is essential to provide comparability of the indicators for the different variations of the means of labor. This is achieved by using a production volume which is the same for all the variations, comparable prices for equipment, materials, energy, fuel, and so forth.

The cost of a unit of product in using the base means of labor is corrected on the basis of analyzing the planned costing. When the plan expenditures for the individual product cost items for the base variation are understated or overstated, these indicators are determined by the direct calculation method based upon progressive standards, and in the event that they are below the standard, they are corrected for the minimum actual expenditures.

The composition of the cost items for industrial products, the methods of calculating them and the general methods of costing are applied in accord with the "Basic Provisions on Planning, Accounting For and Costing Industrial Products" as approved by the USSR Gosplan, the USSR Ministry of Finances, the State Price Committee and the USSR TsSU and put into effect as of 1 January 1971.

Table 34

Formulas for Determining the Economic Efficiency of Using New Equipment, Inventions and Rationalization Proposals in the National Economy, According to the Standard Method

Indicators and Calculation Formulas (a)	Explanation (b)
1. Annual economic effect from employing new production processes, the mechanization and automation of production and labor which provide a savings in production resources with the output of the same product $E_a = (O_1 - O_2)A_2$	O_1, O_2--calculated expenditures of a unit of product (work) produced using the base and new equipment determined from the formula $O = C+E_nK$; C--the cost of a unit of product (work), rubles; K--proportional capital investments into productive capital, rubles; E_n--the standard coefficient for the efficiency of capital investments ($E_n = 0.15$); A --annual volume of the production of product (work) produced using the new equipment in the calculated year, in physical units
2. Annual economic effect from the production and use of new means of labor in extended use (machinery, equipment, instruments, and so forth) with an improvement in quality performance (productivity, durability, operating costs, and so forth) $E_a = \left[O_1 \frac{B_2}{B_1} \frac{P_1 + E_n}{P_2 + E_n} + \frac{(I'_1-I'_2) - E_n(K'_2-K'_1)}{P_2 + E_n} - O_2\right] A_2$	O_1 and O_2--calculated expenditures of a unit, respectively, of the base and new means of labor, rubles; B_2/B_1--coefficient considering rise in productivity of a unit of the new means of labor in comparison with the base; B_1 and B_2--annual volumes of product (work) produced in using a unit, respectively, of the base and new means of labor, in physical units; $\frac{P_1+E_n}{P_2+E_n}$-- coefficient considering change in the service life of the new means of labor in comparison with the base; P_1 and P_2--share of deductions from the balance sheet value for complete replacement (renovation)

[continuation of Table 34]

a	b
	of the base and new means of labor. Calculated as amounts inverse to the service lives of means of labor determined considering their obsolescence; E_n--standard efficiency coefficient (0.15) $\frac{(I_1'-I_2') - E_n(K_2'-K_1')}{P_2 + E_n}$ --savings for consumer in current operating outlays and deductions from accompanying capital investments over entire service life of the new means of labor in comparison with the base, rubles; K_1' and K_2'--corresponding capital investments of the consumer (not considering the value of the examined means of labor) in using the base and new means of labor in the calculation for the volume of product (work) produced by the new means of labor, rubles; I_1' and I_2'--annual operating outlays of the consumer in its use of the base and new means of labor calculated for the volume of product (work) produced using the new means of labor, rubles. These outlays consider only a portion of amortization earmarked for the major overhaul of the means of labor, that is, not counting the funds for its renovation, as well as the amortization deductions for the accompanying capital investments by the consumer; A_2--annual volume for the production of the new means of labor in the calculated year, in physical units

[continuation of Table 34]

a	b
3. Annual economic effect from the production and use of new or improved means of labor (materials, raw products, fuel) as well as the means of labor with a service life less than 1 year $E_a = \left[O_1 \frac{Y_1}{Y_2} + \frac{(I_1'-I_2')-E_n(K_2'-K_1')}{Y_2} - O_2 \right] A_2$	O_1, O_2--calculated expenditures of a unit, respectively, of the base and new subject of labor; Y_1, Y_2--proportional expenditures, respectively, of the base and new subject of labor, calculated per unit of product (work) produced by the consumer, in physical units; I_1', I_2'--expenditures per unit of product (work) produced by the consumer in using the base or new subject of labor without considering their value, rubles K_1', K_2'--accompanying capital investments by the consumer in his use of the base or new subject of labor calculated per unit of product (work) produced using the new subject of labor, rubles; A_2--annual production volume of the new subject of labor in the calculated year, in physical units
4. Annual economic effect from the production of a new product or superior quality product (with a higher price) for satisfying the needs of the population, as well as a new product and superior quality product based on inventions and rationalization proposals $E_a = (P - E_n K)A_2$	P--profit from the sale of the new product or increase in profit (P_2-P_1) from the sale of superior quality product (P_2--profit from the sale of superior quality product, P_1--profit from sale of product with previous quality), rubles; K--proportional capital investments for the production of the new product or proportional additional capital investments related to improving product quality, rubles; E_n--standard efficiency coefficient (0.15); A_2--annual volume of new product or superior quality product in calculated year, in physical units

[continuation of Table 34]

a	b
Reflection of Economic Efficiency from New Equipment in Standards, Rates, in Planning and Report Indicators	
1. Planned (actual) increase in profit from the production of a new product in year t $\Delta P_t = (Z_t - C_t) A_t - (Z_1 - C_1) A_1$	Z_t and C_t--wholesale price (without turnover tax) and production cost of a unit of product in the planned year t, rubles; Z_1 and C_1--wholesale price (minus turnover tax) and production cost of a unit of product to be replaced in the year preceding the introduction of new equipment, rubles; A_t and A_1--production volume of new products in year t being planned and the product to be replaced in the year preceding the introduction of the new equipment, in physical units
2. Planned (actual) reduction in costs (increase in profit) from introduction of new production methods, mechanization and automation, scientific organization of labor, as well as from the use of new products by the consumer $C_t = (C_1 - C_t) A_t$	C_1 and C_t--production cost of a unit of product in year t being planned and the year preceding the introduction of new equipment, rubles; A_t--production volume in year t being planned, in physical units
3. Planned (actual) reduction in the number of industrial-production personnel (hypothetical release of workers) at areas where new equipment is to be introduced $\Delta N_t = (T_1 - T_t) A_t$ or $\Delta N_t = \frac{Z_t A_t}{B_{b_1}} - \frac{Z_t A_t}{B_{b_t}}$	ΔN_t--hypothetical release of workers in year t being planned, persons; T_1 and T_t--labor intensiveness of a unit of product in physical (or cost) units prior to introduction of new equipment and in year t being planned, persons; B_{b_1}, B_{b_t}--labor productivity prior to introducing new equipment and in year t being planned, rubles/man; A_t--production volume in year t being planned in physical units

[continuation of Table 34]

a	b
4. Planned (actual) savings of capital investments $\Delta K_e = K_1\left(\frac{B_2}{B_1} - K_2\right) A_2$	K_1 and K_2--proportional capital investments into base and new equipment, rubles; B_1 and B_2--annual volumes of product (work) produced in using the base and new equipment, in physical units; A_2--annual production volume of product (work) in variation for new equipment in calculated year, in physical units
5. Planned (actual) reduction in material expenditures as the result of introducing new equipment $M_t = (M_1 - M_t)A_t$	M_t and M_1--material expenditures per unit of product in year t being planned and in year preceding introduction of new equipment, rubles; A_t--production volume in year t being planned in physical units
6. Repayment time of capital investments planned for the introduction of new equipment and supplementary capital investments: $T = \frac{K_2}{P_t}$; $T_1 = \frac{K_{add}}{\Delta P_t}$	K_t and K_{add}--planned and supplementary capital investments into new equipment, rubles; P_t and ΔP_t--planned (absolute) and additional (in comparison with base equipment) profit from the realization of the annual volume of new equipment for year t of production to be planned, rubles

After correcting the cost of a unit of product, the total cost of the annual output for the base variation is corrected by the production volume in the year being calculated. The volume of capital investments under the base variation is also adjusted in accord with the planned volume of production in the year being calculated. This correction is made by a direct calculation of the demand for equipment, production areas and other items of capital outlays.

The capital investments of the manufacturers and consumers of new equipment consider both the direct capital investments related to the development and introduction of the new equipment, as well as the accompanying one-shot

Table 35

Formulas for Calculating Changing Elements in the Cost of Manufactured Product

Expenditure Items and Calculation Formulas (a)	Explanation (b)
1. Expenditures on basic materials and semifinished products $O_m = \frac{\sum_1^m N_c P_m (100+d_t)}{100} - \Sigma Q_\ell P_\ell$ Same for purchased articles $O_b = \frac{\sum_1^m N_b P_b (100+d_t)}{100}$	N_c--consumption rate of material (semifinished product per article), kg; P_m--the cost of a unit of material, rubles; Q_ℓ--the amount of wastes, kg; P_ℓ--value of a unit of wastes, rubles; d_t--transport and preparatory expenditures, %; N_b--consumption rate of purchased article; P_b--cost of a unit of purchased article, rubles; m--number of types and sizes
2. Amount of wastes which can be sold $Q_\ell = N_c - Q_d - Q_w - Q_m$ Note. Irrecoverable losses with hot stamping and forging per heating are 2-3% of the initial weight of the material, with machining approximately 3% of the weight of the chips	N_c--consumption rate of materials per article, kg/m; Q_d--net weight of the piece, kg; Q_w--weight of irrecoverable losses of materials (forging, stamping and so forth), kg; Q_m--same with machining, kg
3. Wages of production piece and time workers: $W_p = t_u C_t N$; $W_t = t_u C_b N$	t_u--piece time rate, hour; C_t--average hourly rate (considering piece-bonus and piece-progressive surpayments), rubles; N--annual program; C_b--average hourly rate of time workers (considering time-bonus surpayments), rubles

[continuation of Table 35]

a	b
4. Expenditures on upkeep and operation of equipment $O_e = \mu \left\| \sum_1^m R_m(H_m+H_n+H_t) + \sum_1^m H_e R_e + \sum_1^m H_f R_f \right\|$	μ--equipment duty factor; R_m, R_e, R_f--the number of repair units, respectively, on the mechanical, electrical and furnace part of the equipment; H_m, H_n, H_t--correspondingly the average amount of expenditures on a repair unit of the mechanical part of the equipment per year; the average amount of expenditures on the wages of repairman per repair unit (per year); average amount of expenditures on production purposes per repair unit per year, rubles; H_e, H_f--average amount of expenditures per repair unit per year, respectively, for the electrical and furnace parts; m--number of equipment types per production group
5. Expenditures on amortization of equipment $O_a = \sum_1^m \frac{V_c a \mu}{100}$	V_c--the initial (replacement) value of the fixed capital, rubles; a--amortization percentage; μ--equipment duty factor; m--number of equipment types
6. Expenditures on routine equipment repair $O_r = \mu \left(\sum_1^m H_m R_m + \sum_1^m H_e R_e \right)$	See above
7. Expenditures on power electric energy $O_e = \left(\frac{N_y F_e K_t K_u}{EFF} \right) P_e \mu$	N_y--total installed capacity; F_e--available (calculated) annual equipment time fund, hour; K_t--coefficient for equipment use in time; K_u--equipment use coefficient for capacity;

[continuation of Table 35]

a	b
	EFF--efficiency; P_e--cost of 1 kilowatt hour of electric energy; μ--equipment duty factor
8. Expenditures on compressed air $O_a = \frac{nY_aF_eK_u1.5}{1,000} P_a\mu$	n--number of compressed air receivers; Y_a--consumption of compressed air per receiver with continuous use, m^3 per hour; F_e--available (calculated) annual time fund for operation of receiver, hour K_u--equipment use coefficient (K_u = 0.3-0.5); 1.5--coefficient considering air loss; P_a--cost of 1,000 m^3 of compressed air, rubles; μ--equipment duty factor
9. Expenditures on gas for production purposes $O_g = \sum_1^m C_gF_eK\ell P_g\mu$	C_g--proportional hourly consumption of gas by one user with continuous operation, m^3 per hour; F_e--available (calculated) annual operating time fund of the user, hour; $K\ell$--load factor of consumer; P_g--the price of 1 m^3 of gas, ruble; μ--duty factor of consumer; m--number of consumers
10. Expenditures on operation of transport $O_{tr} = C_{tr}Q_{fr}$	C_{tr}--average cost of shipping 1 ton of freight, ruble/ton; Q_{fr}--quantity of freight transported per year, tons
11. Expenditures on tools $O_i = I_hF_e\mu$	I_h--consumption rate of tools per hour of equipment operation, kopeck/hour; F_e--available (calculated) annual operating time fund of the equipment, hour;

[continuation of Table 35]

a	b
	μ--equipment duty factor
12. Expenditures on operation and repair of fittings $O_f = 0.6C_f\mu$	C_f--value of fittings and attachments, rubles; μ--equipment duty factor; 0.6--coefficient considering annual amortization deductions (50%) and repair expenditures (10%)
13. Expenditures on steam $O_s = H_sF_e1.2P_s\mu$	H_s--average hourly steam consumption per unit of equipment, ton/hour; F_e--actual (calculated) annual operating time fund of the equipment, hour; P_s--price of 1 ton of steam, ruble; μ--equipment duty factor; 1.2--coefficient considering steam losses in network
14. Annual savings from the reduction in product costs from a relative decline in the conditionally fixed portion of shop expenditures $E_s = H_yK_p - H_y(1+K_{cc})$	H_y--total conditionally fixed expenditures for the given type of product calculated for the annual program prior to the introduction of the measure, rubles; K_p--coefficient reflecting the ratio of the planned annual output of the product N_2 to the base N_1 prior to the introduction of the measure; K_{cc}--coefficient expressing the rise in the conditionally fixed portion of the shop expenditures with a set percentage of a rise in the production volume
15. Amount of the conditionally fixed portion of shop expenditures for the base variation $H_y = O_eY_{co}$	O_e--expenditures related to the operation of the equipment according to the base variation for the annual output prior to introduction of measure, rubles;

[continuation of Table 35]

a	b
	Y_{co}--ratio of the conditionally fixed portion of the shop expenditures to the variable

expenditures necessary for the development and use of the equipment, regardless of the financing sources. Such expenditures include: a) the expenditures on scientific research and experimental design, including the testing and adjustment of the experimental models (only in the variation for new equipment); b) expenditures on the acquisition, delivery, assembly, disassembly, technical preparation, adjustment and development of production; c) expenditures on the replenishment of working assets related to the development and use of new equipment; d) the cost of the necessary production areas and other elements of fixed capital directly linked to production and the use of the new and base equipment; e) expenditures on technical measures and units preventing the negative consequences of the influence of the use of the equipment on the environment, as well as on working conditions; f) a loss (with a plus sign) or profit (with a minus sign) from the production and sale of products during the production development period preceding the year being calculated.

In the calculations for the annual economic effect of the new equipment, the time factor is considered in those instances when the capital investments are carried out over a number of years, as well as when the current production outlays, as a consequence of a change in the operating conditions at the site of the new equipment, change substantially over the years of operation.

The introduction of new equipment and production methods, as a rule, introduces changes into the various cost elements. Thus in mechanizing the production process, expenditures of live labor are reduced, and this leads to a savings in the share of wages, the wage surpayments and expenditures on labor safety in product costs, but here expenditures on amortization, repair and upkeep of equipment are increased.

In calculating the economic efficiency of introducing new equipment, production methods, as well as the mechanization and automation of production, it is advisable to consider only the variable cost elements. If a comparison is made of the manufacturing methods for products employed in different subdivisions, then it is essential to determine the full costs in one or the other subdivision.

The calculation formulas for determining economic efficiency from the introduction of new equipment are given in Table 34, and the variable elements in the costs of the manufactured products are to be found in Table 35.

CHAPTER 6: STANDARDS AND RATES

52. A description of standards and rates. An essential condition for increasing the level of the scientific soundness of plans is the development of progressive technical and economic standards and rages at the enterprise. The efficient and complete use of a scientifically based system of standards in the practical activities of the enterprises is one of the important elements for a planned rise in production efficiency.

A *standard* is the maximum possible amount of the absolute consumption of raw products, materials, fuel, energy, live labor and so forth for manufacturing a unit of product (or performing a job) of the established quality under the production conditions of the year being planned.

A *rate* is an indicator characterizing the relative amount or degree of utilizing the implements and subjects of labor, their consumption per unit of area, weight, volume and so forth (for example, the use factor of material, product output per m^2 of production area, the percentage of losses, and so forth).

Progressive technical and economic standards and rates serve as the initial basis in working out the tekhpromfinplan and the indicators for the economic efficiency of production at the enterprise.

The technical and economic standards and rates are classified by a number of features: a) in terms of the time of action of the planning period into long-range, annual and current; b) in terms of the nature of distribution into intersectorial, sectorial and local; c) in terms of the nature of resource utilization (raw products and basic materials, auxiliary materials, fuel and energy, and so forth); d) in terms of the object of norm setting into a unit of finished product, semifinished product, type of work or production stage; e) in terms of the scale of use into group and individual; f) in terms of the degree of detailing into specific standards or summary standards; g) in terms of the methods (procedures) of working out the standards and rates into calculation-analytical, experimental and report-statistical.

The most accurate and scientifically sound are the standards and rates worked out by the calculation-analytical method. They are of a progressive nature, and they reflect the achievements of scientific and technical progress, the best organization of production and labor, and the advanced experience of the enterprises and production innovators.

In an enterprise tekhpromfinplan, the standards and rates are put in a separate section. The normative base of the enterprises is systematically replaced considering the influence of the measures in the plan for increasing production efficiency.

The enterprises work out and employ the following groups of standards and rates: Standards for raw products and materials; consumption standards for fuel and power resources; standards for the consumption of live labor; standards and rates for the use of equipment, the development of production capacity; calendar planning standards and rates; financial rates and standards.

At the enterprises, for the purpose of systematizing the standards and rates, for analyzing the dynamics of their changes, and for monitoring the observance of the rates set in the plan, it is advisable to create a file of rates and standards or other similar types of normative specifications depending upon the degree of automation and the use of computers in production management.

53. Basic provisions in the elaboration of consumption standards for raw products, materials, fuel, thermal and electric power. The standards and rates for the consumption of raw products and materials, thermal and electric power are used for determining their demand in production for the period being planned, for improving economy, for organizing the production process, as well as for calculating other indicators in the current and long-range enterprise plans.[1]

The materials consumption standard consists of the following standard-setting elements: the weight of the material, production wastes and losses. The weight sets the amount of material which physically comprises the finished article or is effectively used in the production process. The production wastes and losses are those expenditures of material resources which are caused by the production process.

The consumption standard for basic materials per unit of product should not include the following: Losses related to damaged products or a deviation

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[1]See: "Statute on the Organization of Work and the Procedure for Setting Consumption Standards for Materials in the Shipbuilding Industry," 1972; "Instructions on Setting Consumption Standards for Materials in Basic Machine Building Production (Standard)," Moscow, Ekonomika, 1972.

from the prescribed production process, operating conditions, and so forth; losses from transporting and storage; losses caused by deviations from the requirements for materials quality and grade; expenditures on the adjustment and repair of equipment, on fittings, the manufacturing of automation and mechanization, on test models and other analogous types of expenditures.

In terms of the purpose of the materials and their varying role in the production process and involvement in the formation of the finished product or vessel, the standards are divided into consumption standards for basic and auxiliary materials. The basic materials are directly consumed in manufacturing the finished product (the article or the vessel), and they physically comprise it, forming the material base. The auxiliary materials are used in the process of manufacturing the given article or the vessel for supporting the normal production process.

The basic initial data for calculating the individual consumption standards of materials per part, article or vessel are: a) the plan-established product range; b) the plan quotas for the average reduction in the consumption standards and the saving of materials; c) data from design and production specifications; d) indicators provided by the technical conditions for manufacturing the product; e) the approved rates for production wastes and losses of materials considered in calculating the standards; f) indicators for the proportional consumption of materials per unit of surface, weight, length, and so forth; g) the indicators of the plan for the introduction of new equipment into production and the organizational and technical measures to save materials.

At the shipbuilding enterprises, the following standards are used: design, production and for the future period.

The design standards for the consumption of materials are worked out by the design organizations for the head vessels or machine building products using the data of the technical plans.

The production consumption standards for materials to build vessels, for the manufacturing of machines, mechanisms, equipment, instruments as well as the consumption standards of materials for the foundry and metallurgical shops are worked out by the plant production subdivisions as the blueprints and other technical specifications are received from the design organization. These are worked out on the basis of a part-by-part calculation of the consumption standards for materials, the charts and lists for laying out materials, as well as a calculation for the proportional consumption standards of those materials from which the parts are directly not manufactured (painting materials, glues, and so forth). Production consumption standards are not worked out for materials to be used on vessels or machine building products which are manufactured once.

In working out the consumption standards for material resources in production for a long-range period, the initial data include: The quotas for the long-range period for saving material resources and reducing the consumption

standards of materials in production as set by the directives for compiling the long-range plan, proceeding from the achievements and forecasts in the development of science and technology; indicators for the plan of measures to save material resources with a distribution in terms of specific areas and years of the long-range period with an indication of the volume of measures to be introduced and the amount of savings in materials in producing the planned product for the ministry in achieving the fulfillment of the quotas stipulated by the directives; the product range of the national economic plan over the long-range period as set in accord with the Union-wide classifier of industrial and agricultural products; the production volumes of the corresponding product for years of the long-range period; the base consumption standards for material resources in producing the corresponding product for the year preceding the start of the long-range period.

For a tekhpromfinplan, consumption standards for the means of labor, live labor as well as material and other resources should be worked out and approved at an enterprise.

54. Rates and standards for the means of labor. All means of labor at an enterprise, depending upon the purpose and nature of their use in the production process, are divided into active and passive. The active portion includes transfer devices, power machines and equipment, operating machines and equipment, metering and control devices and assemblies, means of transport, tools, fittings and production supplies. The passive portion includes predominantly the production buildings and installations. The ratio between these parts is of important economic significance. The higher the proportional amount of the active portion in the fixed productive capital the higher the indicators for the efficiency of their use, and consequently, production efficiency as a whole.

The setting of standards for the means of labor consists in working out standards and rates for the demand for equipment, its use and repair. The standards and rates for the demand for equipment are worked out for determining the fleet of equipment for basic production, for general use and for auxiliary-service production. The availability of the designated standards and norms is essential for establishing the planned production volumes for the enterprise and its production subdivisions, as well as the degree to which the current production capacity is utilized.

The standards and rates at an enterprise are worked out in accord with the current sectorial procedural and instructional materials.

The active portion of the means of labor is given norms for the following groups: a) transfer devices; b) power machines and equipment; c) working machines and equipment; d) metering and control devices and instruments; e) means of transport; f) tools and fittings; g) production and office supplies and inventory.

For all the listed means of labor, service rates, operating conditions and repair conditions are worked out. These are essential for setting the amount and degree of utilizing capacity in the production subdivisions and as a whole for the enterprise. This, in turn, contributes to the more accurate establishing of the product production volumes in each planned period.

55. The setting of standards and rates for live labor. The standards and rates for the expenditures of live labor are essential for setting the growth rates of labor productivity and for determining the required number of employees and the wage funds. They should reflect the achievements of scientific and technical progress, advanced experience of the production innovators (at related enterprises), as well as progressive and methods for organizing production and labor.

For setting the standards for the expenditures of live labor, the following are used: time rates, service or manning rates and employee rates.

Time rates are a calculated amount of time expenditures needed for performing individual elements of a job (operations) with the most rational organizational and technical production conditions. These are worked out for types of expenditures: Rates of basic (production) times, auxiliary time for servicing a work area, rest and personal needs, and preparatory-concluding time.

A *manning standard* is the stipulated quantity of equipment, units, devices, area, and so forth which during a work shift or month should be served by one worker or group of workers. Basically the manning standards are set for various categories of auxiliary workers (the manning standard for units, a unit of equipment, area cleaned, and so forth).

The *employee rate* is the regulated number of employees necessary for carrying out a unit of the volume of work or an individual function. The employee standards are used for determining the number of workers for manning the equipment, work areas, units of materials handling equipment, and so forth, or in determining labor expenditures for the professions and specialties, the groups and types of work, and certain functions on a shop scale and for the enterprise as a whole, considering the established amount of work and the rational organizational and technical production conditions.

The time standards and rates, depending upon the sphere of use, are divided into: intersectorial, sectorial and local (plant).

The intersectorial standards are designed for setting standards for labor at enterprises of the various industrial sectors.

The sectorial rates are used for setting labor standards for all enterprises or for groups of enterprises comprising one sector. As a rule they are worked out by the sectorial scientific research institutes and organizations.

Table 36

Basic Dependences Between Time and Output Standards and Their Change

Indicator	Symbol	Initial data	Calculation Formula
Output standard, %	K_o	Normed hours, T_m Actually worked hours T_f	$K_o = \frac{T_m 100}{T_a}$
Reworking of standards, %	R	Percentage of output K_o	$R = K_o - 100$
Rise in output standards, %	P	Percentage of rigid standards Y Old time standard N_o New time standard N_n	$P = \frac{Y100}{100 - Y}$; $P = \frac{N_o 100}{N_n} - 100$
Rigid time standards (% of time saved	Y	Percentage of rise in output standards K_o Old time standard N_o New time standard N_n	$Y = \frac{K_o 100}{100 + K_o}$; $Y = 100 - \frac{N_n 100}{N_o}$
Fulfillment of standards with old productivity	K_n	Percentage of output of old standards K_o Percentage of increase in standards R Old time standard N_o	$K_n = \frac{K_o 100}{100 + R}$
New time standard	N_n	Percent of hardening time standard Y Old time standard N_o Percentage of increasing output standard R	$N_n = N_o \frac{100 - Y}{100}$ $N_n = \frac{N_o 100}{100 + R}$

The local (plant) time rates are worked out at the enterprise by the plant scientific research subdivisions and services. These are used only at the given enterprise considering the specific production conditions.

On the basis of the established rates, time standards and output standards are calculated, and the labor intensiveness of manufacturing a unit of product is determined. In shipbuilding the most promising would be the method of technical rate and standard setting using detail plans on the basis of consolidated rates.[2]

The basic dependences between the time standards, the output standards and their change are given in Table 36.

56. Rates for the organization of production and labor. An essential condition for improving and raising the level of internal plant planning is the creation of rates and standards for the organization of the production process at the enterprise. Among the most important rates for the organization of the production process are the calendar planning rates, and the quality of their elaboration largely determines the degree of using fixed and working capital, the growth rate of labor productivity and the decline in product costs.

The composition of the calendar planning rates depends upon the type of production organization (Table 37).

Table 37

Areas of Using Calendar Planning Rates Depending Upon Type of Production

Indicators	Type of Production
Duration of production cycle	In individual, small-series, series and large-series production
Incomplete production	In individual and small-series production
Calendar lead for production stages	In individual and small-series production
Pace of building a series of ships	In series production
Size of output batch, output of products and articles	In series and large-series production
Periodicity of repeat of batch of parts or articles	In series and large-series production
Inventories of parts and articles	In large-series and mass production
Pace of assembly line	In mass production

[2]See: R. N. Gordon, "Novyye Printsipy Tekhnicheskogo Normirovaniya v Sudostroyenii" [New Principles in Technical Rate and Standard Setting in Shipbuilding], Leningrad, Sudostroyeniye, 1973.

In shipbuilding, with its individual and small-series type of production, the most widely found calendar planning rates are: The duration of the production cycle for building the vessel; the volumes of incomplete production; the calendar lead for production stages; planning and accounting units (PUYe), and other data.

The building pace of the vessel is calculated for estimates in rhythmical series production of vessels as a calendar planning rate.

The duration of the production cycle is the calendar period of time from the start of working the metal until the full completion of building the vessel and its delivery to the client. The production cycle for building a vessel is determined by the duration of carrying out the basic leading jobs in all stages of building it, and in shipbuilding is measured in working days. Other jobs which are carried out along with the leading ones in building a vessel do not influence the overall shipbuilding cycle, and are not considered in determining it. Here it is essential to provide the maximum possible parallel execution of the jobs. Calculating the duration of the production cycle makes it possible to correctly determine the amount of leads and backlogs necessary for promptly putting the individual elements of the vessel into production for all stages of building it, and to compile a schedule for carrying out the jobs for all the periods of building the vessel, namely: Preparatory, unit, ways, outfitting and delivery.

The production cycle of the leading work D_c can be calculated using the following formula:

$$D_c = \frac{t_f}{pk_f h},$$

where t_f--labor intensiveness of carrying out the leading work;
p--number of workers in brigade simultaneously carrying out given job;
k_f--planned coefficient for fulfilling the output standards;
h--duration of work shift, hours.

Incomplete production is the name given to the incomplete products which are in the production process or are awaiting making up at the warehouse. The quantity of such products in their physical units (pieces, sets, and so forth) is usually termed the stock, and its monetary expression is the incomplete production. The volume of incomplete production in individual and small-series production can be determined using schedules for the rise in total expenditures (in rubles) or labor expenditures (in norm-hours).

57. Standards and rates of financial resources. The standards and rates for financial resources are essential in working out the financial plan, the economic incentive funds and other financial and economic indicators.

For this they use the following rates and standards for financial resources: a) the payment rate for productive capital, fixed and rent payments, interest on bank credit (to the state bank and investment bank); b) deduction rates for the funds: Material incentive, sociocultural measures and housing construction, and production development; c) amortization deduction rates; d) deduction rates for the fund for the development of new equipment; e) deduction rates for the bonus fund for creating and introducing new equipment and the rates for determining the amounts of bonuses for inventions and rationalization measures; f) deduction rates for the reserve of the ministry for providing financial aid to the enterprises; g) profit and profitability rates used in setting wholesale prices, and profitability rates used in determining profit deductions for the incentive funds; h) turnover tax rates; i) rates for own working capital.

58. The organization of work in elaborating rates and standards at a shipbuilding enterprise. Under the conditions of a further deepening of the scientific and technical revolution, it is essential to see to it that the standards most fully reflect the achievements of scientific and technical progress.

All the appropriate technical, economic and production services at an enterprise should be involved in developing the standards and rates and in revising them.

Table 38 shows the relationship of the enterprise rate and standard base with the technical and economic indicators calculated using the corresponding rates and standards.

The continuous improvement in equipment and production methods and the introduction of new methods for the organization of labor and management have led to the necessity of a systematic revision of the rates and standards. In this regard the rate and standard base should be dynamic, although stable for the corresponding planning periods.

The work involved in preparing the rates and standards for revision at enterprises and organizations should be carried out systematically during the year.

Changes in the approved draft standards for the consumption of material resources are made by the design bureaus and design institutes, while changes are made by the manufacturing plants in the production standards.

The designers, after gaining approval of the changes from the corresponding organizations in the established procedure put out notifications which are issued to the plants no later than 5 days after agreement. The notifications stipulate the dates for introducing the changes, the delivery dates and the number of the vessels and products for which they are to be introduced. The designers append to the notification a corrected list of the material consumption standards for the vessel or article.

Table 38

Relationship of Rates and Standards with Indicators of Enterprise Tekhpromfinplan

Rates and Standards	Area of Using Rates and Standards	Those Responsible for Working Out Corresponding Rates and Standards
Rates and standards for consumption of materials, fuel, thermal and electric power		
Consumption rate for raw products and basic materials per unit of product (PUYe)	Plan for material and technical supply Planning costings for individual product type	Bureau (sector) for material rates (BMN)
Consumption standards for auxiliary materials, fuel, thermal and electric power for production needs	Plan of material and technical supply Estimates of shop expenditures and expenditures on maintenance and operation of equipment	BMN
Consumption standards of materials for repair and operating needs	Plan of material-technical supply and equipment repairs. Estimate of expenditures for upkeep and operation of equipment	Department of chief mechanical engineer (OGM)
Consumption standards for fuel and electric power for generating various types of energy in the auxiliary shops	Fuel and energy balances Estimate of expenditures for shops in auxiliary production	OGM and chief power engineer (OGE)
Consumption standards of fuel and electric power for internal needs	Estimates of shop and general plant expenditures and auxiliary production	OGM and OGE
Consumption standards for materials used in manufacturing tools and special fittings	Plan for material and technical supply, plan costings	Tool department (OI)

[continuation of Table 38]

Rates and Standards	Area of Using Rates and Standards	Those Responsible for Working Out Corresponding Rates and Standards
Efficiency (EFF)	Fuel balance	OGM and OGE
Power coefficient	Balance of electric power	OGE
Norms and standards for means of labor		
Equipment load factor	Calculation of production capacity	Department of chief production engineer (OGT)
Shift factor for operation of equipment	Same	Same
Return on investment, product output per ruble of fixed productive capital	Calculation of production capacity Plan for increasing production efficiency	Production planning department (PPO)
Product output per m of area	Plan for raising production efficiency	PPO
Standards for productivity and operating conditions of equipment	Same	OGT
Repair and operating rates and standards	Same	OGM and OGE
Rates and standards for live labor		
Labor intensiveness standards for parts, assemblies, sections, PUYe and products	Labor intensiveness of production program in labor and wage plan Planning costings of individual products	Department for organization of labor and wages (OOTiZP)
Available working time fund of one worker	Number of workers in rated jobs	OOTiZP
Planned coefficient for fulfilling standards	Same	OOTiZP

[continuation of Table 38]

Rates and Standards	Area of Using Rates and standards	Those Responsible for Working Out Corresponding Rates and Standards
Equipment manning standards	Number of workers in jobs without standards	OOTiZP, OGT, OGM and OGE
Staff schedules for engineers, technicians and white collar personnel	Number and wage fund of engineers, technicians and white collar personnel	OOTiZP
Consumption standards for wages of workers for pieces, assemblies, sections, PUYe and articles	Wage fund of piece workers	OOTiZP
Standards for planned surpayments in percent of direct wages	Wage funds for employee categories	OOTiZP
Rates and standards for organization of production process	Production plan in product sales, calculation or production capacity	PPO
Rates of financial resources	Economic incentive funds. Financial plan	Financial bodies

In revising the standards for the following year, the plants are obliged to ensure the fulfillment of the percentages of their average reduction as set by the superior organizations. For this first of all the consumption standards for materials are revised for those vessels and articles for which the greatest savings is possible, as well as for the scarcest materials. In the first quarter of the current year, the plants draw up the results of this work for the current period in the form of a statement of the demand calculation, the consumption and saving standards for materials in product output, and approve standards for the consumption of materials for the vessel or product for the following year. In revising the production standards, all the changes should be considered which have been made in the plans and production processes accepted in the current year. All changes in the production standards should be fixed in all the normative documents used at the plant.

For ensuring the planned work of increasing the output and manning standards (for the reduction in the time standards and employee rates) at the

enterprises before the start of the planned year, calendar plans should be worked out for revising the current standards, and these plans are a component part of the tekhpromfinplan. The calendar plans are worked out on the basis of the measures planned for introduction in the area of raising production efficiency and ensuring the fulfillment of the quotas for the growth of labor productivity set in the annual and five-year plans. The calendar plan for the revision of standards is brought up for discussion by the permanent production meeting or worker assembly, and considering their recommendations is approved by the enterprise leader with the agreement of the trade union committee. The employees should be notified of the revised output, time and manning standards and rates no later than 2 weeks before their introduction.[3]

In accord with the measures stipulated in the tekhpromfinplan to accelerate scientific and technical progress, to raise production efficiency and to save live and embodied labor in the period being planned a revision is also carried out in the rates of the means of labor and the calendar planning rates.

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[3]See: EKONOMICHESKAYA GAZETA, No 49, 1975, p 14.

CHAPTER 7: CAPITAL CONSTRUCTION

59. Planning capital construction. The capital construction plan at a shipbuilding enterprise is a component part of the capital construction plan of the ministry and one of the basic sections of a tekhpromfinplan. The basic form of capital construction planning is the five-year plan, the quotas of which are concretized and adjusted in the current annual capital construction plans (of the given five-year plan) considering the requirements of production and changes in resources. In working out the capital construction plan, consideration is given to the maximum possible use of the existing fixed productive capital and capacity. Capital investments are planned in those areas where the existing fixed capital and capacity do not ensure the fulfillment of the tasks confronting the enterprise.

The plan quotas should be coordinated with the financial and material resources and with the delivery dates for the preassembled equipment.

The initial base for working out capital construction includes: a) the long-range plan for enterprise development and the quotas for the development of new product types; b) the control figures of the production plan; c) data from an analysis of the balance and indicators for the use and development of existing productive capital and capacity; d) the plan for the technical development and organization of production; e) the presence of design and estimate specification; f) technical and economic background studies for the construction of new objects and the reconstruction of existing production shops and sections; g) data on the existing and planned stocks and incomplete construction.

The technical and economic background study is the basic condition for including various projects (construction, reconstruction or rennovation) in the capital construction plan. In terms of the specific features, the capital construction projects are divided into industrial construction, housing, cultural-service, administrative, hydraulic engineering and transport.

In building of one sort or another, the capital investment volume includes the value of the following: a) construction and installation work; b) production, power and materials handling equipment; c) tools and supplies

included as part of fixed capital; d) design and research work; e) other work, acquisitions and expenditures provided in the estimate or title list.

The ratio between these expenditures forms the production structure of the capital investments. An improvement in the capital investment production structure (a rise in the proportional amount of equipment) is a most important reserve for increasing their economic efficiency and an important factor in raising the efficiency of social production.

The elaboration of the capital construction plan must be started by measures and jobs carried out from the production development fund, the fund for sociocultural measures and housing construction, and then bank credits and other noncentralized capital investment sources. Here first of all the plan is drawn up for completing fixed capital and production capacity by measures in the plan for the technical development and organization of production.

The individual sections of the capital construction plan are: a) the plan for the completion of fixed capital and production capacity; b) the title lists which define the direction and dates for beginning and completing the construction of individual projects.

The design capacity is put into operation on the dates corresponding to the standards for the period of its development as approved by the USSR Gosplan on 17 October 1969, in accord with the Decree of the USSR Council of Ministers of 4 November 1966 [66].

Capital construction at the enterprises and associations is carried out by two methods: contractual and direct labor. The basic one is the contractual method of construction whereby the construction and installation jobs are performed by specialized construction and installation organizations on the basis of contracts concluded with the client. The direct labor method of construction is carried out by the enterprise without involving contractual organizations. It is used at operating enterprises in building small projects, and is carried out under the leadership of the capital construction department.

The basic indicators in the capital construction plan are: a) the rise in production capacity at existing production associations and enterprises from their technical reequipping and the carrying out of organizational and technical measures; b) the completion of fixed productive and nonproductive capital; c) the volume of capital investments and construction-installation work; d) the volume of incomplete construction at the end of the five-year plan (year). The indicators of the capital construction plan are determined on the basis of the project title lists which have been worked out and approved in the proper procedure.

At existing enterprises, a unified capital investment plan is drawn up and its financing and crediting are carried out solely through the institutions of the USSR Stroybank, regardless of the financial sources.

60. A title list is a specific list giving the names of the projects to be included in the capital construction plan. The title list reflects: The dates for the beginning and completion of construction on the project; estimated value, the volume of construction and installation work; the quota for completing production capacity and fixed capital; the yearly volumes of work for the entire construction period. The approved title list for capital construction is the basic document for opening up construction financing and for concluding contracts with a contracting construction organization and the equipment suppliers.

Recently each year on the basis of the approved title lists, for each project internal project title lists have been compiled for concretizing the plan quotas for the given plan period.

The Decree of the USSR Council of Ministers, No 643, of 10 July 1967 established the procedure for approving the title lists of construction sites.[1] According to this decree, the title lists for newly commenced construction projects for facilities with an estimated value of 2.5 million rubles and above should be approved by the USSR Council of Ministers upon proposal of the USSR Gosplan; projects from 1 to 2.5 million are approved by the USSR ministries and departments and the Union republic councils of ministers; from 1 million rubles and lower, by the procedure set by the USSR ministries and departments and by the Union republic councils of ministers.

61. Expenditures related to reconstruction and technical reequipping of existing enterprises.[2] The *reconstruction* of an existing enterprise includes: The complete or partial reequipping and reorganization of production carried out under a single plan with the replacement of obsolete and physically worn out equipment, the mechanization and automation of production, and the construction of new shops and projects.

The *technical reequipping* of an existing enterprise includes: The carrying out of a range of measures (without an expansion of the existing area) in accord with the enterprise's (association's) plan for technical development and the organization of production to raise the technical level of the individual production areas up to modern requirements by introducing new equipment and production methods, by mechanizing and automating the production processes, by improving the organization and structure of production and the general plant system, as well as other organizational and technical measures aimed at bringing about an increase in product, an improvement in

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[1] "Sbornik Postanovleniy Pravitel'stva SSSR," No 17, 1967, Article 119.

[2] See: "Provisional Instructions on the Procedure for Financing and Long-Term Crediting of Capital Investments for Technical Reequipping and Reconstruction of Existing Enterprises," Stroybank SSSR, Moscow, 1977.

its quality, a rise in productivity, an improvement in the conditions for the organization of labor, and so forth.

Such expenditures also include: Expenditures on the acquisition, manufacturing and installation of new equipment, machines and mechanisms; the reequipping and adapting of production areas needed to carry out measures to introduce new equipment; to convert boiler and other units from solid fuel to liquid and gas, including expenditures on connecting them to the main gas lines, the heat lines and power transmission lines; to improve and modernize the ventilating systems, to employ radio, telephone and television in controlling production, as well as other measures related to the scientific organization of labor; to reequip special means of transport; to replace fixed capital, to purchase freight transport designed for production purposes, as well as other measures to develop production (including for organizing the production of consumer goods) without new construction; to intensify the production processes (the use of higher speeds, voltages, pressures, temperatures and so forth); for the additional installation of new equipment at existing production areas; to improve the quality and composition of raw products, materials and fuel; to expand cooperation and raise the level of production specialization; to increase the equipment shift factor.

62. Financing capital investments. The financing and crediting of capital investments for all national economic sectors (with the exception of the Ministry of Agriculture, the Ministry of Reclamation and Water Resources, the State Forestry Committee of the USSR Council of Ministers, USSR Sel'khoztekhnika and other organizations the financing and crediting of which are carried out by institutions of the USSR Gosbank) for reconstruction and technical reequipping of existing enterprises are carried out by the USSR Stroybank within the limits of the funds provided by the financial plans of the enterprises (organizations) and the credit plans of the local USSR Stroybank institutions.

Financing of capital investments is carried out:

1) For the technical reequipping and reconstruction of existing enterprises (without construction and expansion of the existing basic production shops), including expenditures of future years, primarily from the money of the production development fund, the enterprise fund, and money earmarked for construction of production projects in other economic incentive funds, as well as fron enterprise profits and amortization deductions earmarked for the complete replacement of fixed capital and for the lacking part, from bank credits;

2) For the technical reequipping and reconstruction of the planned-loss and low-profit enterprises, in addition to the fund for the development of production, it is also possible to use money from amortization deductions earmarked for the complete replacement of fixed capital, profit and allocations from the state budget. Here the state budget allocations can be used for reconstruction and technical reequipping only with permission from the USSR Council of Ministers;

3) For acquiring equipment for a replacement to be carried out under the capital construction plan for maintaining existing capacity, as well as equipment not included in the construction estimates (railroad rolling stock, airplanes, helicopters, maritime and river fleet vessels, motor vehicles, buses, motor transport road equipment, streetcars, construction machinery, and so forth) from the production development fund, the enterprise fund and money earmarked for construction of production projects in other economic incentive funds, a portion of profits and amortization deductions for the complete replacement of fixed capital, and with a shortage, using money of the state budget.

The financing sources for capital investments for the technical reequipping and reconstruction of existing enterprises are provided in the financing plans (forms No 12, 5).

Credit for technical reequipping is provided for a period up to 6 years from the time the first loan is granted under the condition of the repayment of the expenditures within the stipulated time.

The financing and crediting of expenditures on the technical reequipping and reconstruction of enterprises are carried out under the condition of the incorporation of the designated expenditures in the capital construction plan and the title lists which are provided with the properly approved technical specifications within the limits of the standard (planned) times and the approved estimated cost. The overall need for credit is determined as the difference between the estimated cost of expenditures for carrying out all the measures related to the technical reequipping and reconstruction of operating enterprises and the total of their own assets earmarked for the given financing. Crediting is carried out on the basis of credit agreements which set the conditions for granting the credit, the efficiency of the expenditures to be credited, the sources and dates of retiring the credit, and the responsibility of the parties. The financing of capital investments which have been allocated to existing enterprises for the construction of nonproduction projects is carried out in the generally established procedure.

A credit obtained for the construction of new enterprises or the expansion of existing ones under the centralized state financial capital investment plan is repaid from the profit and a portion of the amortization deductions going into the full replacement of fixed capital.

The credit extended for expenditures on the reconstruction and technical reequipping of operating enterprises is repaid from money of the production development fund. The credit issued for expenditures to increase the output of consumer goods is repaid from money of the production development fund, and with an insufficiency of this fund, from the profits (savings) and 50 percent of the total turnover tax received from the sale of the designated goods.

63. Crediting expenditures on the technical reequipping and reconstruction of existing enterprises. The financing and crediting of expenditures on the technical reequipping and reconstruction of existing enterprises, regardless of the sources, are carried out by the USSR Stroybank on the basis of the properly approved capital construction plans (form No 7) and the financing of capital investments (form No 5).

For opening the financing and crediting of expenditures on the above-indicated purposes, the client enterprise submits to the financing bank the documents provided by the Rules Governing Capital Construction Contracts as well as a credit agreement worked out on the basis of the approved project technical and economic indicators.

The capital construction plans of the enterprises and organizations (form No 7) which have been granted capital investments for technical reequipping or reconstruction indicate in a separate line the increase in production capacity and the volume of capital investments separately for "Technical Reequipping" or "Reconstruction," depending upon to what type of construction the capital investments of the given enterprise are related. In those instances when the existing enterprises simultaneously are granted capital investments for expansion and for technical reequipping, the internal project title lists should give the expenditures separately with the statement "for technical reequipping."

The amount of credit for the year being planned is set by the client, proceeding from the capital investment projects considering the enterprise's own assets, the mobilization (immobilization) of the working assets and changes in the total constantly carried forward debt.

The basic portion of the credits goes on expenditures to introduce new equipment, mechanization and improvement in production methods, the replacement of equipment, the automation of production processes, the modernization of equipment and for carrying out other measures related to the technical improvement and bettering of the production organization.

A bank credit is granted to organizations and enterprises with a shortage of money in the production development fund and under the condition of national economic advisability, economic efficiency and the repayment of the planned expenditures over the set limit crediting times, the providing of them with the necessary material and technical resources, capacity at contracting organizations and a labor force, and an additional amount of raw materials sufficient for the complete utilization of the new capacity and the marketing of the additional product. The corresponding data should be considered in working out the capital construction and financing plans.

The banking institutions grant credits for the technical reequipping and reconstruction of existing enterprises on the basis of the approved capital investment plans and a credit agreement between the parties, that is, the client (enterprise) and the institution of the USSR Stroybank. Appended to the petition for the obtaining of a credit are the estimate and financial

calculation (the summary estimate financial calculation), a calculation of the effectiveness of the measure being credited and the credit repayment date, and data on the allocated amount of own capital investments. Here the dates for using the credits are figured from the moment of granting the first loan. The enterprises and organizations can be granted credits for working out design and estimate specifications needed for carrying out the technical reequipping and reconstruction, as well as other measures related to the introduction of new equipment, and the expansion and organization of consumer goods production. Loans for these purposes are granted with the permission of the leader of the corresponding Stroybank institution. In granting the loans, they proceed from the total expenditures on carrying out the entire measure, including the cost of the design and research and this is determined from a preliminary calculation compiled on the basis of consolidated measurements, analogs or other indicators, regardless of whether these specifications are worked out by the borrower enterprise or an outside organization.

The enterprises and organizations draw up and submit a calculation of the demand for credit to the corresponding Stroybank institutions for obtaining a credit on expenditures related to technical reequipping and construction and the expansion of consumer goods production.

With the contract method of executing the work, the payments with the contracting organizations are made in accord with the construction financing rules. The loans are granted within the total amount of the permitted credit.

When the work is performed by the direct labor method, the money for paying wages to workers employed in construction and installation work is provided above the wage fund approved for the enterprise, but not over 40 percent of the total expenditures on the measure being credited. In granting these funds, they proceed from the totals provided by the financial estimate calculation.

The calculation of the time for repaying the credit is drawn up by the enterprises and organizations on the basis of the data of the efficiency calculations and the repayment of the credited measures. The fixed productive capital created from the money of the production development fund and the bank credit are freed from budget payments until the complete repayment of the credit.

64. The composition (structure) of capital investments in terms of the basic types of capital expenditures.

The total volume of capital investments is:

$$K = C_c + C_m + C_t + C_i + C_k + C_p,$$

where C_c--the cost of all types of construction work;
C_m--the cost of work related to equipment installation;
C_t--the cost of production, power, materials handling, pump-compressor and other equipment (both requiring and not requiring installation)

stipulated in the construction (reconstruction) estimates;

C_i--the cost of tools and supplies included in the building (reconstruction) estimates and entered as fixed capital;

C_k--the cost of machinery and equipment not included in the estimate of the structures, if these machines (equipment) are acquired from capital investments;

C_p--other capital work and expenditures (including expenditures on design-research and drilling work).

The volume (cost) of construction work is:

$$C_c = C_e + C_{st} + C_f + C_{pp} + C_\ell + C_p + C_u + C_h + C_a,$$

where C_e--expenditures on erection, expansion, reconstruction and rebuilding of permanent buildings and structures and the related work of the installation of reinforced concrete, metal, wooden and other structural elements;

C_{st}--the cost of sanitary-technical devices, water supply and sewage, the erection of installations for purifying industrial waste water and gas and ash traps, the laying of lighting wire, the building of gas and heating networks, oil pipelines, product pipelines, gas lines, overhead and underground power transmission lines, communications lines, the building of bridges and quays, roadwork, under water engineering, diver and other types of special work in construction, as well as the cost of the sanitary-technical equipment provided by the construction standards and rules (heating boilers, boilers, radiators and heaters);

C_f--expenditures on the construction of footings, foundations and support elements under equipment, the cladding and lining of boilers, furnaces and other units;

C_{pp}--expenditures on the development of sections, preparation and planning of the construction territories, including the building up of the territories and the related demolition of structures, felling of timber, uprooting of stumps, drainage, vertical planning, and so forth;

C_ℓ--the cost of landscaping and other amenities on the developed territory as well as settlements and towns;

C_p--expenditures on the alignment of the ground, land reclamation (irrigation and drainage), the building of hothouses, forcing frames, bottom-deepening, bank-retaining and swamp preparation work, except track repair work, work on maintaining the depths on navigable rivers, canals and port waters, ship repair yards and fleet repair and operating bases, as well as for draining swamps at existing peat enterprises;

C_u--expenditures on mining work (except work carried out from operating expenditures of existing enterprises);

C_h--expenditures on hydrological work (drilling, pit sampling, pumping out of water and so forth) involved with the construction of buildings and installations;

C_a--additional expenditures related to carrying out construction work during the wintertime, wage surpayments (set for individual regions of the country, as well as for individual sectors and construction projects for jobs carried out under alpine conditions as stipulated in the uniform estimates), and other types of construction work and expenditures not listed above and provided for in the construction standards and rules.

The volume (cost) of work related to the installation of equipment is:

$$C_m = C_{ai} + C_{hu} + C_{is} + C_{ip} + C_{aw},$$

where C_{ai}--the cost of the assembly and installation of production, power, materials handling and other equipment, including the testing of installation quality;

C_{hu}--the cost of devices for delivery to the equipment (delivery of water, air, steam, cooling fluids, the laying, suspending and installation of cables, electric wires and communications wires) in the amounts stipulated by the price lists;

C_{is}--the cost of the installation and installment of service areas, ladders and other metal structural elements which are related to the equipment;

C_{ip}--the cost of insulating and painting the installed equipment and pipeline;

C_{aw}--additional expenditures related to carrying out installation work in wintertime.

Not included in the amount of installation work is the following: a) expenditures on disassembly and assembly of equipment made during starting-up and adjustment work; b) work related to assembly and disassembly of construction machinery and mechanisms.

65. Determining the economic effectiveness of capital investments. The economic effectiveness of capital investments is determined in accord with the standard procedure for determining the economic effectiveness of capital investments [96] and the sectorial procedural instructions.

CHAPTER 8: FIXED CAPITAL AND PRODUCTION CAPACITY OF A SHIPBUILDING ENTERPRISE

66. Fixed capital and its classification. One of the most important tasks in improving production efficiency is the most rational use of fixed capital and production capacity at the enterprises.

Fixed capital in the national economy is divided into productive and nonproductive. The productive fixed capital includes that fixed capital which is directly in the sphere of material production, it is operated for an extended time, therein maintaining its physical form, and transfers its value to the manufactured product piecemeal, as it wears out.

The nonproductive industrial fixed capital includes the installations for nonproduction purposes (housing, nurseries and creches, schools, hospitals and other public health and cultural-service facilities) which are run by the industrial enterprises and have an indirect effect upon the production processes.

The fixed productive capital of a shipbuilding enterprise comprises an important place in its chartered capital, and its proportional amount is about 60 percent.

The classification of fixed capital of the shipbuilding enterprises envisages its dividing into the following groups:

I. Buildings: of the basic, auxiliary and service shops, as well as the ehterprise administrative buildings.

II. Installations: production (ways, dry and floating docks, floating docks, slipways, slips, quays and outfitting basins), hydraulic engineering (canals, dams, rising towers), transport (roads, bridges and track), and so forth. Here an inventory item is considered to be each individual structure with all the devices comprising a single whole with it, for example, a dock with the materials handling equipment, and so forth.

III. Transmission devices: power networks, heating networks, gas networks, the distribution networks of water mains, water towers, steam lines, transmissions, and so forth.

IV. Power machines and equipment: steam engines, turbines, internal combustion engines, electric motors, electric machines, tractors and self-propelled chassis, starters, measuring and power transformers, converters, and other power equipment.

V. Working machines and equipment: machines, devices and equipment used for a mechanical, technical or chemical effect on the subject of labor and its movement through the process of creating the production-type product or service (metalworking and woodworking lathes, forging-stamping equipment, electrical welding equipment, materials handling equipment, conveyors, cranes, attachments and tools which are part of the given machine, and other basic and auxiliary equipment).

VI. Metering and recording devices and laboratory equipment: instruments and devices designed for all sorts of measurements, controlling the parameters of production processes, as well as for testing materials, carrying out experiments and research (ammeters, water flow meters, indicators, manometers, chronometers, automatic control panels, microscopes, stabilizers, and so forth).

VII. Means of transport: all types of means of transport used for moving people and freight, including the railroad rolling stock, motor vehicles and vessels, as well as production transport (internal combustion engine and battery operated plant trucks, carts, motorcycles, scooters, and so forth).

VIII. Tools: mechanized and unmechanized general tools (cutting, pressure, impact, and so forth) with a service life of over 1 year.

IX. Production and office supplies. Production supplies include: production articles which are used to support operations during work (benches, trestles); equipment providing labor safety (group machinery guards, and so forth); containers for storing liquid and loose articles (barrels, tanks, vats and so forth); regular crating, technical articles which could be considered as working machines (for example, frames, copiers, and so forth). Office supplies: office articles such as office furniture, racks, cabinets, sofas, desks, chairs, fireproof cabinets and boxes, typewriters, duplicating equipment, beds, rugs, curtains, as well as firefighting equipment (hand sprayers, standpipes, ladders, and so forth).

X. Other fixed capital: library holdings (regardless of the value of individual books), and capital expenditures on least fixed capital accounted for on the balance sheet of the lessor.

Each of the ten groups of the given classification, in turn, is divided into subgroups which consist of more uniform fixed capital with approximately the same service lives, amortization rates and operating conditions.

Not all the elements of fixed capital play the same role in the production process. The working machines and equipment, the tools, the metering and control devices and instruments, and the technical installations take a direct part in the production process, they directly influence the increase of product output and for this reason are considered as the active portion of fixed capital. The other elements of fixed capital (production buildings and office supplies) have only an indirect influence upon product output, and for this reason they are termed the passive portion of fixed capital.

67. An evaluation of fixed capital. For the purposes of accounting and planning the reproduction of fixed productive capital, physical and monetary indicators are used for evaluating the fixed capital. A physical evaluation of fixed capital (in units and sets) is required for gaining a notion of its physical state, as well as for calculating the production capacity of the shipbuilding enterprise, the operation of the capital, the organization of repairs, the replacing of worn out fixed capital, and the drawing up of the equipment balance.

A monetary evaluation of the capital is required for considering its dynamics, for planning expanded reproduction, for establishing wear, for calculating amortization, for determining product costs and profitability of production, as well as for carrying out economic accountability.

General planning and accounting of enterprise fixed capital as a whole are carried out basically in monetary terms. There are two methods for a monetary evaluation of fixed capital: in terms of initial value, the replacement value and in terms of the initial (or replacement) value minus wear.

The *initial (balance sheet) value* reflects the amount of actual expenditures on the creation of fixed capital, construction, and the acquisition of equipment, including its delivery, installation and erection. Proceeding from this value, the enterprises make deductions to the budget in the form of a payment for fixed productive capital, they figure the amortization totals, the profitability level, the return on investment and other indicators.

Initial value minus wear reflects the value of the fixed capital which has not yet been transferred to the manufactured product. This is less than the full initial value by the amount of the wear on the fixed capital and is often termed the residual value. The method of evaluating fixed capital in terms of the initial (replacement) value minus wear is used for setting the degree of wear and for determining the amount of the fixed capital value which still has not been transferred to the new product.

These two types of the monetary evaluation impede the comparability of data on fixed capital dynamics, since prices for equipment and the cost of construction change, while the fixed capital acquired (or built) in various years is expressed in mixed prices.

Uniformity in an evaluation of the same elements of fixed capital created in different years can be introduced by assessing the capital in terms of replacement value. The *full replacement value* is the value of reproducing the fixed capital under new production conditions (of the given year).

An evaluation of fixed capital in terms of replacement cost is a complicated and labor intensive process requiring significant outlays of time and money for revaluing all the fixed capital elements. Fixed capital is revalued periodically upon a governmental decree.

In accord with the Decree of the USSR Council of Ministers approved on 7 April 1969, from 1 August through 31 December 1971, a regular revaluation of fixed capital was carried out at the state self-financing enterprises and organizations, and this determined the degree of capital wear as of 1 January 1972.

68. Wear and amortization of fixed capital. Fixed capital located at enterprises is gradually worn out. Physical wear occurs as a result of using fixed capital in the production process as well as in the period of its idleness. Idle fixed capital wears out if it is exposed to natural processes (atmospheric phenomena, and because of this corrosion of metal parts, the buckling and rotting of wooden parts, and so forth). This type of physical wear causes great losses. As for operating fixed capital, its physical wear depends upon a number of factors, including upon the quality of the fixed capital (the materials from which it is manufactured, upon the technical progressiveness of the design, the quality of construction and installation), upon the load factor (the number of shifts and operating hours per day, the duration of work per year, the intensiveness of use in each unit of working time), upon particular features of the production process and the degree of protecting the fixed capital against the influence of outside conditions, including against aggressive media (temperature, humidity, and so forth), upon the quality of maintenance (promptness of cleaning, lubricating, painting, the regularity and quality of repair), upon the skills of the workers and their attitude toward the fixed capital.

The fixed capital, in being subjected to physical wear in the production process, each year loses a portion of its value equal to that amount which has been transferred to the product manufactured during this year. For example, with an equipment service life of 10 years, after the second year of its operation, the amount of wear will be 20 percent. This amount is determined by the following formula:

$$W_f = \frac{T_f}{T_a} 100,$$

where W_f--wear on fixed capital, percent;
T_f--actual period of operation of fixed capital, years;
T_a--standard service life (amortization period) of fixed capital, years.

Fixed capital undergoes not only physical wear but also obsolescence. Obsolescence consists in the fact that one or another type of fixed capital (for example, equipment) even before its complete wearing out is useless as a consequence of the development of new, more advanced similar elements, machines and equipment. Their use makes it possible to increase the production volume, to raise labor productivity, to reduce the consumption of operating materials (fuel, electric power, lubricants and so forth), and in certain instances machine-processed basic materials as well, to reduce expenditures on the production of a unit of product and provide higher manufacturing quality. Thus, the second form of wear occurs when the machine is technically obsolete and is replaced by a more advanced one. With this form of wear, in using obsolete equipment, more working time is lost in producing the same quantity of product.

In practical terms the solving of the problem of obsolescence consists in carrying out organizational and economic measures. It is essential to use the machines and mechanisms with a maximum load in order to accelerate the return of their useful effect prior to the occurrence of aging. This is why it is so important to reduce the construction times of new projects, and to see to it that the produced machines are not held up at warehouses or in installation.

Wear and amortization are not identical concepts. Amortization only in a monetary form expresses the wear of fixed capital. It may not coincide with the amount of wear in individual intervals of the year, since the fixed capital wears out unevenly, while amortization is calculated in even shares over the entire operating period.

Amortization in socialist industry is the planned recovery of the value of fixed capital (as it wears out) by transferring this value to the manufactured product. It performs the following basic tasks: 1) makes it possible to determine the aggregate social production outlays. In this role on the enterprise scale amortization is essential for calculating the volume and increase dynamics of net product; 2) in a general form it characterizes the degree of wear on fixed capital, and this is essential for planning the process of its reproduction; 3) it creates the monetary amortization fund for replacing worn out means of labor and their major overhaul.

The amount of value to be incorporated by amortization in the production costs represents the *amortization deductions*. Amortization deductions are made on the basis of established rates. The amortization rates are set for each type of fixed capital. They are determined by relating the total annual amortization deductions to the value of the fixed capital, and they are expressed in percentages as is seen from the following formula:

$$N = \frac{A}{F} 100,$$

where N--annual amortization rate;

A--amount of amortization deductions per year;
F--value (initial or replacement) of fixed capital.

Since the amount of amortization deductions over the year depends upon the initial value of the fixed capital at the moment of its acquisition, the proposed service life, the outlays on medium repairs and major overhaul over the entire amortization period, as well as upon the residual (liquidation) value of the fixed capital, hence the annual amortization rate is

$$N = \frac{F + R_m - L}{FC},$$

where R_m--expenditures on medium repair and major overhaul (including modernization) during service life of fixed capital;
L--liquidation value of fixed capital taken out of operation;
C--amortization period (service life) of fixed capital.

From 1 January 1975, new standard amortization rates for fixed capital were introduced, and these were differentiated according to the types (elements) of fixed capital in accord with their different service lives. Uniform amortization rates were set for the corresponding groups of fixed capital having an analogous purpose with relatively uniform service lives and expenditures on major overhauls. Each of these rates was divided, in turn, into two parts: one was designed for the major overhaul of fixed capital, including equipment modernization and expenditures on medium repairs (if these existed) carried out with a periodicity of over 1 year, and the other was for the complete replacement of the fixed capital (for renewal).

For such types of fixed capital as buildings, installations and transmission devices having an extended service life, the amortization rates were significantly lower than, for example, for machinery and equipment and means of transport which are a more active part of fixed capital. In the overall amortization rate for industrial fixed capital, there is a rather high proportional amount of amortization deductions going for major overhaul (about 47 percent). For individual types of fixed capital (buildings, power as well as working machines and equipment, and means of transport) this reaches 50-54 percent.

A portion of the amortization deductions which is earmarked for the major overhaul of fixed capital is available to the enterprises and is spent by them in accord with the repair plans; the other portion which is earmarked for replacement is spent until recently through centralized channels. Moreover, within the established procedure for the purposes of the most rational utilization of the amortization deductions earmarked for major overhauls, the enterprise turns over up to 10 percent of the total volume of these deductions to the superior body for creating a reserve to provide aid to those enterprises which do not have sufficient of their own funds for carrying out major overhauls.

For improving the composition and use of the fixed capital, the "Statute Governing a Socialist State Production Enterprise" gives the industrial enterprises the right to independently dispose of the funds earmarked for major overhauls, using them also for modernization of the fixed capital, and acquiring the necessary assemblies and parts. Moreover, the enterprises have gained the right (with the economic advisability) of acquiring new equipment using these funds.

In accord with the decisions of the September (1965) Plenum of the CPSU Central Committee, the enterprises operating under the new conditions of planning and economic incentive have been given the right to channel a significant portion of the amortization deductions earmarked for full replacement of the fixed capital (including 45 percent for the shipbuilding industry) into the production development fund.[1]

69. Indicators and ways for increasing the efficient use of fixed capital. These are employed for analyzing and planning the composition, structure, movement and state of productive capital.

The basic technical and economic indicators for planning and analyzing fixed capital at a shipbuilding enterprise are given in Table 39.

The return on investment is a general indicator which to the greatest degree describes the complete evaluation of the level of use for fixed productive capital. In drawing up the enterprise tekhpromfinplan, measures are worked out to increase the efficient use of fixed productive capital (the return on investment). A rise in the level of the return on investment is planned considering the influence of the following factors: An increase in the shift factor for equipment operation, a reduction in the time for reaching full production capacity, a decline in the cost of a unit of capacity, an increase in the share of the active part of the fixed capital in the total value of this capital, the replacement of the equipment fleet and a rise in the technical and economic indicators for the use of productive capital, and so forth.

70. Production capacity of a shipbuilding enterprise. By *production capacity* of an enterprise, one understands the maximum possible annual output of ships, ship machine building products and stock in the established range and quantitative ratios with the full use of the production equipment and areas considering the employing of progressive rates and standards, advance production methods and organization.

The calculating of production capacity is a most important element in the technical and economic background studies for the possible product production

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[1]The collection "Khozyaystvennaya Reforma v SSSR" [The Economic Reform in the USSR], Moscow, Pravda, 1969, p 258.

Table 39

Indicators for the Use of Fixed Capital at a Shipbuilding Enterprise

Indicator (a)	Description of Indicator (b)
Proportional amount of fixed productive capital in its total value, %	Ratio of the value of fixed productive capital to the total value of enterprise fixed capital
Proportional amount of nonproductive fixed capital in total value, %	Ratio of value of nonproductive fixed capital to total value of enterprise fixed capital
Proportional amount of each group of fixed productive capital of enterprise (shop) in its total value, %	Ratio of value of each group of fixed productive capital of an enterprise (shop) to the total value of fixed productive capital, %
Completion of newly installed and operating production and other equipment, and production areas	Range, quantity and value (rubles) for annual period
Withdrawal of production and other equipment and production areas	Range, quantity and value (rubles) for annual period
Replacement factor for fixed productive capital	Ratio of value of completed fixed productive capital to balance sheet value of initial composition of fixed productive capital
Withdrawal coefficient for fixed productive capital	Ratio of value of withdrawn fixed productive capital to total balance sheet value of available fixed productive capital
Increase coefficient for fixed productive capital	Ratio of difference in value between newly completed and withdrawn fixed productive capital to overall balance sheet value of fixed productive capital
Proportional amount of active part of fixed productive capital in its total value	Ratio of value of active portion of fixed productive capital to its total value
Proportional amount of highly productive equipment in active part of fixed productive capital (automatic and semiautomatic machines, machine tools with numerical program control, and so forth)	Ratio of quantity and value of highly productive equipment to the total quantity and the value of equipment in the active portion of the fixed productive capital

[continuation of Table 39]

a	b
Servicability coefficient of fixed productive capital K_f	Describes condition of fixed productive capital $K_f = \frac{F_f - W}{F_f}$, where F_f--balance sheet value of fixed productive capital; W--total amount of wear on fixed productive capital during entire period of operation
Coefficient of physical wear on fixed productive capital	Ratio of total wear of fixed productive capital to its initial balance sheet value
Average age of equipment in the fixed productive capital	Ratio of total number of years of use of equipment by groups (types) to the total number of units in the equipment group (type)
Proportional amount of obsolescence of production equipment	Ratio of value, the number of units of obsolete equipment to the overall balance sheet value or number of units of the existing equipment fleet
Use factor of available equipment	Ratio of number of units of installed equipment to their available number
Use factor of installed equipment	Ratio of number of units of operating equipment to the total quantity of installed equipment as an average per day
Shift factor K_{sh}	$K_{sh} = \frac{T_{sh}}{P_{in}}$, where T_{sh}--number of worked machine-shifts per day; P_{in}--quantity of installed equipment This method of determining the shift factor for the operation of equipment is possible on the basis of data obtained as a result of one-shot observations. However it does not provide a notion of the average shift factor for one or another period. In this instance, another method is used to determine the shift factor:

[continuation of Table 39]

a	b
	$K_{sh} = \frac{T_{sh}}{[P_{in}-(P_1+P_2)]D_p}$, where T_{sh}--the number of worked machine-shifts in the report (planned) period; P_1--quantity of installed equipment in reserve in accord with the instructions of the directive bodies; P_2--the quantity of installed equipment in the shops and sections specially set aside for practical training of students from vocational-technical schools and school children; D_p--number of working days in report (planned) period
Coefficient for internal shift use of equipment K_{is}	Calculated for studying the internal shift use of the equipment as the ratio of the total actually worked machine-hours in a shift to the shift time fund of the established equipment
Coefficient of extensive equipment use K_{ex}	Ratio of actual equipment operating time to maximum possible equipment operating time per year
Coefficient of intensive equipment use K_{in}	$K_{in} = \frac{Q_f}{Q_{max}}$, where Q_f--actually produced product per unit of time by one machine or by all machines per year; Q_{max}--maximum possible product output in a unit of time by one or all machines
Load factor for work area K_{ℓ}	$K_{\ell} = \frac{P_{\ell}}{P_c}$, where P_{ℓ}--planned load for calculation period (product in physical units: pieces, weight, meters and so forth); P_c--capacity in the same units and in the same calculation period

[continuation of Table 39]

a	b
Product output per m^2 of area	Ratio of the volume of the manufactured product to the working area of the shop, section (or to the entire area considering the area occupied by auxiliary and service facilities)
Return on investment, rubles or kopecks, F_{oc}	$F_{oc} = \frac{Q_{gp}}{F_{fa}}$, where Q_{gp}--the value of the gross (commodity) or normed net product; F_{fa}--average annual value of the fixed productive capital
Product capital intensiveness	Value inverse to the return on investment. Describes the value of the fixed productive capital per ruble of produced product
Capital-to-labor ratio	Ratio of value of fixed productive capital to total number of industrial-production personnel (or just production workers)
Equipment-to-labor ratio	Ratio of value of active portion of fixed productive capital to the number of production workers
Energy-to-labor ratio (the potential coefficient for the energy-to-labor ratio of one worker of industrial-production personnel or one production worker)	Characterized by the ratio of total capacity of electric motors to number of workers employed on the largest shift

volumes in the period being planned with the given means of labor. The amount of production capacity depends upon the quantity and productivity of the active means of labor. For this reason a rise in their share in the fixed productive capital and an increase in their productivity are a most important condition for increasing the production volume and improving its efficiency. The production capacity of a shipbuilding enterprise, shop or section can be increased both by extensive factors by using additional capital investments, as well as by intensive factors, that is, by improving production organization, by modernization of the equipment and a reduction in its stoppages, the mechanization and automation of production processes, the use of the scientific organization of labor, a rise in the shift factor, and so forth.

The second way is the most efficient for existing enterprises.

The concept of the production capacity of a shipbuilding enterprise, shop or section must be distinguished from the concept of the designed capacity, that is, the capacity of the enterprise provided in the plan specifications, as well as the concept of the production program. While the production capacity characterizes the objectively existing conditions for the maximum possible product output at the given enterprise, the production program reflects the quota for using these capabilities in the planning period proceeding from the product quantity which at the given time is required by the national economy and the production of which is supplied with labor, material and energy resources. A rise in production capacity is planned considering the planned product volume and the degree of carrying out the stipulated program using the existing capacity. The difference between the necessary and existing capacity considering an improvement in its use comprises the amount of the required increase in production capacity and when necessary capital investments are allocated for creating this capacity. For these purposes the enterprises annually draw up production capacity balances.

On the basis of the calculations carried out, reserves are discovered for a rise in production, and the volume of product output is set. The calculations of production capacity are also used for establishing the economically advisable specialization and cooperation of the enterprise and the planned capital investment volume.

The production capacity of a shipbuilding enterprise is calculated for the entire range of product to be produced by it, and this should conform most closely to the specialty and structure of the fixed productive capital at the given enterprise.

The production capacity of a shipbuilding enterprise is calculated in the same physical units as the production program. If the enterprise produces many types of products (vessels), then the production capacity is figured for a consolidated range in terms of representative products. In this instance all the products (particularly this applies to enterprises in ship machine building) are grouped in terms of similarity of the production process. In each group the most characteristic product, that is, the representative product, is selected. All the remaining products in the given group are reduced to this representative using coefficients which have been obtained by dividing the labor intensiveness of the product to be converted in machine-hours by the labor intensiveness of the representative product.

The production capacity of an enterprise as a whole is determined from the capacity of the leading production shops which carry out the basic production processes involved in manufacturing the given product. In determining the production capacity of the shipbuilding portion of the plant (the yard), these leading shops are: Hull assembly, assembly-welding and ways, and in ship machine building they are accessories and machine-assembly.

Table 40

Methods for Calculating Production Capacity

Capacity Indicators and Calculation Formulas (a)	Explanation (b)
1. Annual producton capacity of ways shops (slips) $M_{sw} = \frac{nD_p}{R_p}$	n--number of ways areas according to production plan; D_p--number of working days in year; R_p--building pace, days
2. Building pace of vessels $R_p = \frac{N}{PhK_f}$	N--normed labor intensiveness of ways work, norm-hours P--average number of workers on ways according to production plan; h--number of hours of work on ways, days; K_f--coefficient for fulfilling standards in ways jobs
3. Production capacity of ways shops with flow-position building of the vessels $M_{fp} = \frac{D_p}{R\ell}$	$R\ell$--pace of assembly or flow line, days
4. Pace of flow line $R\ell = \frac{N\ell}{P\ell h\ell K_f}$	$N\ell$--the standard of labor intensiveness for building one vessel in all positions, norm-hour; $P\ell$--average number of workers in all positions of the flow line, days; $h\ell$--duration of the work shift, hours;

[continuation of Table 40]

a	b
5. Production capacity of machine-assembly shops $M_{ma} = \frac{CPF_uK_{sh}K_f}{T_c}$	C--number of assembly work areas; P--average number of workers at one work area; F_u--annual effective time fund of one worker, hour; K_{sh}--shift factor; T_c--labor intensiveness of assembling one product, norm-hour
6. Production capacity of machine shops $M_m = \frac{CF_eK_fK_{sh}}{T_o}$	C--average annual amount of installed equipment in shop; F_e--effective working time fund of equipment per shit, hours; T_o--standard of labor intensiveness for turning out a unit of product, machine-hour
7. Effective working time fund of equipment $F_e = D_p h(1-\beta)$	D_p--number of working days per year; h--number of hours of equipment operation per day; β--coefficient for equipment stoppages during repairs ($\beta = 0.04-0.50$)
8. Production capacity by production area $M_{ar} = \frac{SF_uK_f}{wT_p}$	S--total production area of a shop; F_u--effective time fund of area, hours; w--average area occupied by one product; T_p--the standard of labor intensiveness for work or one product, norm-hour

Of important significance is the coordination of capacity among all the shops and production areas. For this reason at the enterprises they also calculate the capacity of all the remaining production and auxiliary shops, sections or systems. Here if a discrepancy is discovered between the capacity of the individual shops, then organizational and technical measures are worked out to eliminate them or to load up the surplus capacity with other work. The calculation of an enterprise's production capacity

includes all production equipment assigned to the shops (both operating and idle as a consequence of a malfunction, repairs or modernization). Reserve equipment the list and quantity of which are approved by the superior organizations is not considered in the calculation for production capacity. The production capacity of an enterprise is calculated on the basis of advanced technical or design standards for equipment productivity, advanced production methods and the organization of production. The methods of calculating production capacity at shops and the enterprise are given in Table 40.

Production capacity is calculated proceeding from the maximum possible equipment working time fund. At enterprises with a broken production process, the annual time fund is calculated from the number of working days a year multiplied by the number of hours of work per day considering the shortened working time on days before holidays. Equipment shoppages during planned repairs are also excluded from the annual time fund.

The production capacity of each enterprise is determined for two dates: the incoming on 1 January of the current year and the outgoing on 1 January of the following year.

For the purposes of planning and accounting for the use of production capacity, the average annual amount of production capacity is also determined

$$M_a = M_{in} + \frac{M_s h_1 - M_w h_2}{12},$$

where M_{in}--incoming capacity on 1 January of the year being planned;
M_s--capacity newly completed in the year being planned;
M_w--capacity being withdrawn in year being planned;
h_1, h_2--number of months, respectively, for operation and withdrawal of capacity before year's end.

The outgoing capacity is determined from the formula

$$M_o = M_{in} + M_s - M_w.$$

The degree of utilizing the average annual production capacity is determined by a coefficient which is expressed in the form of the ratio of annual product output to average annual capacity in the given year. An improvement in the use of the fixed productive capital is an important reserve for overfulfilling the enterprise production plans and increasing production efficiency.

CHAPTER 9: MATERIAL AND TECHNICAL SUPPLY AND WORKING CAPITAL

71. Planning material and technical supply at a shipbuilding enterprise. The system of material and technical supply [MTS] at enterprises is based upon the strictly planned satisfying of their demand for material resources. The continuity, promptness and completeness of deliveries are essential conditions for its functioning. The annual, semiannual and quarterly material and technical supply plans at shipbuilding enterprises are worked out in accord with the production program using the forms and on the dates stipulated by the Glavsnab [main supply administration] of the ministry and by the territorial administrations of the USSR Gossnab.

The demand of an enterprise for materials to develop rotating production stocks is determined on the basis of the instructions and procedures for the norming of working capital and production stocks.

The basic sources for covering the demand for materials are: the expected balances of materials, the internal resources of the enterprise, the receipts under decentralized procurement and the predominant share in the form of receipts under allocations centrally assigned for the given planning period.

The amount of the expected balance of the material at the beginning of the planning year is

$$M_{ex} = M_f + R_{ex} - P_p,$$

where M_f--the actual balance of material on the first of the month in which the material supply plan is worked out;
R_{ex}--the expected receipt of the given material over the period from the date for which the actual balance has been taken until the end of the current year;
P_p--the expected consumption of the given material over the same interval of the current year.

The amount of the delivery of materials under noncentralized allocations is determined on the basis of the material balance:

$$P_{pr} + P_{nt} + P_{re} + P_{fi} + P_{ed} + P_{sr} + P_{st} = M_{ex} + D_d + B_p + F_c,$$

where P--the demand for materials, respectively:
P_{pr}--for the production program;
P_{nt}--for new equipment;
P_{re}--for repair and operating needs;
P_{fi}--for fittings;
P_{ed}--for experimental design work;
P_{sr}--for scientific research;
P_{st}--for creating the carryover production stocks;
M_{ex}--the expected balances of materials at the enterprise warehouses by the start of the planning period;
D_d--receipts from decentralized deliveries;
B_p--the amount of covering the demand for materials by mobilizing internal resources;
F_c--the amount of material deliveries under decentralized allocations (the requestable allocation).

The amount of the requestable allocation equals

$$F_r = P - (M_{ex} + B_p + D_d),$$

where P--the total demand of the enterprise for the given material (the total of the indicators on the lefthand side of the material balance).

The annual MTS plan for a shipbuilding enterprise is worked out in two stages. At the first stage (March-April), a preliminary plan is drawn up in the form of requests containing the calculations and the total demand for individual types of materials and these are used as the basis for working out the national economic supply plans (the material balances and the allocation plans).

At the second stage (December of the current year--January of the year being planned), the annual MTS plan, in accord with the approved production program, is adjusted and it assumes a final form.

The quarterly supply plans are worked out in a specific form for the entire range of materials essential for the enterprise in the plan period.

The enterprise MTS plan is worked out both in physical and monetary units for the purpose of monitoring the state of working capital invested in production stocks, for comparing the actual expenditures with planned expenditures in product costs, and so forth.

An essential condition for correctly determining the demand of an enterprise for material resources during the period being planned is the use of the appropriate normative or standards base.

The basic standards used in working out the MTS plans are given in Fig. 2.

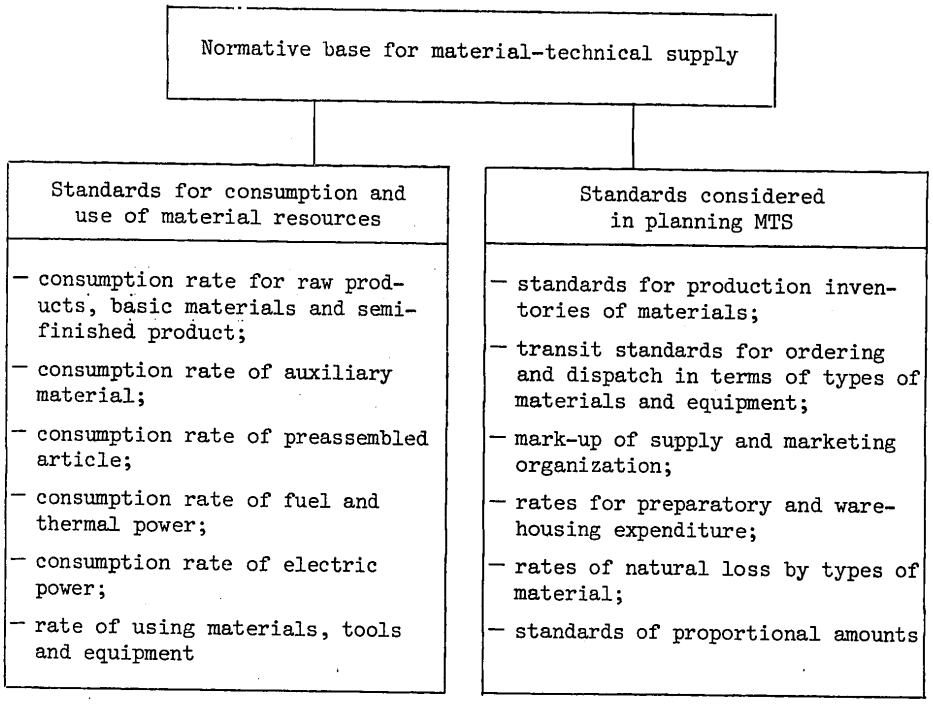

Fig. 2. Normative MTS Base of an Enterprise

72. Materials consumption standards. One of the most important aspects in material and technical planning is the elaboration and approving of progressive consumption rates. Consumption standards and rates comprise the basis of the MTS plan. Using the rates, the demand of the enterprise is determined for material resources, the delivery plans are drawn up, the plans for the material supply of the shops, sections and work areas are organized, and standards for the issuing of materials for production are worked out.

A *consumption rate* is the maximum necessary quantity of raw products, materials, fuel or energy needed for producing (manufacturing) a unit of product of the established quality considering the specific organizational and technical production conditions.

For assessing the level of the progressiveness of consumption rates or, in other words, the degree of the rational use of material resources, a system of indicators is employed. The basic ones are: The materials use factor, the indicator for the reduction of material consumption and the indicator of the progressiveness (economicness) of the material consumption rates.

The material use factor K_u is the ratio of the net weight of the product to the established rough material consumption rate and is expressed either in percentages, or by a number lesser or equal to one:

$$K_u = P_n : P_r,$$

where P_n--the net weight of the piece (article);
P_r--the rough weight of the material for the piece (article) according to the standard.

The percentage of the reduction of the consumption rate R_c is determined from the formula

$$R_c = \frac{K_p - K_b}{K_p},$$

where K_p, K_b--the material use factors, respectively, in the plan and base periods.

The indicator for the progressiveness of the rate R_d expresses the amount of additional product which can be obtained as a result of a rise in the material use factor:

$$R_p = \frac{K_p - K_b}{K_b} 100.$$

In terms of the degree of detailing, the rates are classified into specific rates or rates which establish the consumption of a specific material (with the indication of the type-size, grade, shape, composition and so forth) per unit of product; summary rates or rates which set the consumption of a uniform type of material per unit of product, and are used for drawing up the annual plans (orders).

The piece, assembly and article consumption rates for shipbuilding enterprises are employed mainly for operational planning in the material and technical supply of the enterprise shops and facilities.

In working out the consumption rates, a prime task is to optimize the amount of the normed losses and wastes for the entire production chain in manufacturing the product.

Any individual consumption rate is set considering the consumption structure. In a general form the structure of the material consumption rate is:

$$A_m = q_e + \Sigma(q_o - q_u) + \Sigma(q_{ot} - q_{ou}),$$

where q_e--the effective or net material consumption;
q_o--the total quantity of production waste and material losses;

q_u--the usable portion of production wastes;
q_{ot}--other technical and organizational expenditures and losses;
q_{ou}--the usable portion of the other technical and organizational wastes.

From the formula it follows that the structure of the individual material consumption rate consists of three basic elements: The effective (net) consumption, production wastes formed in the production process, and other losses in the process of storing and transporting the materials.

The effective consumption includes that quantity of materials which is directly part of the finished product or is effectively used in the production process.

The production wastes and losses include those which are related to product output under the conditions of the given production process. The production wastes can be usable and unusable.

The other technical and organizational expenditures and losses are formed outside the production process. These include waste materials arising from incorrect sizing, excessive tolerances, and so forth. In those instances when the existing organizational and technical conditions do not make it possible to fully eliminate such wastes, a minimum of them is included in the rate.

73. The setting of rates and standards for production stocks. In order to protect the enterprise against possible interruptions in material and technical supply, a certain production stock of material resources should be set up at it. The *production stock* is the maximum acceptable average level of material resources (raw products, materials, preassembled articles, fuel, and so forth) which in the next plan period should ensure the uninterrupted and steady operation of the enterprise in carrying out the set product production plan.

In quantitative terms the production stock standard represents the total of the individually calculated rates for the current, reserve (guarantee), preparatory and seasonal stocks. The current reserve is necessary for the enterprise to ensure uninterrupted operations in the intervals between regular delivery; the reserve (guarantee) for ensuring normal production activities in the event of possible interruptions in supply or fluctuations in the production volume. The preparatory stock is created for the operation of the enterprise in the period of preparing the materials for use and delivery to the work areas.

The seasonal stock is caused by seasonal fluctuations in the delivery of various materials or in their consumption. The necessity of a seasonal stock may also be caused by interruptions in transport operations as a consequence of the territorial location of the supplier and consumer.

The material stock standards are set separately for materials received from suppliers in transit or from the warehouses of the supply and marketing organizations. The differentiated calculation of stock rates by types and sizes of materials (with the subsequent consolidation into product groups) does not exclude the possibility of the consolidated calculation of standards for materials which have the same or similar delivery conditions, that is, consumption volume, form and interval between deliveries.

In stock norming, it is essential to be guided by the following general provisions: 1) the standards for production stocks calculated in days of supply should have a stable nature and be in effect for 3-5 years. For recalculating the stock standards in the event of a change in the production and supply conditions, permission is required from the superior organization; 2) the number of days in a year is set at 360, in a quarter there are 90, and in a month 30; 3) the composition of the production stocks of an enterprise does not include en route; 4) the basis for calculating the stock standards is the actual data on deliveries and for not less than 12 months; 5) the reserve stock is provided for only for those materials supplied in transit, but for materials which the enterprise receives from the depots and warehouses of the supply and marketing organizatios within the system of the USSR Gossnab and the departmental depots, no reserve stock is planned. It is also not calculated in setting the seasonal stock.

The standards for production stocks of normed materials are calculated in accord with the current procedure for determining the production stock standards.[1]

Calculation of the current stock standard. The current stock standard is the amount of the average current stock defined as one-half of the delivery interval (in days of supply) or as one-half the volume of the planning and calculation delivery batch (in physical units).

For finding the amount of the planning and calculation batch and the delivery interval, the following method is used:

1) From the log for recording the delivery of freight to the enterprise warehouses, one copies out the actual dates and lots of receipt of transit deliveries of a normed material delivered by various types of transport, that is, by rail, truck, water and so forth. If several lots of material have been delivered on one day, these volumes are added up, and the number of deliveries on this day is set as equal to one.

2) After a careful analysis and correcting of the number of deliveries, the total delivery volume of the given material is determined for the period

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[1]"Procedure for Determining Production Stock Standards for Raw Products and Materials (Provisionsl)," Moscow, NIIPIN under the USSR Gosplan, 1967.

being analyzed (for not less than 12 months), and its average daily consumption by the enterprise.

3) The amount of the planning and calculation delivery batch is determined by dividing the total volume of the received normed material by the corrected number of deliveries.

4) The average calculated interval between deliveries is determined by dividing the volume of the planning and calculation delivery by the average daily consumption of the given material (see the example).

Example (hypothetical). The receipt of rolled ferrous metals at an enterprise has been determined as 27 deliveries (according to the warehouse records) with a total weight of 9,000 tons. On the basis of a careful analysis and the excluding of accidental individual small and excessively large deliveries, 24 deliveries were used in the calculation with a total weight of 7,200 tons.

The average amount of the planning and calculation delivery in this instance equals 300 tons (7,200:24). The given total number of deliveries in the given year will be 30 (900:300). The average interval between deliveries is set at 12 days (360:30).

For materials which are consumed in small quantities and are supplied from the warehouses of supply and marketing organizations and which are stipulated in certain standards (not less than one carload, one tank carload, truckload, and so forth), the average interval is determined by the time during which the given material can be consumed in production and which has been received in the amount of the given delivery batch which is most advisable for transporting. For this the amount of the most advisable delivery batch for transporting is divided by the one-day consumption of the given material in production.

With the daily delivery of the normed material, the current stock standard is set in the amount of 1 day. With deliveries of material once or twice a year, the stock standard in days of availability is set, accordingly, at 180 and 90 days.

In determining the current stock standard for materials which are produced by the enterprise and are to be used in internal production consumption (for the internal allocations), the volume of the current stock is set as equal to the time of manufacturing a batch of the given material.

The planning of the emergency stock standards is based upon comparing the actual receipt of materials at the enterprise warehouse. For this they use the same information (the receipt dates of the batches and the delivery volumes) on the basis of which the plan and calculation delivery batch was set.

The planning of the emergency stock standards is based on a comparison of the actual delivery intervals and volumes with their average weighted values. As the emergency stock standard, they use 25 percent of the larger of two maximum deviations: toward an increase in terms of the delivery intervals, and toward a decrease for the delivery volume. This amount corresponds to the probably deviation in the delivery volume and the interval in the plan period. The emergency stock standard should not exceed the standard of the current stock.

The setting of rates and standards for the preparatory stock presupposes individual planning of its ordinary and special parts. The ordinary preparatory stock (the time for performing operations involved in loading and unloading work, the quantitative and qualitative acceptance of materials, grading, and so forth), as a rule, are set as equal to 1 day.

The special preparatory stock of materials is formed at an enterprise because certain materials before being put into production should undergo preparatory production operations (drying, the special saturating of lumber, the special superficial and internal chemical treatment of materials, corrosion-retarding surfacing, and so forth). As the rate for the special preparatory stocks one uses the maximum amount of time needed to carry out the preparatory operations in accord with the employed production method. The largest amounts of seasonal stocks occur at the end of the seasonal receipt or by the beginning of the seasonal consumption of materials, and the least occur at the beginning of the seasonal receipt or the end of the seasonal consumption. The least amount of seasonal production stocks is determined by multiplying the average daily consumption (the annual consumption divided by 360) by the number of days of interruption established in each individual case depending upon the specific delivery and consumption conditions.

The standard for the production carryover stock is calculated using Table 41.

74. Organizing the fulfillment of the material and techical supply plan. The annual MTS plan of a shipbuilding enterprise determines the delivery volume, as a rule, in a consolidated group range. The concretizing by grade is carried out in the period of specifying the allocations. The work of specifying the allocations is an important stage in organizing the fulfillment of the MTS plan. The allocations are specified for ferrous and nonferrous metal, steal and iron pipe and hardware for a 6-month period. Equipment, chemicals, paint and varnish materials, and industrial rubber products are specified proceeding from the annual allocations. Lumber, building materials, fuels and lubricants and others are specified proceeding from the quarterly allocations.

The compiling of the specifications is preceded by a careful analysis of the availability of each type of material from the resources of the current period, as a result of which the specific demand for allocations is ascertained.

Table 41

Calculation of the Rate
for the Production Carryover Stock

Enterprise _____

Ministry _____

№ п/п	Наименование типосорторазмеров материалов	Величина планово-расчетной поставки	[a] Плановая потребность на 19__ г.		Плановый интервал поставки по расчету (гр. 3 : гр. 5) или согласованному графику	[b] Норма производственного переходящего запаса								Примечание
						[c] Норма текущего запаса		[d] Страховой запас			[e] Подготовительный запас	[f] Всего		
			Годовая	Среднесуточная (гр. 4 : 360)		в днях (0.5 гр. 6)	в натуральных величинах (гр. 5 × гр. 7)	максимальное отклонение	в днях (0.25 гр. 9)	в натуральных величинах (гр. 5 × гр. 10)	в днях	в натуральных величинах (гр. 5 × гр. 12)	в днях	в натуральных величинах (гр. 8 + гр. 10 + гр. 13)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Key: 1--number; 2--name of material type, grade or size; 3--amount of plan and calculation delivery; 4--annual; 5--average daily (column 4:360); 5--planned delivery interval by calculation (column 3:column 5) or by approved schedule; 7--in days (0.5 of column 6); 8--in physical amounts (column 5 x 7); 9--maximum deviation; 10--in days (0.25 of column 9); 11--in physical amounts (column 5 x column 10); 12--in days; 13--in physical amounts (column 5 x column 12); 14--in days; 15--in physical amounts (column 8 + column 10 + column 13); 16--note; a--planned demand for 19__; b--rate of production carryover stock; c--current stock rate; d--reserve stock; e--preparatory stock; f--total.

The specification orders for metal products are drawn up for more than a quarter prior to the start of the 6 months being planned. The compilation of the specified orders, depending upon the assigned product range, are submitted either to the supply bodies of the MSP [Ministry of Shipbuilding Industry] or to the bodies of the territorial administrations of the USSR Gosbank.

The specifications are coordinated with the product production plans and the consumer enterprises are assigned to the suppliers by the soyuzsnabsbyts [all-Union supply and marketing administrations], together with the glavsnabs [main supply administrations] of the ministries, the Union republics and the territorial MTS administrations.

Simultaneously with specifying the allocations, the form of supply is established. In practice two forms of deliveries are employed: transit and warehouse. The most effective form of delivery is the one which meets the following requirements: Promptness and completeness of delivery, the fullest utilization of the means of transportation, the least transport preparatory expenditures, and a minimum of material stocks.

The transit form of supply has a number of advantages over the warehouse one. It reduces the time of delivering the materials from the supplier to the consumer, it excludes intermediate loading and unloading operations at the warehouses of the supply and marketing organizations, and reduces the transport-preparatory expenditures. However, the transit form of deliveries can lead for certain types of materials to an increase in the production stocks in comparison with the warehouse form. The warehouse form of deliveries is employed basically for those materials which the enterprise consumes in quantities less than the transit form.

The relationships of the shipbuilding enterprises with the suppliers of material and technical products are regulated by the conditions of contracts concluded on the basis of the orders, the allocation notifications and other documents proving the allocating of supplies. The concluding of contracts for the delivery of products is an important stage in organizing the material and technical supply of the enterprise. In forming economic ties, the enterprises (consumers and suppliers) should be guided by the "Statute on the Deliveries of Production and Technical Products" approved by the USSR Council of Ministers on 9 April 1969; the Decree of the USSR Council of Ministers of 27 October 1967 "On Material Liability of Enterprises and Organizations for the Nonfulfillment of Quotas and Obligations"; the Decree of the USSR Council of Ministers of 28 April 1969 "On Measures to Further Improve Material and Technical Supply of the National Economy"; the Special Delivery Conditions for Individual Product Types approved by the decrees of the USSR Gossnab and the USSR State Arbitration Committee, as well as by the other legislative enactments.

The economic ties of the consumer enterprises are organized both directly with the supplier enterprises and with the territorial supply bodies.

The most progressive form of relationships making it possible for the involved parties to maintain direct professional ties is the direct contract which establishes extended and stable ties between the consumer enterprises. In concluding direct long-term economic contracts, it is essential to follow the "Statute Governing Deliveries of Products for Production and Technical Purposes" which provides a common product delivery procedure for all suppliers and consumers, and the Decree of the USSR Gossnab of 15 July 1971

"On the Procedure of Assigning Consumer Enterprises to Supplier Enterprises for Direct Long-Term Economic Ties Relating to Product Deliveries."

The next stage of material and technical supply at an enterprise is the organizing of the operational preparatory work. This is expressed in the elaborating of quarterly and monthly operational preparatory plans in which the demand is clarified for material resources in terms of the delivery volume and dates, as well as all changes disclosed since the time of drawing up the annual plan. On the basis of these plans, direct ties are established with the supplier enterprises and the delivery of raw products and materials to the enterprise warehouses is organized.

The most important task of operational work is the supervising of the stock level and controlling the fulfillment of the contractual obligations by suppliers for the delivery of raw products and materials at the dates stipulated by the plan.

75. Planning working capital. Each production enterprise, along with fixed productive capital, possesses working capital. *Working production capital* is the money of the enterprise invested in the production stocks of raw products, basic and auxiliary materials, preassembled ship equipment, fuel, spare parts, crating, inexpensive and rapidly worn out articles, incomplete production and own-manufactured semifinished products, as well as expenditures of future periods.

Enterprise working capital is divided into normed and unnormed. The normed is those elements of working capital for which a planning rate is set, that is, a permanent minimum balance. These include all commodities and materials of value, such as: Production stocks, incomplete production, expenditures of future periods, and finished products. The remaining elements of working capital at an enterprise are not normed. Simultaneously, the sources for forming working assets are divided into own or internal and borrowed. The internal assets include the money allocated and assigned to the enterprise in the form of the charter capital, while the borrowed is the temporarily used money in the form of short-term bank loans and debt.

The planning of working capital includes a defining of both the aggregate demand of the enterprises for working capital as well as separately the sources of its formation, internal working capital and borrowed.

The *working capital standard* is an indicator which describes the ratio of the necessary balance of various types of materials in monetary units to a certain indicator of enterprise operations. For example, at industrial enterprises the working capital standard for materials is expressed in days in relation to the consumption of these materials. Thus, if the standard is 20 days, then the value of the average materials balance at the given enterprise according to the plan equals their 20-day consumption.

The *working capital rate* is the minimum necessary average balance of commodities and materials for the enterprise in monetary units. The rate depends upon the volume of expenditures and the working capital standard. As a rule, it is figured by dividing the standard by that indicator in relation to which the standard was set.

The working capital standards are calculated for the individual working capital elements in terms of the items of the bookkeeping balance, and here consideration is given to the particular features of the operation of enterprises in the shipbuilding industry.

76. Methods of setting standards and rates for working capital. In the planning and norming of enterprise working capital, three basic methods are used: The direct calculation method, the statistical-analytical method, and the coefficient method.

The *direct calculation method* for working capital means a monetary evaluation of the materials of value necessary for ensuring the normal operation of the enterprise on the basis of their consumption and stock rates.

A direct calculation presupposes stability of the plan, and steadiness of material-technical supply and the range of the produced product. These conditions are essential for the normal operation of the enterprise, and for this reason at present the direct calculation method underlies all working capital calculations.

The *statistical and analytical method* consists in determining the required working capital proceeding from the report data for the previous period. Here the actual balance of working capital is taken as its planned amount. The actual balances of the normable assets undergo careful analysis for the purpose of excluding materials which are surplus, unnecessary or not used at the enterprise for a long time, as well as the expenditures which have been the result of a deviation from the plan or those which should not be repeated in the future. A detailed analysis of the actual data can be carried out only directly on the spot, and for this reason the statistical and analytical method is applicable chiefly at enterprises. In other instances, report data on surplus and unnecessary assets are used for adjusting the actual balances.

The *coefficient method* consists in an increase or decrease in the current working capital rates depending upon a change in the production volume. Here all working capital is divided into three groups: Productive (raw products and basic materials, incomplete production and finished products), nonproductive (spare parts, inexpensive supplies) and specific. The latter include individual working capital elements of a number of industrial sectors, and in particular, expenditures of future periods.

Here the working capital rate for production elements is increased proportionately to the rise in the production volume, and for the nonproductive

ones, for a certain part of the growth, and for the specific elements is determined by direct calculation.

The calculating of working capital rates using the coefficients is marked by a combination of simple calculating techniques, but at the same time can lead to inaccurate calculations. With this method, miscalculations arise caused by shifts in the production structure.

The development of the norming of working capital at enterprises by direct calculation does not eliminate the necessity of using the above-indicated and other consolidated calculation methods.

77. The method of norming working capital of industrial enterprises. The method of norming working capital is based upon the direct calculation method. This method, as was pointed out, best ensures the elaboration of economically sound rates at each enterprise, as it considers all the factors related to the particular features of production, supply and product sales.

Many factors influence the amount of the working capital rate, and in particular, this would include the supply and sales conditions (the frequency and sizes of delivery lots, the periodicity of dispatching finished products, and so forth); the production conditions (the duration of the production cycle, the type of production, and so forth). Due to the fact that the working capital rates are set for the end of the year, for calculating them one employs the estimate of production expenditures and the corresponding calculations for it in the fourth quarter at enterprises with a nonseasonal type of production, where these expenditures grow gradually, in increasing toward the end of the year.

Proceeding from the quarterly estimate of production expenditures and the corresponding calculations for it, by dividing by 90, one can determine the 1-day expenditures for the individual working capital elements. A 1-day expenditure is set for raw products, materials and fuel, 1-day expenditures for incomplete production, and a 1-day dispatch for finished products.

In relation to the 1-day expenditures for each working capital element, standards are figured which describe the demand for working capital expressed in relative amounts (Table 42).

The general rate formula for the given element of internal working capital in monetary units is as follows:

$$N = \frac{P}{90} D,$$

where P--the turnover for the given working capital element according to the estimate of production expenditures (considering the adjustment) in the fourth quarter of the year being planned, rubles;

D--the working capital rate in relative amounts for the given type of commodities and materials, days.

Table 42

Working Capital Standards Expressed in Relative Amounts

Working Capital Elements	Working Capital Standard
1. Raw products, basic materials and purchased semifinished products	In days for consumption according to production expenditure estimate
2. Auxiliary materials	Same
3. Fuel	Same
4. Crating	In rubles per 1000 rubles of commodity product in wholesale prices
5. Spare parts	In rubles per 1000 rubles of equipment according to balance-sheet value without deducting wear
6. Inexpensive and rapidly wearing out supplies (without special tools and attachments)	In rubles per enterprise employee
7. Special tools and attachments	In rubles per 1000 rubles of commodity (gross) product in wholesale prices
8. Incomplete production	In days of gross product by costs
9. Finished products	In days of commodity product according to factory-plant costs

Economically sound working capital standards can be used for a number of years if there are no substantial changes in the conditions of product output, supply and sales.

78. Working capital norming for stocks of raw products and basic materials. The working capital standard for raw products and materials is determined in days of their consumption, and is calculated considering the supply conditions, the periodicity of the consumption of each type of raw product and materials, as well as the conditions for payments with suppliers. Like the 1-day consumption, this is set for each type of raw product and material.

For reducing the labor intensiveness of the calculations and ensuring the correct setting of the working capital standards, it is essential to divide the raw products and materials into groups which include varieties of

materials with more or less the same delivery and consumption conditions. The working capital standard can be calculated by direct calculation only for a portion of the product types in each group, the proportional amount of which is at least 70-80 percent of materials consumption for the given group in monetary units.

On the basis of the calculated standards for these varieties, an average weighted standard is determined and this can be used as the standard for the entire group, that is, it is extended to all the materials in the given group. With a broad range of raw products and materials, the calculating of the standards by the direct calculation method can be carried out for the basic types of materials which comprise 70-80 percent of the total expenditure of all types of consumed materials. For the remaining types of materials, the working capital standard is determined as a whole for the group proceeding from an analysis of the actual balances during the previous year.

In determining the full working capital standard for raw products and basic materials, the following times are calculated: The time the materials paid for by the enterprise remain en route; the time required for unloading, grading and preparing the materials for production; the time the materials remain in the form of a current stock; the time the materials remain in the form of the guarantee (reserve) stock (see §73).

Each of the component parts of the working capital standard is set depending upon the factors which influence its formation and size.

The duration of freight turnover for all types of raw products and materials received from supplier enterprises is determined on the basis of data for the previous period.

The duration of paper work includes, in addition to the time of the direct sending of documents by mail from the supplier bank to the recipient bank, the time needed by the enterprise to compile a bill and to handle the documents at the supplier bank on the day of their presentation.

The standard for working capital in the form of materials en route is calculated as the difference between the duration of freight turnover and the time of paper work in the following form:

(days)

Вид сырья или материалов	Поставщик	Станция отправления	Время нахождения груза в пути	Время оборота документов	Норма транспортного запаса (гр. 4—5)
1	2	3	4	5	6

Key: 1--Type of raw product or materials; 2--Supplier; 3--Station of departure; 4--Time freight is en route; 5--Time of paper work; 6--Standard for the transport stock (col. 4-5)

The working capital standard for materials en route can be also determined by dividing the average balance of materials considering the changes in the delivery conditions for individual types of materials designated in the plan period by the 1-day consumption of materials. In the given instance, the standard for materials en route is determined not for each type of materials, but rather as a whole for calculating the standard under the item "Raw Products, Basic Materials and Purchased Semifinished Products."

The standard for the preparatory stock includes the time for the ordinary stock (receiving, unloading and grading) and the production stock. The former is set, as a rule, in an amount of 1 day, and the second for however much is necessary for carrying out the operations related to preparing the material for production (the cleaning of metal, passivation, the drying out of wood, and so forth).

It is possible to calculate the working capital standard for the preparatory stock not for each type or size of material, but rather using consolidated groups (for example, large-section steel, thin sheet, and so forth).

The current stock is the basic portion of the working capital standard for raw products and materials. The amount of current stock is influenced by the size and periodicity of receiving individual types of materials, and the quantity of the types of raw products and materials consumed in production.

At a majority of the enterprises, the raw products and materials are consumed continuously, on a daily basis and evenly over the year. With such putting of raw products and materials into production, the current stock standards depend upon the average interval between deliveries, and are determined in an amount of one-half its duration. The calculation method for the average interval between deliveries of raw products and materials is given in §73.

The demand for working capital to form a reserve stock of materials is determined basically by the deviations in the delivery dates and the amounts of actually received material from the average amount of the deliveries.

For example, if it has turned out that there were three instances of a discrepancy of 6, 5 and 4 days, then the average deviation will be 5 days $\left(\frac{6+5+4}{3}\right)$. This will also be the standard for the reserve supply, but it should not exceed 50 percent of the current stock standard. Often the standard for the reserve stock is set at one-half the standard of the current stock, and then it is not calculated separately.

Having determined all the elements of the working capital standard which correspond to the stages of movement of the raw products and materials, it is possible to calculate the working capital standard as a whole for each type of raw product and materials: the time the materials paid for are en route, the time necessary for the receiving, unloading, warehousing

and preparation of the materials for production, the time the materials remain in the form of current and reserve stocks using the form:

Виды сырья и основных материалов	8. Нормы оборотных средств (в днях) на					Однодневный расход в натур. ед. или руб.	Потребность в оборотных средствах (гр. 6×гр. 7)
	материалы в пути	приемку, разгрузку, подготовку к производству	текущий запас	страховой запас	Итого		
1	2	3	4	5	6	7	8

Key: 1--types of raw products and basic materials; 2--materials en route; 3--receiving, unloading, and preparation for production; 4--current stock; 5--reserve stock; 6--total; 7--1-day consumption in physical units or rubles; 8--demand for working capital (col. 6 x col. 7).

On the basis of the working capital standards for each type of raw product and material, the working capital standard as a whole is figured for the element "raw products and basic materials."

79. The norming of working capital for auxiliary materials. The demand for working capital to form the minimum stocks of auxiliary materials needed to ensure the steady operation of the enterprise is determined by the same factors and methods as the norming of working capital for the element "raw products and basic materials."

However the procedure for setting the standards for working capital for auxiliary materials differs somewhat from the method of setting the standards for working capital for raw products and materials. This is determined primarily by the large range of auxiliary materials used at industrial enterprises.

A direct detailed calculation of the working capital standards for each type of auxiliary material would be very labor intensive and would not be justified for a number of materials used in insignificant amounts and comprising a small proportional amount in the consumption of materials. Out of all the auxiliary materials it is possible to isolate the basic ones which are consumed in significant amounts, and to calculate the working capital standards for these types by the direct calculation method. For the remaining auxiliary materials it is advisable to determine the working capital standard as a whole for the group and not for each type.

Having thus determined the working capital standard for all the auxiliary materials and their 1-day consumption considering consumption on production and other needs, the required working capital rate for auxiliary materials is figured. Then by dividing the total of this demand for working capital by the 1-day expenditure of auxiliary materials, the working capital rate is figured for the element "auxiliary materials." The obtained standard can be used in setting rates and standards over a number of years with the appropriate correction for a change in supply conditions.

80. Setting rates and standards of working capital for fuel. The fuel standard is calculated for all types of fuel consumed at the enterprise, with the exception of gas. The method of determining the working capital standard for fuel is the same as calculating the standards for raw products and materials. Fuel consumption is set from the estimate of production expenditures.

Due to the fact that a rate for gaseous fuel is not calculated, the consumption of this fuel is excluded from the total fuel consumption in the production expenditure estimate. The value of the fuel consumed in the nonindustrial facilities is added to fuel consumption according to the production expenditure estimate, if this has not been condidered in the expenditure estimate, and in addition the value of the fuel issued to employees from the enterprise storage facilities. The enterprises which use gas as a fuel must have reserve supplies of another type of fuel the rates for which are set by superior organizations. The demand for working capital for reserve fuel supplies is calculated by multiplying the average daily consumption of the existing type of fuel by the established standard.

81. Setting working capital rates and standards for crating. The enterprises use all sorts of crating. The methods of setting rates and standards for working capital for crating depend upon the method of acquiring the crating (purchase or own-produced), the nature of its use (disposable crating or reusable crating which is returned by the consumers), and upon whether the crating is used for packing the finished products or for storing raw products and materials.

The enterprises purchase crating or manufacture it themselves for packing finished products. The purchased crating is normed in the same procedure as the materials, proceeding from the conditions of its receipt and the plan of producing that finished product which is to be packed in the crating. The working capital standard for own-produced crating is determined by the time of its manufacturing up to the packing of the finished product in it.

In calculating the working capital standard for crating used on raw products and materials, one proceeds from the working capital standard for those types of raw products and materials which are to be stored in the crating. The standard for the crating equals the time it remains with certain types of raw products and materials, and consequently, it equals the standard in days for these raw products and materials. Also added to

this is the time for washing, repairing and making up batches of crating for preparing it for sale or for reuse at the enterprise.

The working capital rate equals the duration of one turnover of the crating in days from the established time of paying for it until the bill is submitted to the bank.

In the practices of the shipbuilding enterprises, the working capital rate for forming crating stocks is set basically only for purchased crating.

82. The setting of rates and standards for working capital used for spare parts. The demand for working capital for spare parts to be used on machines, mechanisms, means of transport and equipment is determined by the conditions of supplying the enterprises with spare parts and the conditions of their use.

The use of spare parts is not directly related to the process of producing the product. However stocks of them are essential for the enterprise in order to ensure the uninterrupted operation of all the equipment. The amount of the necessary stocks of interchangeable parts, assemblies, pieces and other spare parts and the demand of the enterprise for working capital are determined by the composition of the fleet of equipment and means of transport, by the number of machines, by the service life of the spare parts, by their price and by other factors. For this reason the working capital standard for spare parts is expressed in rubles per 1,000 rubles of the value of the equipment and the means of transport (separately for the types of equipment) on the basis of analyzing the actual balances of such spare parts.

In order to determine the rate for working capital used for spare parts for the year being planned, this standard is multiplied by the value of the equipment at the end of the year being planned.

83. Setting rates and standards for working capital for inexpensive and rapidly wearing out articles. The inexpensive and rapidly wearing out articles used at shipbuilding enterprises encompass materials which are extremely diverse in their nature, and include: Special and general tools employed in the production process; office supplies the use of which is not directly linked to the production of products; special clothing, special footwear, bedding, and so forth.

In a majority of instances, in putting the inexpensive and rapidly wearing out articles into production from the warehouse, one-half their value is written off, and the other half when these articles are withdrawn due to wearing out. Consequently, as an average their wear with sufficient grounds can be accepted in the calculation as equaling 50 percent of the initial (procurement) value. Articles with a value under 2 rubles per unit are written off as they are issued from the warehouse. For this reason, the demand for working capital for such articles is planned only at the warehouse.

Due to the fact that by their nature of use in production and employment at the enterprise the inexpensive and rapidly wearing out articles are extremely diverse, for norming the working capital they are divided into the following groups: Inexpensive and rapidly wearing out general tools; inexpensive and rapidly wearing out office supplies; special clothing, special footwear and bedding; production packaging; special tools and special fittings.

The demand for working capital for the above-indicated groups of articles is determined by direct calculation if special rates are lacking.

Calculating the stocks of general tools and attachments is carried out separately for: Stocks in the central tool storeroom (TsIS) and stocks in operation, at work areas and in the shop issuing stores (TsRK), as well as in the sharpening and repair shops where the sharpening of the tool, the regrinding for other dimensions and repairs are carried out.

In this instance the demand for working capital for the tool stock is determined by multiplying the calculated circulating stock in terms of tool types by their value considering the transport and preparatory expenses.

Often a consolidated method of determining the annual tool consumption is used, in following the consumption standards per 1,000 rubles of gross (commodity) product or per worker and set experimentally on the basis of analyzing the data for a number of years (in reducing the product volume in the instance of a change in price to a comparable series in the prices of the planned year).

The demand for working capital for supplies is calculated for the subdivisions of the enterprise such as shops, plant administration, dormitories, and so forth.

The demand for working capital for special clothing and footwear in operation depends upon the length of wear and the value of the individual types of special clothing and footwear. For calculating this demand, they use standards for the supply of one worker in terms of the individual professions as set by the appropriate provisions or collective agreements.

The working capital standard for inexpensive and rapidly wearing out general tools, office supplies, special clothing and bedding is expressed in rubles per worker.

The demand for working capital for special tools and attachments which also are classified as inexpensive and rapidly wearing out articles depends solely upon the particular features of production and is not related to the number of employees at the enterprise. For this reason the working capital standard for special tools and attachments is calculated analytically in relation to that indicator which determines the demand for working capital, that is, per 1,000 rubles of commodity (gross) product.

84. Setting rates and standards for working capital for incomplete production and expenditures of future periods. The amount of working capital invested in incomplete production is determined by the total expenditures of the enterprise related directly to the production process, from the moment of the first production operation to the delivery of the finished product to the enterprise warehouse and the client.

The method of calculating the working capital standard in days is most often determined by two procedures: 1) proceeding from the duration of the production cycle and the expenditure increase coefficient; 2) by dividing the directly calculated amount of stock in the various stages of the production process by the 1-day output of gross product.

One of the basic factors influencing the amount of incomplete production is the duration of the production cycle. Here the dependence is a direct one as the longer the process of manufacturing the product, the longer the expenditures are in production, and consequently, the greater the demand for working capital.

The production cycle in shipbuilding, in encompassing the work period and breaks, runs into hundreds of days. For setting the rate for working capital, the average duration of the production cycle is determined as a whole for all the articles (of one type) on the basis of the duration of the production cycles of each of them. The average duration of the production cycle can be calculated as the average weighted amount of the duration of the production cycles for the individual articles and their cost.

The demand for working capital for incomplete production also depends upon the total expenditures needed by the enterprise in the direct manufacturing of the given product. These expenditures which the enterprise carries out over the entire production process gradually increase and reach a maximum by the end of the production process. If the increase in the expenditures is even over the entire production cycle, then the average amount of the stock standard for incomplete production in days would equal one-half the duration of the production cycle. However, expenditures in the production process for various types of shipbuilding products grow unevenly.

In such instances, at enterprises with a long production cycle, for calculating incomplete production, cyclical schedules are drawn up for manufacturing the articles (vessels) with the dividing of the entire cycle into stages. The plan costings for the articles are also organized with the dividing of the expenditures by stages of the production cycle. Here it can be conditionally assumed that the expenditures by stages enter incomplete production on the first day of each stage.

On the basis of such data, the expenditure increase coefficient is determined as follows:

$$K = \frac{\sum_{i=1}^{m} O_i d_i}{CD_c},$$

where O_i--the amount of increase in the expenditures of incomplete production according to the plan costing for production stage i, rubles;
d_i--the duration of the linking of the increase in expenditures from the beginning of stage i to the delivery of the article (vessel) to the client, days;
C--the cost of manufacturing (building) the article (ship), rubles;
D_c--the duration of the production cycle, days;
m--the number of accounting production stages for the rise in the expenditures of incomplete production.

In practical terms, the expenditure increase coefficient in shipbuilding according to the above-given formula is K = 0.55-0.60.

On the basis of the calculated average duration of the production cycle and the expenditure increase coefficient, the working capital standard for incomplete production is determined as the product of these two amounts.

Due to the fact that the working capital standards for incomplete production are calculated in calendar days, and the duration of the production cycle is determined proceeding from the working days, in calculating the working capital rate, it is essential to introduce a correction factor. This is set by dividing the calendar days (360) by the number of working days per year.

Another method. On the basis of the calendar schedule and the stage-by-stage costing at the start of each month for the percentage of technical completion one establishes the working capital rate for each article (vessel). The total rate for the enterprise as a whole is determined by adding up the rates for all the articles (vessels) with the addition of the rate of incomplete production for nonshipbuilding products to the total.

The ratio of the total rate for incomplete production to the 1-day expenditures shows the stock rate for incomplete production in days.

For the shipbuilding industry plants which manufacture heavy machine building products and vessels with a long production cycle (over 6 months), the working capital rate for incomplete production can also be calculated by the balance method, using the formula

$$N_p = N_e + O - B,$$

where N_p--incomplete production at the end of the plan year;
N_e--expected incomplete production at the start of the plan year;

O--expenditures on production determined on the basis of the plans and the cyclical schedules for each article included in the plan;
B--product output (commodity product by plant costs).

The amounts of all types of stocks at each shop and in the intershop warehouses are determined in quantitative terms by the production department of the enterprise together with the department of the chief production engineer.

Table 43

Calculation of Average Working Capital Standard and Rate as a Whole for the Enterprise (figures hypothetical)

Elements of working capital and calculation indicators	Approved by plan of 4th quarter of current year	By calculation for 4th quarter of planned year	Changes in comparison with plan of current year	
			In absolute amount	In %
1. Raw products and basic materials				
Expenditure for quarter, 1,000 rubles	1,312.0	1,218.0	--	--
Expenditure for day, 1,000 rubles	14.6	13.5	--	--
Working capital standard, days	75	62	-13	-17.3
Rate, 1,000 rubles and so forth	1,094.0	837.0	-257.0	-23.4

Having determined by one of the methods the complete demand for working capital for incomplete production, it is possible to calculate the working capital standard by dividing the demand by the 1-day total expenditures on gross product.

The expenditures for developing new types of product are first accumulated in the account "Expenditures of Future Periods" and these are included in the costs of new products from the moment that they move into series output.

The working capital rate for expenditures of future periods can be calculated using the formula

$$N = B_e + P_p - P_i,$$

where N--the working capital rate on expenditures of future periods;
B_e--total money (from expected execution or bookkeeping figures) invested in the expenditures of future periods at the start of the plan year;
P_p--expenditures carried out in the plan year provided under the corresponding estimates properly approved;
P_i--expenditures included in the product costs for the plan year and provided in the production estimate or to be repaid from special sources.

A long-term standard for expenditures of future periods is not set, and the enterprise annually calculates the working capital rate proceeding from the expenditures under this element of working capital for the beginning of the year being planned, the expenditures carried out in the year being planned, and the total repayment of these expenditures included in the product costs of the year being planned.

85. Calculation of the working capital rate for the enterprise as a whole. The working capital standards calculated for each element of working capital are the basis for calculating the working capital rates for these elements for that planning period for the data of which the standard has been worked out. For this reason the working capital standards calculated for each element of working capital are transferred to a summary table which also includes the plan indicators for which the standards have been calculated (Table 43).

The working capital rate for the enterprise as a whole represents the total of the working capital rates calculated for the individual elements at the end of each planned year. The increase or reduction in the working capital rate is determined as the difference between the rate at the beginning and end of the year.

CHAPTER 10: PLANNING LABOR AND WAGES

86. The content of the labor and wage plan. The labor and wage plan for an industrial (shipbuilding) enterprise is one of the basic sections of a tekhpromfinplan. It includes three major subdivisions: 1) the labor productivity plan; 2) the plan for the number of industrial-production personnel [PPP]; 3) the plan for the wage fund and average wages of the PPP (separately for the nonindustrial group).

The indicators of these subsections are of very important significance for working out and establishing other sections of the tekhpromfinplan and the economic indicators for the production and economic activities of the enterprise. For example, the enterprise production program is set considering the growth of labor productivity and the change in the number of employees, the reduction in product costs is related to the saving of labor expenditures, and so forth.

The basic tasks of the labor plan are: 1) the greatest possible and continuous rise in labor productivity on the basis of the fullest disclosure and utilization of existing reserves; 2) providing the most rapid growth rate of labor productivity in comparison with the growth rate of average wages; 3) the rational use of working time and a reduction in existing losses; 4) the prevention of overstaffing for workers and management on the basis of introducing progressive standards for working time expenditures and observing the manning rates and staff schedules; 5) providing the required training and skill improvement for the personnel in accord with the requirements of production development and technical progress; 6) the saving of the wage fund and a reduction in its expenditures per unit of product.

The labor plan should be based on a carefully elaborated plan for increasing production efficiency and the planning technical and economic rates and standards.

The content and procedure for elaborating labor plans depends upon whether or not the plan is long-range or current (annual). The long-range labor plans are worked out in two stages at enterprises. In the first stage they draw up a draft plan based on the ascertained reserves, and in the second

stage they work out a final labor and wage plan based on the basic (directive) indicators which are approved by the superior organization.

The current plans are worked out, as a rule, on the basis of the long-range plans for the period that the tekhpromfinplan is worked out. This means that the basic indicators for the current plans are already predetermined by the long-range plan and in current planning they are merely corrected, adjusted and set in more detail in accord with the production plan and the plan for raising production efficiency.

The current labor plan, like the entire enterprise tekhpromfinplan, is worked out in the second half of the year preceding the one being planned, not only as a whole for the enterprise, but also for the shops, with a quarterly breakdown, and proceeding from the quarterly plans, the shops are given labor quotas for each month.

The base indicators for calculating the basic labor indicators are planned labor intensiveness and the labor intensiveness standard.

Planned labor intensiveness is the conditionally constant labor rate for the individual groups of vessels in the series of one design expressed in norm-hours. Planned labor intensiveness is used for setting in the fixed indicators the production volume, labor productivity and their dynamics over a number of years.

The *labor intensiveness rate* is the labor expenditures by production workers needed to build the given vessel, including the work of adjusting and improving the design in the process of its construction, and the additional labor expenditures related to the practically unavoidable deviations from the production process.

The planning and approving of the labor intensiveness for building the vessels are carried out in accord with the special sectorial instructions.

87. Planning a rise in labor productivity. Labor productivity is determined by the quantity of product produced per unit of time (month, quarter or year), or by the amount of working time spent to turn out a unit of product. Labor productivity in the plan is set in absolute terms and in percent of growth over the previous period.

The indicator of labor productivity is:

1) For the enterprise, product output per employee of PPP (including the number of juveniles): a) in monetary units in a comparable estimate; b) in labor intensiveness in comparable labor intensiveness rates;

2) For the basic shops, product output per employee of the PPP in labor intensiveness in comparable labor intensiveness standards;

3) For the sections, product output per production worker in labor intensiveness in comparable labor intensiveness standards.

Labor productivity is planned at an enterprise by the technical and economic calculations for the possible saving of working time according to the factors. The saving of working time in man-hours is expressed in a reduction in the necessary number, that is, it is recalculated in the average savings of the number of PPP.

The basic factors which influence the labor productivity level are: I. A rise in the technical level of production. II. An improvement in the organization of production and labor. III. A change in the production volume and the related relative reduction in the number of PPP (without basic workers). IV. A change in the production structure of the products. V. The development of new production capacity.

Such a classification of the basic groups of factors is required for all enterprises in the shipbuilding industry, and from it the enterprises calculate the growth of labor productivity. Each of the designated basic groups includes a number of special factors (Table 44).

In calculating the growth of labor productivity for the factors it is essential to avoid double counting caused by the fact that individual measures influence a savings in working time for a number of factors, and the influence of each of them cannot be isolated. This savings, to avoid double counting, is included in one factor the influence of which is the greatest.

The basic possible savings in labor expenditures (the savings in the number of PPP) in the period being planned is the plan for technical development and the organization of production, the concluding of which precedes the working out of the labor plan.

In the plan for increasing production efficiency, the efficiency of all measures which provide a growth in labor productivity is determined. On the basis of the data concerning the efficiency of the measures, the following standards and rates are worked out, corrected and approved in the established procedure for calculating the number of PPP: a) the labor intensiveness standards (the quota for reducing labor intensiveness) in building the ships and manufacturing the product; b) the manning standards and zones for one worker or a group of a certain quantity of equipment, units, devices, areas, and so forth, considering the influence of the effectiveness of the measures; c) the rates for the number of auxiliary workers, engineers, technicians, white collar personnel, junior service personnel and other workers; d) the net annual time fund of one worker for the period being planned (the balance of working time); e) the percentage of fulfilling the time standards in the period being planned.

Labor productivity considering the savings in the number of workers according to the factors is determined in the following procedure: initially, the initial number of employees for the period being planned under the

condition of maintaining base output; then a possible reduction in it (according to the calculations) is excluded for all the factors, and as a result of this the number of PPP is found for the period being planned. Having divided the product volume for the year being planned by the planned calculated number, one obtains the output per employee in the period being planned (labor productivity).

The growth of labor productivity due to the influence of organizational and technical factors on altering the number of PPP is determined according to the formula:

$$P_p = \frac{\Sigma E \cdot 100}{W_p - \Sigma E},$$

where P_p--the percentage of the growth of labor productivity;
ΣE--the total average annual savings in the number of PPP;
W_p--the number of PPP calculated for the planned production volume in terms of the output of the base period (year).

A percentage of the growth for decline in labor productivity for each factor can be determined individually using the formula:

$$P_{p_1} = \frac{E_1 \cdot 100}{W_p - \Sigma E},$$

where P_{p_1}--percentage of labor productivity growth for the given factor;
E_1--savings in number for given factor, persons;
W_p-ΣE--the number of PPP in the plan period (considering juveniles), persons.

In calculating the savings in personnel by the factors it is very important to determine correctly the time of action of the given measure (factor) in the year being planned.

For measures which are carried over from t-e previous year or are to be introduced in the year being planned, the average annual savings in the number of PPP must be calculated considering the coefficient for the action of the given measure which is determined by the ratio of the number of months of the action of the measure in the year being planned to 12. For example, if the measure was introduced on the 1st of October of the previous (base) year, the coefficient of action for the measure in the plan year will equal 0.75 (9:12); if the measure was introduced under the plan on the 1st of August of the year being planned, the coefficient for the action of the measure will equal 0.42 (5:12), and so forth.

If the enterprise intends to introduce a range of measures (for example, the mechanization of the production process with a simultaneous introduction of NOT), then the possible reduction in the number of workers must be shown for one of the measures having a predominant economic effect.

Table 44

Formulas and Methods for Determining the Savings (Increase) in the Number of PPP by Factors

Determining the possible savings (increase) in the number of PPP (a)	Explanation (b)
I. Increase in technical level of production	
a) From introducing progressive production processes $E_1 = \frac{Q_p(t_b - t_p)}{F_b K_b}$	E_1--the possible reduction in the number of basic (production) workers, persons; Q_p--the number of product units to be carried out in the plan period using the progressive production methods; T_b--the labor intensiveness of a unit of product under the old production method, norm-hour; T_p--the same for progressive production methods, norm-hour; F_b--the working time fund worked by a worker in the base period considering overtime; K_b--the average coefficient for fulfilling the standards in the base period
b) From mechanization and automation of production equipment (work areas) $E_2 = (n_0 N_b K_{sp} - \frac{n_0}{q} N_m K_{sp})\mu$	n_0--the number of units of equipment (work areas) to be automated or mechanized in the year being planned; N_b--the manning standard for the old equipment, persons; K_{sp}--the shift factor for the year being planned; Q--the coefficient for the productivity of automated (mechanized) equipment in relation to the non-automated; N_m--the manning standard for a unit of automated (mechanized) equipment, persons; μ--coefficient for the operation of the automated equipment in the year being planned

[continuation of Table 44]

a	b
c) From mechanizing heavy physical labor in auxiliary jobs $E_3 = (W_b - W_p)K_0$	W_b--the number of workers in the base year the labor of whom is to be mecnanized in the year being planned; W_p--the number of workers for the previous volume of work after mechanizing the heavy physical jobs; K_0--the increase factor for the work in the period being planned in comparison with the base
d) From introducing new, more productive equipment $E_w = (n_0 N_b K_{sp} - \frac{n_0}{q} N_m K_{sp})\mu$	Symbols the same in point "b" of the given group of factors
e) From modernizing existing equipment $E_5 = (n_0 N_b K_{sp} - \frac{n_0}{q} N_m K_{sp})\mu$	Symbols same as in point "b" of the given group of factors
f) From using new types of materials $E_6 = \frac{Q_p(t_b - t_p)}{F_b K_b}$	Q_p--the number of units of product to be carried out in the period being planned using new types of materials; t_b--labor intensiveness of a unit of product in using the old materials, norm-hour; t_p--the same using new materials, norm-hour; F_b--the same as in point "a" of the given group of factors; K_b--the same as in point "a" of the given group of factors;
II. Improving the organization of production and labor	
a) From improving the management structure, the systems of planning and mechanizing planning	W_{bs}--the number of management workers (engineers, technicians and white collar personnel) in the base year;

[continuation of Table 44]

a	b
and accounting work. The possible reduction in the number of engineers, technicians and white collar personnel is determined by a direct comparison of the average listed number of management workers in the base year with the one being planned, after implementing the measures $E_7 = W_{bs} - W_{ps}$	W_{ps}--same in year being planned
b) By expanding standardization of parts, assemblies and units $E_8 = \frac{Q_s(t_b - t_p)}{F_b K_b}$ Note. This same formula is also used in the development of specialization (not related to the introduction of new equipment).	Q_s--the quantity of standardized parts, assemblies and units; t_b--the labor intensiveness of a part, assembly or unit in its original form, norm-hours; t_p--labor intensiveness of the standardized part, unit or assembly, norm-hour; F_b, K_b--point I, a
c) From introducing the scientific organization of labor $E_9 = \frac{Q_m(t_b - t_p)}{F_b K_b}$	Q_m--the number of units of product to be carried out in the year being planned under the revised labor intensiveness as a result of introducing the NOT measures; t_b--labor intensiveness of a unit of product prior to revising the time standards, norm-hour; t_p--same after revising time standard, norm-hour; F_b and K_b--see point I, a
d) From increasing manning standards (extending multitool manning and the combining of professions) $E_{10} = \frac{Q_m}{N_b} - \frac{Q_m}{N_p}$	Q_m--number of equipment units which can be switched to multitool manning in the year being planned; N_b--the manning standard (for equipment units) per worker in the base year; N_p--same in year being planned

[continuation of Table 44]

a	b
e) From increasing the manning standards and zones (combining professions) in auxiliary jobs $E_{11} = (W_{db} - W_{dp})K_r$	W_{db}--the number of auxiliary workers on duty in base year the professions of which can be combined, persons; W_{dp}--same in the plan year after combining professional duties in those areas (jobs) where this is advisable for the base amount of work; K_r--coefficient for the increase in work in the year being planned (as a result of introducing new production capacity)
f) From increasing the use of the working time fund $E_{12} = \left(\frac{F_p}{F_b} - 1\right)W_{bp}$	F_p--effective working time fund of one worker in year being planned, hour; F_b--same in base year (considering overtime); W_{bp}--number of basic (production) workers for planned volume of work with the output of base year, persons
g) From reducing losses from rejects $E_{13} = \left(\frac{a_b - a_p}{100}\right)W_{bp}$	a_b--percentage of losses from rejects to cost of gross product in base year; a_p--same in year being planned; W_{bp}--see point "f"
h) From reducing deviations from normal operating conditions $E_{14} = \left(\frac{d_b - d_p}{100}\right)W_{bp}Y_c$	d_b--the percentage of surpayments for deviations from normal working conditions to the wage fund of the basic piece workers in the base year; d_p--same in year being planned; W_{bp}--see point "f"; Y_c--proportional amount of piece workers in total number of basic workers in year being planned

[continatuion of Table 44]

a	b
i) From reducing the workers who do not fulfill the time standards $E_{15} = \left(\frac{Y_c Y_o K}{K_p}\right) W_{bp}$	Y_c--see above, point "h"' Y_o--the proportional amount of workers in the total number of piece workers who raise quota fulfillment from 90 to 100 percent; K--percentage of increase in the fulfillment of the standards by the piece workers who previously did not fulfill the standards; K_p--average percentage of fulfilling the standards by piece workers in the year being planned; W_{bp}--see point "f"
III. The change in the production volume	
a) From increasing the production volume and the related relative decline in the number of PPP (without basic workers) $E_{16} = \left(\frac{R_e - R_n}{100}\right) W_{ap}$ Note. On the basis of many years of practical experience, it has been established that the increase in the service personnel per 100 persons of the increase in basic workers (calculated for the planned production volume for base output) is: — to 25 persons for shipbuilding enterprises; — to 35 persons for machine building and instrument building enterprises	R_e--percentage of rise in the volume of gross product; R_n--percentage of the necessary increase in number of PPP (without basic workers) accepted for the calculation in line with the growth in the production volume; W_{ap}--the number of PPP (auxiliary workers, engineers, technicians, white collar personnel, MOP, students and security) in base year

[continuation of Table 44]

a	b
IV. Change in product production structure	
a) From a change in production production structure, that is, from a change in the proportional labor intensiveness per 1,000 rubles of gross product, including subcontracting deliveries (increase in number +, reduction -) $E_{17} = \left(\frac{T_b - T_p}{T_b}\right) W_{bp}$	T_p--proportional labor intensiveness per 1,000 rubles of gross product in the year being planned; T_b--same in base year; W_{bp}--number of basic (production) workers calculated for planned volume of work with base output
b) Including from a change in the proportional amount of subcontracting deliveries (increase in number +, recuction -) $E_c = \left(\frac{100 - A_p}{100 - A_b}\right) W_{bp}$	A_b--proportional amount of subcontracting deliveries in gross product of base year, %; A_p--same for year being planned, %
V. Development of new production capacity	
a) Possible increase (reduction) in the PPP during the period of developing production capacity which has been newly put into operation (increase in number +, reduction -) $E_{18} = \frac{Q_p}{B_p} - \frac{Q_p}{B_b}$	Q_p--volume of gross product planned in shop (section) newly put into operation; B_p--planned output in shop (section) newly put into operation per worker; B_b--output in existing shop (section) of analogous specialty in base year per worker

The general formulas and methods for determining the possible savings (increase) in the number of PPP (calculated per year) for the groups of factors which influence the rise (reduction) in labor productivity are given in Table 44.

The calculated growth of labor productivity can be achieved only with careful and strict supervision over the course of implementing the designated measures both in terms of the dates of their introduction and in terms of the degree of their actual efficiency. When necessary the appropriate measures should be promptly taken which would ensure their fulfillment and a possible reduction in the times.

88. Planning the number and composition of employees. The number of employees at a shipbuilding enterprise is planned for the corresponding groups and categories.[1] All the enterprise employees are divided into two groups: industrial-production personnel (PPP) and nonindustrial personnel. The PPP comprises the basic composition of enterprise employees, and this includes the employees engaged in production and servicing it. The nonindustrial personnel includes the employees of the housing and utility system, nurseries and creches, cultural and educational organizations, medical and sanitary facilities, and so forth.

Depending upon the functions performed, the entire composition of the industrial personnel is divided into the following categories: Workers, engineers and technicians (ITR), office personnel (SKP), junior service personnel (MOP), students and security.

The workers are divided according to the nature of their involvement in production into basic who are directly related to manufacturing the product, and the auxiliary who serve the basic workers and provide basic production with everything necessary including tools, transport, repairs, power supply, and so forth.

The auxiliary workers are divided into the auxiliary workers of the basic shops and workers of the auxiliary shops.

According to the planning methods, a distinction is drawn between the workers engaged in normed jobs (piece workers) and unnormed jobs (time workers). In addition, the workers are differentiated by professions and skill. In shipbuilding there is a multiplicity of different professions, each of one is further divided into specialties and categories depending upon the skill level. All of this is of important significance in planning, since each enterprise should be provided with personnel of basic and auxiliary workers with the corresponding professions, specialties and skills.

The group of engineers, technicians and white collar personnel is divided into management and production personnel.

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[1]The enterprise employees are classified in the appropriate groups and categories in accord with the Instructions of the USSR TsSU of 10 March 1965 No 4-82, as well as considering the Decree of the CPSU Central Committee and the USSR Council of Ministers of 2 February 1966, No 83, as well as other directive documents.

In labor planning the superior organizations set for the enterprises only the total number of employees. The questions of planning the number of workers for the individual groups and categories as well as the providing of personnel of the necessary specialty (except specialists with a higher and specialized secondary education) are settled directly by the enterprises.

The basic core of personnel at an enterprise is the workers and primarily the basic ones, as the volume and quality of the produced product and the labor productivity level depend directly on them. Their number depends directly upon the volume of gross product, while the number of other categories is indirectly related to the production volume. The elaboration of the labor plan should be aimed at improving the personnel structure at each enterprise and be organized on the basis of a careful study and analysis of the actual needs and possibilities of each individual enterprise. It should proceed from the necessity of a maximum savings of labor. This applies particularly to the planning of administrative and management personnel.

The listed personnel includes all permanent, temporary and seasonal employees for whom labor booklets are kept. It includes not only those employees who are employed at the given moment (the so-called reporting personnel), but also those who are not working at the given moment at the enterprise (sick persons, persons on leave, persons on an official trip, and so forth). The listed personnel changes constantly as a result of hiring and firing, and for this reason the presence of labor resources is figured in the form of the average listed number of employees.

The *average listed number* of employees over the month is determined by dividing the total listed personnel for all the days of the month (including days off and holidays) by the total number of calendar days in the month. The average listed number of employees for a quarter or a year is determined by dividing the total monthly average listed number of employees over the year or quarter by the appropriate number of months.

The basic initial data for determining the number of basic production workers are: a) the production program for the output of gross product expressed in labor intensiveness standards set for the year being planned; b) the effective annual time fund of one worker (the balance of working time); c) the planned percentage of fulfilling the quotas.

The number of basic production piece workers is determined, as a rule, proceeding from the labor intensiveness of gross product (calculated in the approved labor intensiveness standards for the period being planned), the effective annual working time fund and the planned coefficient for carrying out the quotas according to the formula:

$$W_p = \frac{T_g}{F_u K_p},$$

where T_g--the volume of gross product in the labor intensiveness standards for the period being planned, norm-hour;

F_u--the effective annual time fund of a worker, hour;
K_p--the planned coefficient for fulfilling the quotas.

The planned coefficient for the fulfilling of the quotas is:

$$K_p = K_b(1-K_1)K_2(1+K_3),$$

where K_b--the coefficient for fulfilling the quotas in the base period;
K_1--coefficient for the hardening of the quotas according to the plan for revising the standards;
K_2--coefficient for increasing the fulfillment of the standards by reducing internal shift losses

$$K_2 = \frac{100 - P_2}{100 - P_1},$$

where P_2 and P_1--internal shift losses, respectively, in the base and planned period, %;
K_2--coefficient for increasing the fulfillment of the standards by all workers from increasing the fulfillment of the standards by workers who previously did not fulfill them (in practice the calculating of this coefficient is often disregarded, as its value is insignificantly slight).

The number of basic production workers (piece and time workers) employed in equipment and instrument jobs where the actions of the workers consist basically in controlling mechanized or automated processes is determined from the work areas and the equipment manning standards.

The number of auxiliary workers is determined for normed jobs analogously to the calculation for the basic production piece workers; for unnormed jobs, by work areas and manning standards. The calculation is carried out in a tabular form:

Profession	Number of work areas by plan	Manning standard	Number of work areas per shift	Number of shifts	Number of workers by plan for 19__	
					Reporting	Average listed

The number of managers, engineers, technicians and white collar personnel for the enterprise and the shops is determined on the basis of the approved staff schedules for each individual category, proceeding from the organizational structure of the enterprise and the rational number needed for ensuring the management functions.

The number of the individual specific categories of engineers, technicians and white collar personnel is set in accord with the sectorial rates for personnel or by progressive rates worked out by the enterprise. The individual employee groups such as designers, draftsmen, copiers, timers, planners, timekeepers and wagekeepers are calculated in terms of manning standards and the volumes of work.

In terms of the number of workers, the number of shift and senior foremen is determined. For example, at enterprises at least 25 workers should be under a foreman; the position of senior foreman is established with three and more foremen under him. At large sections with a great and diverse product range, in the event that it is necessary to coordinate the work of the shifts headed by senior foremen, the position of section chief is established. The basic and auxiliary shops can be set up with at least 100 persons.[2]

The number of junior service personnel (MOP) is determined from the existing manning standards or from the work areas; for security workers in terms of the number of posts and hours (shifts, continuous, and so forth); for students (average listed) in accord with the plan for training new personnel, as well as considering the training time; the personnel of the nonindustrial group, according to the standard sectorial rates, the manning standards and in individual instances from the labor intensiveness of the jobs (broken down into groups for: Housing-utility systems, children's institutions, building repairs, cultural and sports institutions).

Proceeding from the tasks posed by the 25th CPSU Congress in the area of improving planning and management, a number of ministries have introduced a new procedure which is a normed method for planning the number of managers, engineers, technicians and white collar personnel.[3]

This method is based upon a calculation of the number of managers, engineers, technicians and white collar personnel for each management function individually, proceeding from the most important factors which influence the volume of work related to the carrying out of one or another function. For example, in determining the number of workers in the supply department, they consider such factors as the range of materials to be received and the products to be produced, the number of suppliers and consumers, and so forth; in determining the number of employees in the power repair service, they

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[2]See: "Procedural Instructions for Working Out Individual Personnel Rates" as given in the procedure of the Scientific Research Institute for Labor in 1964.

[3]See: "Decree of the State Committee of the USSR Council of Ministers on the Questions of Labor and Wages, the USSR Gosplan, the USSR Ministry of Finances and the AUCCTU Secretariat of 28 April 1967," EKONOMICHESKAYA GAZETA, No 21, 1976.

consider the value of the active portion of fixed productive capital, the shift factor for the operation of the equipment, and the quantity of consumed electric power.

The use of the normative method will be a new step ahead along the path of improving the planning of the number of engineers, technicians and white collar personnel at the shipbuilding enterprises.

89. The annual effective working time available (the working time balance). In the structure of the available working time, a distinction is drawn between: a) the available calendar time (the number of calendar days in the plan period); b) the nominal available time (the calendar time available minus the holidays and days off according to the calendar); c) the effective time available (the nominal time minus the planned losses and absences).

In calculating the effective working time available under the conditions of a 5-day workweek, it is essential to bear in mind that the time of planned absences for all reasons, with the exception of regular and additional leaves, is calculated in the workdays of a 5-day week. But the duration of the regular and additional leaves is determined proceeding from the duration of the leaves set by the legislation prior to the changeover to the 5-day week, that is, including the second days off (Saturdays) in the working time. For this reason for correctly determining the number of workdays with a 5-day week, it is essential to determine (by a special calculation) the number of second days off considered in the duration of the regular and additional leaves, and add them to the effective available working days.

The time of the planned absences for each factor is determined by a special calculation and then totaled. The absences (failures to report) with the permission of the administration are planned in minimum amounts. Absences without leave and whole-day stoppages and overtime are not planned.

The given example of calculating the balance of working time for a worker (Table 45) has been carried out with a 5-day workweek and a duration of the workday of 8.2 hours (here the working Saturdays are not considered in the duration of the workday).

90. Wages. *Wages* in a socialist society represent a monetary expression of that portion of gross social product which becomes personal consumption for the employees and is distributed in accord with the quantity and quality of labor expended by them.

The distribution of consumer goods (in the form of monetary payments) among the members of a socialist society in terms of the quantity and quality of the expended labor is a most important principle in organizing wages and an economic law of socialism.

Table 45

Annual Effective Time Available of a Worker
(figures hypothetical)

No.	Indicators	Unit	Base Year	Planned Year	Note
1	2	3	4	5	6
1	Calendar available time	days	365	365	
2	Number of nonworking days	days	110	107	
	Including:				
	a) Sundays and holidays	days	60	56	By calendar
	b) Second days off (Saturdays)	days	50	51	
3	Number of calendar workdays (nominal available time)	days	255	259	
4	Planned absences:				
	a) Regular and additional leave	days	17.6	18.3	By calculation
	b) Training leave	days	2.5	2.7	By calculation
	c) Training leave with 50% pay	days	0.6	0.7	By calculation
	d) Leave on occasion of birth	days	0.8	0.7	On basis of report data considering change in proportional amount of women in yr being planned
	e) Sick leave	days	6.0	4.7	In accord with measures
	f) Fulfilling social and state duties	days	0.7	0.8	On basis of analysis data
	g) Absences with permission of administration	days	1.8	0.6	Same
	h) Absences without leave (only by report)	days	0.5	--	
	i) Whole-day stoppages	days	0.4	--	
	Total planned absences	days	30.9	28.5	
5	Number of second days of rest considered in regular and additional leaves	days	2.9	3.0	By calculation
6	Number of workdays in year (effective)	days	227.0	233.5	Line 3 - line 4 + line 5
7	Time losses related to reduction of length of working day	hrs	0.40	0.30	

[continuation of Table 45]

1	2	3	4	5	6
	Including:				
	a) For those engaged in heavy physical and harmful jobs	hrs	0.2	0.2	By calculation
	b) For nursing mothers	hrs	0.03	0.02	By calculation
	c) For juveniles	hrs	0.04	0.05	By calculation
	d) Internal shift stoppages	hrs	0.08	--	By calculation
	e) On days before holidays	hrs	0.05	0.03	By calculation
8	Overtime	hrs	0.11	--	
9	Average duration of working day (not counting overtime)	hrs	7.80	7.90	8.2--line 7
10	Average duration of working day considering overtime	hrs	7.91	7.90	
11	Effective working time available for one worker not counting overtime	hrs	1770.7	1844.6	Line 6 x line 9
12	Effective working time available for one worker considering overtime	hrs	1795.6	1844.6	Line 6 x line 10

Note. If the working time balances for the production and auxiliary workers have substantial differences, then two balances are drawn up: one for production workers and the other for auxiliary workers. The working time balance is calculated for the shops for a year with a quarterly breakdown, and for the sections quarterly with a monthly breakdown.

Equality of people under socialism means that all members of society are equal in relation to the means of production, they have a guaranteed right to obtain work in their specialty and skill, and they receive their share of social product on equal grounds, regardless of sex, age or nationality.

The consistent observance of the law of distribution according to labor is one of the important factors for the rapid development of the socialist economy contributing to the manifesting of the creative abilities of the Soviet people and ensuring a material incentive for the workers to improve their skills and labor productivity.

Each member of a socialist society receives a certain real income for satisfying his needs, and this income represents his share in the national income of the country, or more precisely, that share of it which is used for consumption.

The basic portion of employee wages is made up of the wage rates or salaries, the amount of which is centrally fixed by the state. Here a distinction is drawn between nominal and real wages. Nominal wages are the total earnings

expressed in money and received by the employee (or group of employees) over a given period (usually a month). The *real wages* describe that quantity of goods and services which can be acquired by the employee with the given amount of monetary wages and the given price level for goods and services. In keeping with the development of production and the rise in labor productivity, both nominal and real wages rise.

A second source for increasing the real income of the members of a socialist society is the *public consumption funds* which are basically formed from the money allocated for sociocultural measures from the state budget, as well as from the money of the enterprises, trade unions and other public organizations. From the public consumption funds financing is provided for the children's preschool institutions, schools, technical schools, VUZes, vocational-technical schools, libraries and certain other cultural and educational facilities, as well as hospitals and polyclinics. From these same funds subsidies are received for the housing system, vacation houses, sanitoriums, pensions, scholarships and aid are paid, and so forth.

Due to the large and growing public consumption funds, Soviet people have such benefits as free education and medicine, the world's lowest apartment rent and the support of cuildren in nurseries and creches. The direct payments from the public consumption funds as well as the benefits provided from them comprise a substantial contribution to the basic income of the workers.

The Soviet state, as social production has grown, has on a planned basis increased the wages of many employee categories, and above all the low- and medium-paid ones. The average wages of workers have continuously risen also as a result of the growth of labor productivity and workers skills. Due to scientific and technical progress, in the structure of employed persons there has been a systematic increase in the share of skilled workers, and the share of workers engaged in unskilled labor has declined.

The concern of the party and the government for the well-being of the people is expressed also in a continuous increase in the public consumption funds.

91. The rate system and its role. The organization of wages for employees is based upon the rate system. The rate system represents an aggregate of rates which determine the differentiation in wages depending upon the quality and conditions of labor. The basic elements in the wage rate system for workers are the rate-skill handbooks, the wage rates and the wage networks.

The labor of managers, engineers, technicians and white collar personnel is paid for on the basis of salaries. One of the important elements in the employee rate system is also the regional coefficients.

The *rate-skill handbooks* are used to set the category of the jobs and workers. The entire diversity of jobs for each profession (specialty) is divided depending upon their complexity into a series of categories or skill groups

called categories. In a majority of sectors, including the shipbuilding industry, the jobs are divided into six categories. The simplest jobs are in the first category, and the most complicated in the sixth.

For organizing wages it is essential not only to determine the category for the job, but also to rate the workers, that is, to assign a category to them depending upon the level of professional knowledge and the labor skills. For these purposes the rate-skill handbooks give the necessary requirements (characteristics) which determine the range of professional knowledge (what the worker should know) and the labor skills (a description of the job which he should be able to perform). The handbook also gives examples of the most characteristic and widely spread jobs performed by the workers of the given profession (specialty) and category.

The rate-skill handbooks should reflect the achieved level of technology, the organization of labor and production, and for this reason they must periodically be revised.

In industry a majority of the jobs and workers is rated according to a single handbook employed in all sectors. The shipbuilding jobs, as the most specific, are rated in the sectorial handbook. Individual categories are given to workers by special commissions consisting of representatives from the management and the enterprise trade union organization. As a required condition, involved in the work of the commission is the foreman of the corresponding section who, as a rule, provides information on the assigning of one or another category to the worker.

In being guided by the demands of the sectorial rate-skill handbook, a commission checks the theoretical knowledge and practical skills of the worker, after which it submits to the leadership proposals on establishing the corresponding rate category for him.[4]

On the basis of recommendations by the commission, the enterprise leader, with the approval of the trade union organization, approves the corresponding category for the worker in an order which is noted in the worker's labor booklet and is entered in the wage documents.

Wage rates determine the amount of wages per unit of time. Wage rates can be hourly, daily and monthly (salary). The amount of wages is determined primarily by the amount of the wage rate.

Within the sector the wage rates of the first category are used to differentiate wages depending upon working conditions, the forms of wages and the

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[4]A worker who is a member of a brigade is given a category not from the difficulty of the work which the brigade performs but rather from the difficulty of the job which he performs independently.

intensity of production. Depending upon the working conditions, two-four wage rates are set for the first category. For jobs involving heavy and harmful working conditions, the wage rates are increased by 10-12 percent above the normal, and for jobs with particularly heavy and harmful working conditions, 16-24 percent higher.

The wages rates of the first category are differentiated by the industrial sectors, and using them an intersectorial regulation of worker wages is carried out.

In order that the wage rates perform their role most efficiently, they should correspond to a certain level of average wages. The wage according to the rate should be approximately 80 percent of the level of average wages for time workers and 70 percent for piece workers and for this reason as average wages rise the wage rates are periodically revised on a centralized basis.

The *wage networks* are used to set the wage ratios depending upon the skill level. These are an aggregate of the rate categories and the corresponding rate coefficients.

The ratio of the rate coefficients for a six-category wage network for workers of machine building (shipbuilding) enterprises is given in Table 46.

Table 46

Rate Coefficients and Their Ratio

Indicator	Category					
	I	II	III	IV	V	VI
Rate coefficients	1.0	1.09	1.20	1.33	1.50	1.71
Absolute rise in rate coefficients	--	0.09	0.11	0.13	0.17	0.21
Relative rise in rate coefficients, %	--	9.0	10.1	10.8	12.8	14.0

The rate coefficients indicate by how many times the wage rate of the given category is above the first. The ratio between the rate coefficients of the extreme categories is called the range of the wage network. Before the increase in the minimum wage, a majority of the wage networks in industry had a range of 1:2. With the increase in the minimum wage, the range of the networks was reduced approximately to 1:1.7.

In keeping with technical progress and the rise in the general educational level of the workers, the qualitative differences in labor will gradually

be reduced and for this reason the reduction in the range of the rate network is natural. The number of categories in the wage networks will also be gradually reduced.

The wage network (the current one in shipbuilding) is organized according to the principle of an increasing relative rise in the rate coefficients. Here the wage rate of the second category is 9.0 percent greater than the preceding one, and the sixth is 14.0 percent greater.

Proceeding from the basic principles in the organization of wages, the wage networks should provide the necessary material incentive for improving skills, and not permit wage leveling and unsound differences in the wages of workers in the higher and lower categories.

The salary systems are the basis of wages for managers, engineers, technicians and white collar personnel. They represent a normative documennt which contains lists of all the positions existing in the given sector with an indication of the monthly salaries.

The salaries of management workers at the enterprises depend upon the group of the enterprise. The group is determined by the production volume, its type (mass, large-series, small-series and individual), by the complexity of the produced product, by the level of production mechanization and automation. Shops are divided into four groups in terms of the salary level of the management, and sections into three.

The salary systems for each position give the minimum and maximum acceptable amount of salary, and this provides an opportunity for the leaders in setting the salaries to adjust their amount considering the personal qualities of each worker. Moreover, the enterprises are given the right to set wage supplements up to 30 percent of the salary for highly skilled foremen and other engineers and technicians within the limits of the wage fund set for them, using for these purposes 1 percent of the enterprise planned wage fund with permission of the superior economic body. The surpayments for combining professions and functions are set in the same amounts for engineers, technicians and white collar personnel.

The salary systems are used for the intrasectorial adjusting of wages. For this purpose the salaries for managers, engineers, technicians and white collar personnel are set on a differentiated basis depending upon a whole series of factors, the most important of which are: The work volume, the degree of responsibility of the employee, the complexity of the job, the skills of the employee and the labor conditions.

Regional coefficients are an indicator for increasing the amount of wages depending upon the location of the enterprise, and they are a means of the interregional adjustment of wages. For a majority of the eastern and northern regions of the country, the regional coefficients have been set at an amount of 1.1-1.3. For a number of regions of the Far North and their equivalent, coefficients of 1.5-2.0 are used. These coefficients are added

to earnings not over 300 rubles a month. If earnings exceed this amount, then the coefficient is figured for a total of 300 rubles.

92. Forms and systems of wages. Wages for workers, engineers, technicians and white collar personnel are adjusted not only by the rate system, but also by the wage forms and systems. While the rate system is the basis for the qualitative evaluation of various types of labor, the wage forms and systems establish a certain procedure for calculating wages depending upon the quantity and quality of expended labor.

In industry (including shipbuilding) two forms of wages are used: piece and time. With the *piece* form, wages are paid for each manufactured unit of product or performed unit of a volume of work; with *time* wages, according to a wage rate or salary for the actually worked time.

Both piece and time forms have several varieties of wage systems.

The piece form is divided into direct piece, piece-bonus, piece progressive, indirect piece and job systems. Depending upon the form of the organization of labor, they can be individual or brigade (collective). The time form is divided into simple time, time-bonus and a salary.

With the direct piece system, the earnings of the worker are directly dependent upon the quantity of product produced by him (the carried out volume of work) and the rates. The latter are figured by dividing the daily or hourly wage rate by the shift or hourly output standard. The actual piece earnings of a worker with the direct piece system are determined by adding up the products of the rate by the actual output for each type of work.

The enterprise leaders are given the right to pay additions for professional skill of highly skilled workers in the leading professions of the fifth and sixth categories and employed in the most important production sections up to 15 percent of the wage rate of the assigned category and within the limits of the planned wage fund.

With the piece-bonus system, the piece worker, in addition to earnings under the direct piece rates, is also paid a bonus for fulfilling and overfulfilling the established quantitative and qualitative indicators, including: The fulfillment and overfulfillment of the production quotas or technically sound output rates, the acceptance of products upon first submission, the increase in the output of good products, the savings of raw products and materials, and so forth. The bonuses are paid both from the wage fund and from the material incentive fund for the work results over the year.

The piece-bonus system is a very effective system which has been rather widely spread at the shipbuilding enterprises. For successfully employing it it is essential that the number of bonus indicators be not more than one or two and that they depend completely and directly upon the work results of the worker. The introduction of the piece-bonus systems should

be preceded by a calculating of their economic effectiveness. The bonus payments should not exceed the amounts of the actual savings.

With the piece-progressive wage system, the workers are paid at the direct piece rates within the established initial quota, and above the initial quota, at increased rates. The rise in the piece rates is determined by a special scale depending upon the growth of output. With this wage system, the earnings of the worker grow more rapidly than the productivity of his labor. For this reason it cannot become a mass and permanent form of wages but rather should be employed temporarily and only at production "bottlenecks."

With the indirect piece system which is used to pay certain categories of auxiliary workers, the wages are figured depending upon the indicators which have been achieved by the basic workers being served or by the sections as a whole.

With the job system, the amount of the piece rate is set not for each type of work but rather for the entire volume (complex) of work as a whole (according to the current quotas and rates).

With brigade piece wages, the earnings of the brigade figured for it at the piece rates are distributed among the brigade members proportionately to the worked time and the skill (the wage category).

The brigade leaders who have not been released from their basic job in the brigade, under the condition that the brigade fulfills the normed quotas for the month, are paid 10 percent of the wage rate for leading the brigade if the brigade has from 5 to 10 members, and 15 percent of the wage rate with more than 10 members in the brigade.

With the simple time system, wages are determined by the amount of the wage rate and the quantity of time worked by the worker. With the time-bonus system, in addition to the earnings under the wage rates (salaries) the employees are paid a bonus for achieving certain quantitative and qualitative indicators according to the provisions.

With a salary, the earnings are figured proceeding from fixed monthly rates and the number of worked workdays over the given month.

The labor of engineers, technicians, white collar personnel and junior service personnel is paid for under salary and time systems, and only individual categories of these employees can be paid piecemeal. For example, enterprise leaders have the right, with the agreement of the trade union committee, to introduce piece wages for designers, draftsmen, typists and other categories of white collar personnel in those instances when they perform work according to uniform or sectorial rates.

The engineers, technicians and white collar personnel receive bonuses predominantly from the material incentive fund. The bonus indicators are set on a differentiated basis for the individual categories and groups of workers considering the specific tasks confronting them.

Bonus conditions are also set. For example, if the basic indicator for bonuses is the volume of sold product, then the required bonus conditions can be the fulfillment of the plan for profit and the range of the produced product. In addition to required bonus conditions, where bonuses are not paid with their nonfulfillment, additional bonus conditions can be set and with the nonfulfillment of them the bonus can be reduced up to 50 percent with the agreement of the plant trade union committee.

For managers of an enterprise (shop) who have allowed an overexpenditure of the wage fund, the bonus is reduced by the amount of the overexpenditure (but by not more than 50 percent). If within 6 months the overexpenditure is made up, then the designated employees are paid 50 percent of the bonus which was not paid to them because of the overexpenditure in the wage fund.

Enterprise employees also receive remuneration for the work results during the year from the material incentive fund. This remuneration is paid proceeding from the actual earnings of the employee, his length of employment at the given enterprise and attitude toward the carrying out of his production duties.

Individual employees can be fully (or partially) deprived of bonuses and remuneration for the work results of the year both for production oversights and for violating labor discipline. The depriving or reduction of bonuses or remuneration is drawn up as an order of the leader with an indication of the established reasons.

93. Calculation of the average category, the average rate coefficient and the average wage rate. Along with the individual wage categories, the wage networks and rates, for the purposes of determining the average skill of the workers, for planning the wage funds and for analyzing the labor indicators, the enterprises determine: a) the average category of the workers and jobs; b) the average rate coefficient for the workers and job; c) the average wage rate of the workers and jobs.

The average category R_a is determined as an average arithmetic amount weighted for the number of workers (jobs):

$$\text{workers} \quad R_a' = \frac{\Sigma R_{pi} p_i}{\Sigma p_i}, \qquad \text{jobs} \quad R_a'' = \frac{\Sigma R_{ti} t_i}{\Sigma t_i},$$

where R_{pi}--the wage category of the workers in group i;
p_i--the number of workers of category i;
Σp_i--the total number of workers of all categories, persons;
R_{ti}--the wage category of type i of jobs;

t_i--labor intensiveness of category i of jobs;
Σt_i--total labor intensiveness of all types of jobs, norm-hour.

The average wage coefficient K_a is determined as an average arithmetic amount weighted for the number of workers (jobs):

$$\text{for workers} \quad K_a' = \frac{\Sigma K_{pi} p_i}{\Sigma p_i};$$

$$\text{for jobs} \quad K_a'' = \frac{\Sigma K_{ti} t_i}{\Sigma t_i},$$

where K_{pi}--the wage coefficient for group i of workers (of the given category);
p_i--the number of workers in group i, persons;
Σp_i--the total number of workers for which the average wage coefficient is being determined, persons;
K_{ti}--the wage coefficient for the volume i of jobs;
t_i--labor intensiveness for volume i of jobs, norm-hour;
Σt_i--total labor intensiveness for all i jobs.

The average wage rate C_a is calculated as the average arithmetic value of the wage rates weighted for the number of workers (labor intensiveness):

$$\text{for workers} \quad C_a' = \frac{\Sigma C_{pi} p_i}{\Sigma p_i},$$

$$\text{for jobs} \quad C_a'' = \frac{\Sigma C_{ti} t_i}{\Sigma t_i},$$

where C_{pi}--the hourly i wage rate for the category of the given group of workers, rubles (kopecks);
p_i--the number of workers paid at wage rate i, persons;
Σp_i--the total number of workers for whom the average wage rate is determined, persons;
C_{ti}--the hourly wage rate i of the category for the given volume of work, rubles (kopecks);
t_i--labor intensiveness of job i paid for at the given wage rate, norm-hour;
Σt_i--the total labor intensiveness of all jobs.

94. Planning wage funds at an enterprise. The planned wage fund includes all the monetary payments to the employees under the piece rates, wage rates and salaries; the various additions and surpayments for night work, on holidays, for leading a brigade, to women during the nursing of children, to juveniles for the short workday, for the regional coefficients, and bonus payments to workers under the piece-bonus, time-bonus and other systems, with the exception of the bonuses paid from the material incentive fund.

A wage fund may be an hourly, day or monthly (annual) wage fund. These funds are based upon the direct wage fund and this consists of the payment of piece workers by the rates and time workers by the time rate. The other funds are formed by various planned additions which are provided for under the labor legislation to the direct wage fund (Table 47).

The amount of the planned wage fund should provide the wages owed all categories of employees for manufacturing the planned product and carrying out the designated jobs.

The planned wage fund as a whole for the enterprise is determined: 1) by a consolidated calculation method in working out the draft plan; 2) by the method of calculating the wage fund by personnel categories. The wage fund for the shops is determined solely by the calculation method using worker categories.

With the consolidated calculation method, the planned wage fund for the enterprise is determined on the basis of analyzing the expenditure of the wage fund in the current period and the planned rise in labor productivity in the period being planned. On the basis of the expected average wage during the current period and the planned growth of labor productivity, the optimum growth of average wages and their absolute amount are projected.

Here it is important at each enterprise to ensure the more rapid growth of labor productivity in comparison with the growth of average wages. Only in this instance is a relative savings of wages achieved and the expenditure of wages per unit of product reduced.

The amount of the growth of average wages (not counting payments from the material incentive fund and benefits for the Far North) for the shipbuilding enterprises should be set depending upon the proportional amount of engineers, technicians and white collar personnel (Table 48).

Having thus determined the amount of the rise in average wages in the current period and the approximate number considering the growth of labor productivity, it is possible to calculate (roughly) the total wage fund for the enterprise PPP.

In planning the total wage fund by the calculating using employee categories, it is essential to have the following initial data: 1) the labor intensiveness of the production program; 2) the working time budget in the period being planned; 3) the planned number of workers by profession and skill; 4) the current enterprise wage rates, the staff schedules for engineers, technicians, white collar personnel, MOP and security, salaries and bonus systems.

The wage fund for the basic production workers of an enterprise (shop) is calculated proceeding from the wage rate (the expenditures on wages per norm-hour considering additional wages) and the production plan expressed in labor intensiveness quotas.

Table 47

Wage Funds and Types of Additions

Types of Wage Funds	Additions	
	Planned	Unplanned
Fund for piece rates; Fund for time rates		
Direct wage fund	For piece-bonus and piece-progressive systems. Bonuses of time worker For night work For class rating For brigade leaders for directing brigade Payment on holidays For training students Other additions	For piece workers performing job below assigned category To average day earnings of worker in previous month For deviation in normal working conditions
Addition to hourly fund		
Payment to day fund	For juveniles for short workday Payment for breaks in work of nursing mothers Payment for stoppages within shift	For overtime For work on holidays Payment for rejects not fault of worker
Day wage fund	Payment of regular and additional leaves Payment for time performing social and state duties Payment for workers sent to other enterprises or for study Cost of free utility services Other additions	Payment of compensation for unused leave Payment for severance aid Payment for whole-day stoppages
Addition to monthly (annual) fund		
Monthly (annual) wage fund		

Table 48

Rate for Increase in Average Wages (Approximate) for 1% Rise in Labor Productivity

Proportional amount of engineers, technicians and white collar personnel in total number of PPP, %	Growth of average wages (not counting payments from material incentive fund and benefits of the Far North) per 1% rise in labor productivity, %
to 25	0.30
from 25 to 30	0.25
from 30 and over	0.20

Table 49

Calculation of Average Weighted Wage Coefficient of Jobs (volume of work hypothetical)

Category	Wage coefficient	Volume of work, in 1,000 norm-hr (or number of workers)	Product of the wage coefficient and the volume of work (or number of workers)
1	1.0	--	--
2	1.09	200.0	218.9
3	1.20	250.0	300.0
4	1.33	400.0	532.0
5	1.50	150.0	225.0
6	1.71	50.0	85.5
Total	--	1,050.0	1,360.5

Note. The average wage coefficient for the jobs is 1.3 (1360.5:1050).

The wage rate (considering all additions) is calculated for each shop once a year and is approved by an order of the enterprise director.[5]

[5]With significant changes in the structure of the production program caucing a sharp change in the rating of the jobs, the rate can be revised and re-approved by an order of the enterprise director.

Table 50

Calculation of Average Hourly Wage Rate of First Category
(without additions)
(figures hypothetical)

Types of jobs	Network and category of jobs	Volume of work, 1,000 norm-hr	Wage rate of 1st category, kopecks	Product of volume of work and rate of 1st category
Marking	Piece-cold	50.0	47.9	2,400.0
Cold metal cutting	"	100.0	47.9	4,790.0
Assembly	Piece-hot	550.0	53.9	29,500.0
Welding	"	300.0	53.9	16,100.0
Forging	Particularly heavy	50.0	57.6	2,880.0
Total	--	1,050		55,670.0

Note. The average weighted wage rate of the first category (without addition) is 53.1 kopecks (55670.0:1050).

The rate for the value (for wages) of 1 norm-hour and the total wage fund for the production workers are calculated in the following procedure: 1) the average weighted wage coefficient for the jobs in the shop is calculated (Table 49); 2) the average wage rate of the first category (without additions) is calculated (Table 50); 3) the average value (for wages) of 1 norm-hour is determined; 4) the amount of additions and additional wages is determined as a whole (in absolute and relative terms in relation to direct wages) (Table 51); 5) the full planned rate for the value (in terms of wages) of 1 norm-hour and the total wage fund for the production workers are determined (Table 52).

1. The average wage coefficient for the jobs will be 1.3 (1360.5:1050) (Table 49).

2. The average weighted wage rate of the first category (without additions) will be 53.1 kopecks (55670.0:1050) (Table 50).

3. The average value (for wages) of 1 norm-hour considering the wage rate of the jobs is 53.1 x 1.3 = 69.0 kopecks.

4. The calculation of the amount of additions and additional wages as a whole (in absolute and relative terms) for the basic production workers is given in Table 51. For the example the volume of gross product of the shop

Table 51

Calculation of Additions and Additional Wages
(figures hypothetical)

No.	Content of parts of wages	Unit	Absolute value	Note
1	2	3	4	5
1	Volume of gross product of planned period	norm-hr	600,000	Set hypothetically
2	Direct wage fund	rubles	414,000	$\frac{69.0 \cdot 600,000}{100}$
	Addition to hourly fund			
	a) for piece-progressive system	"	12,500	By calculation
	b) for piece-bonus system	"	35,800	"
	c) for night work	"	1,500	"
	d) working brigade leaders	"	850	"
	e) for training students	"	1,100	"
	f) for holiday work	"	530	Determined from report data for previous period
	g) other additions	"	940	
3	Total additions to hourly fund	rubles	53,220	
4	Additions to hourly fund in percent of direct fund	%	12.9	(53220:414000)·1000
5	Total hourly wage fund	rubles	467,220	(414000 + 53220)
	Addition to day wage gund			
	a) for juveniles for short workday	rubles	1,200	By calculation
	b) for nursing mothers	"	950	"
	c) other additions	"	580	Determined from report data for previous year
6	Total additions to day fund	rubles	2,730	
7	Additions to day fund in % of direct fund	%	0.66	(2730:414000)·100
8	Total day wage fund	rubles	469,950	(2730 + 467220)

[continuation of Table 51]

1	2	3	4	5
	Additions to monthly (annual) wage fund			
	a) payment of regular and additional leaves	rubles	25,500	By calculation
	b) payment of training leaves	"	4,100	"
	c) payment of 50% of payment leaves	"	500	"
	d) payment for time spent carrying out state and social duties	"	1,200	"
	e) severance aid	"	730	Determined from report data for previous year
	f) payment for years employed	"	3,100	
	g) other additions	"	1,420	
9	Total additions to monthly (annual) fund	rubles	36,450	
10	Additions to monthly (annual) fund in % of direct fund	%	8.9	(36530:414000)·100
11	Total monthly (annual) wage fund	rubles	506,400	(36450 + 469950)
12	Total additions to direct fund	"	92,400	(53220 + 2730 + 36450)
13	Total percentage of additions to direct fund	%	22.4	(92400:414000)·100

Note. The calculation of the full planned cost rate (for wages) of 1 norm-hour and the monthly (annual) wage fund for basic production workers is given in Table 52.

(enterprise) in the labor intensiveness quotas has conditionally been set as equal to 600,000 norm-hours.

5. The calculation of the full planned rate for the value (in terms of wages) of 1 norm-hour and the monthly (annual) wage fund for the basic production workers is given in Table 52.

Table 52

Calculation of Rate and General Wage Fund
for Production Workers of a Shop

(figures hypothetical)

No. of Section	Content of Parts of Wages	Unit	Absolute Value	Note
1	Average cost of norm-hr without additions	kopeck	69.0	By calculation
2	Additional wages in % of direct fund	%	22.4	By calculation, Table 51
3	Same in absolute terms	kopeck	15.4	$\frac{(69.0 \times 22.4)}{100}$
4	Full planned wage rate for basic production workers per norm-hr	kopeck	84.4	(69.0 + 15.4)
5	Planned volume of tross product per shop per year in labor intensiveness quotas	norm-hr	600,000	From condition of example
6	Total annual wage fund for basic production workers	rubles	506,400	$\frac{(600000 \times 84.4)}{100}$

The rate wage fund for auxiliary workers paid piecemeal is determined in an analogous manner as for the basic production workers. For the production program they use the volume of auxiliary jobs in labor intensiveness quotas. The rate wage fund for time workers is determined proceeding from the hourly wage rate of the corresponding worker category (considering the working conditions), the number of time workers by categories and the available working time in the plan period.

Additional wages to the wage fund of auxiliary workers are determined in the same manner as for basic workers.

The planned wage fund for students [apprentices] is calculated proceeding from the wage rate of a student, the number of students, the period of instruction and payment conditions, that is, this is the product of the monthly wage rate of the student, the coefficient for fulfilling the quotas (with piece wages), the number of students and the period of instruction (in months).

The planned wage fund for engineers, technicians, white collar personnel, MOP and security is determined on the basis of the approved staff schedules and salaries. The wage fund for these categories (with the exception of

security) should be reduced by the amount of unpaid absences (for sickness, statutory leaves, and so forth), and a coefficient considering these absences is set on the basis of report data. In addition, for these employee categories, leave pay, the carrying out of state and social duties, additions for breaks to nursing mothers and other such additions are not planned separately. Additions for night work are also not planned for engineers, technicians and white collar personnel.

The annual planned wage fund for engineers, technicians and white collar personnel is calculated in a tabular form:

Employee category	Planned number, persons	Average annual salary, rubles	Annual wage fund by salaries, rubles	Coefficient considering unpaid absences	Total planned annual wage fund, in 1,000 rubles

At enterprises which are in areas with an increased regional coefficient, in the planned wage fund for all categories of the PPP, they consider additions for the regional coefficient within the established amounts.

In the planned wage fund provision is also made for wages to the students of vocational-technical schools (PTU) for work performed by them during the period of job training. This fund is calculated on the basis of report data on the amount of student earnings and the number of them.

The calculated wages for the work performed, as a rule, are transferred and paid out at the PTU.

The formulas and methods for calculating additions to the direct wage fund are given in Table 53.

95. Planning the labor indicators for shops and sections. The basic (directive) indicators of the labor and wage plan for the shops (for the year, quarter and month) are worked out at the department for labor and wages (OTiZ). They are approved by the enterprise leader. The labor and wage plans for the sections are worked out and approved by the shop leadership.

Providing a continuous rise in labor productivity at a pace that outstrips the growth of average wages (considering payments from the material incentive funds) is a basic task both for the enterprise leadership and the shops.

Table 53

Formulas and Methods of Calculating Additions
(additional wages)

Name of Additions and Calculation Method (a)	Explanation (b)
Additions to hourly wage fund:	
a) Bonuses for piece-progressive system $D_{pr} = A_c \frac{P-B}{P} K_p$	A_c--the wage fund for basic production workers by basic piece rates, rubles; P--planned percentage of fulfilling the quotas; B--initial base for calculating additions, %; K_p--coefficient for an increase in piece rates for each percentage of overfulfilling the quotas above initial base
b) Bonuses for piece-bonus system $D_{sp} = A_{cg} \frac{P-B}{P_{pr}} K_p$	A_{cg}--the wage fund for basic piece rates (separately for first and second worker groups), rubles; P_{pr}--established bonus percentage according to current statute (separately for first and second worker groups)
c) For night work $D_n = \frac{C_a K_n T_n W_n}{100}$	C_a--average hourly wage rate, kopecks K_n--coefficient for addition to wage rate for each hour of night work (1/7); T_n--available night work per year per worker, hour; W_n--number of workers on night work, persons
d) Working brigade leaders for leading brigade: from 5 to 10 persons--10% (of monthly rate of brigade leader)	

[continuation of Table 53]

a	b
from 10 persons and more--15% (of monthly rate of brigade leader)	
e) Total additions to workers for training students is determined by multiplying the cost of training one student by number of trainees in period being planned	Payment for each student per month with simultaneous instruction respectively with ordinary working conditions and harmful and hard: 1 student 7 rubles-10 rubles 2 students 5-8 3 students 4-6 4 and more 3.50-5
f) Additions for work on holidays and other additions (except those listed above)	Determined from report data for previous period and from other sources describing their amount
Additions to Day Wage Fund	
a) To juveniles for short workday $D_j = \frac{C_a h W_j}{100}$	C_a--average hourly wage rate of juveniles, kopecks; h--number of preferential hours per year per juvenile; W_j--number of juveniles, persons
b) For breaks for nursing mothers $D_m = \frac{A_h Y_b}{100}$	A_h--hourly wage fund of workers, rubles; Y_b--proportional amount (in %) of breaks for nursing child in total available working time is determined by formula $Y_b = \frac{bD_p}{F_p} 100;$ b--losses of working time in nursing child (set from working time balance), hr; D_p--number of working days in year being planned; F_p--effective available working time, hours

[continuation of Table 53]

a	b
c) Other additions to day fund (except those listed above)	Determined from report data for previous period with corresponding adjustment
Additions to Monthly (Annual) Wage Fund	
a) Payment of regular and additional leaves $D_{\ell} = \frac{A_d d_o}{D_p}$	A_d--day wage fund, rubles; D_p--number of working days in year being planned; d_o--average planned duration of leave, days
b) For time of training leaves $D_{tr} = \frac{A_d D_y}{D_p}$ Note. In calculating additions for leaves paid at 50%, a coefficient of 0.5 is added to the formula	A_d--day wage fund; D_p--number of working days in planned year; D_y--average duration of trai-ing leaves
c) For time spent carrying out state and social duties $D_s = \frac{A_d D_s}{D_p}$	A_d--day wage fund; D_p--number of work days in year being planned; D_s--average duration spent carrying out state and social duties
d), e), f) Severance aid, payment for number of years employed and other additions to monthly (annual) wage fund	Determined from report data for previous year and from other sources describing their amount

For determining the percentage of growth for the production volume and labor productivity to the corresponding base period, it is essential to calculate the planned production volume in the labor intensiveness quotas for the base and planned periods. With these data available, it is possible

to determine the reduction factor for the labor intensiveness of the planned period (as the quotient of dividing the planned production volume in labor intensiveness quotas for the planned period by the same production volume in the labor intensiveness quotas of the base period).

With the aid of the found coefficient, the production volume of the base period in the labor intensiveness quotas of the period being planned is adjusted. As a result the output of the base and planned periods become comparable, and it correctly reflects the percentage of growth of labor productivity. Such a calculation is made once a year. Its results depend upon the preciseness of working out, approving and systematizing the labor intensiveness quotas for the shops as well as for the orders and the years.

The labor and wage plan of a shop should include the directive indicators which are approved by the enterprise leader and the internal shop calculation indicators approved by the shop chief.

The directive indicators include: Output per worker in norm-hours and in percent of the corresponding period of the previous year; the total number of PPP; the total wage fund; the material incentive fund; average wages of one employee (considering payments from the material incentive fund) and in percent of the previous year; the full planned wage rate for basic workers per norm-hour (considering additional wages).

The internal shop calculation indicators for the labor plan include: The number of personnel by categories; the wage fund by categories; the systematization of the labor intensiveness quotas for the articles (orders) and as a whole for the shop.

It is recommended that the labor and wage plan of a section include the following indicators: a) the production volume in labor intensiveness quotas for the period being planned; b) output per worker in norm-hours; c) the number of production workers; d) the wage fund of production workers, including the fund of the foreman.

CHAPTER 11: THE COSTS AND PRICE OF PRODUCTS IN SHIPBUILDING

96. The cost of shipbuilding products. Costs represent the expenditures of the shipbuilding enterprises on producing the product and selling it. Product costs express the value of the consumed working capital, the share of fixed capital which wears out in the production process (amortization deductions), the share of live labor paid directly to the employees in the form of wages, and the share of surplus product in the form of deductions for social security of the enterprise employees.

Product costs are a portion of the value of the product expressed in a monetary form. There is a quantitative and qualitative distinction between product costs and its value. The quantitative difference is that the accumulation created at the enterprise is not included in the product costs, except the deductions for social security. The qualitative difference in product costs from its value is, in the first place, that there is a substantial difference between the expenditures of the consumed means of production and their monetary expression, and this difference depends upon the price level set for the means of production, and secondly, product costs are determined proceeding from the individual labor expenditures and the production conditions at individual enterprises, while the expenditures of socially necessary labor underlie product value.

In addition, it is essential to bear in mind that the individual product costs of the separate enterprises do not coincide with the real outlays on their production, since a portion of the expenditures of necessary labor relating economically to the enterprise is not included in its product costs. In particular, the costs of a self-financing enterprise do not include a number of expenditures which are recovered from the following sources: From profit in its redistribution, including the expenditures (with the exception of amortization) on the maintenance of buildings and installations of the cultural and educational institutions, health and physical culture measures, on the running of nurseries, parks and pioneer camps, the losses of the housing and utility system, and credit interest; from a direct reduction of financial results, including unproductive expenditures such as penalties, losses and fines paid, losses from canceled orders, losses from natural disasters, and from operations of previous years discovered in the

report year; from economic incentive funds, including bonuses for engineers, technicians and white collar personnel as a portion of their wage; by purchaser enterprises (organizations) to suppliers in the price (c.i.f. the station of the consignee) and including the average value of transporting the freight.[1]

Regardless of the common economic content of the expenditures to be included in the cost of industrial products, the forming of costs in the individual industrial sectors and subsectors has its particular features. In shipbuilding, the most important are: The conditional nature of cost planning for the prototype and first vessels in a series, the particular features of including expenditures on additional work in product costs; the procedure for determining the amount of reducing the cost of subsequent vessels in a series; the particular features of including the expenditures related to developing new ship designs in the costs of shipbuilding products; the procedure for assessing incomplete production for shipbuilding products; the incomparability of the total amount of expenditures with the production volume; the use of specific planning and accounting units, and so forth.

97. Classification of production expenditures. All expenditures on the production of products at industrial enterprises are calculated in different ways. One of the most important ways for classifying production outlays is to divide them into the economic expenditure elements and the expenditure costing items. The grouping of expenditures by economic elements is used for compiling the expenditure estimate for production, and by costing items for calculating and analyzing the costs of commodity product.

In shipbuilding, the composition of the economic cost elements and the costing items differs somewhat from the ones used in machine building generally (Table 54).

In turn, production expenditures are further classified depending upon: Their participation in the production process, into basic expenditures which are directly related to the production process, and expenditures related to the serving of production and management; upon the method of classifying expenditures in the costs of a unit of product, into direct and indirect expenditures; the relation of the given type of expenditures to the production volume of the enterprise, into proportional expenditures, that is, those which rise directly proportional to the growth of the production volume, and nonproportional, that is, they change not directly dependent upon the product output volume. In addition to the above-indicated ways of classifying expenditures, they are also divided into expenditures which depend upon the operation of the given enterprise, and those which do not depend upon the enterprise.

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[1]"Kal'kulyatsiya Sebestoimosti v Promyshlennosti" [Costing in Industry], edited by A. Sh. Margulis, Moscow, Finansy, 1975, p 6.

Table 54

Range of Economic Elements and Costing Items
Used in Shipbuilding

Economic Elements of Expenditures	Costing Items of Expenditures
1	2
Raw products and basic materials (minus recoverable wastes)	Raw products and materials Recoverable wastes (subtracted) Own-produced semifinished products
Including: Purchased preassembled articles and semifinished products	Purchased preassembled articles, semifinished products and services of subcontracting enterprises
Contractual deliveries and work (employed only by shipbuilding and repair enterprises)	Contractual deliveries and work (used only by shipbuilding and repair enterprises)
Auxiliary materials	Fuel and energy for production purposes
Fuel	Basic wages of production workers
Energy	Additional wages of production workers
Wages, basic and additional	Deductions for social security
Deductions for social security	Expenditures on preparation and development of production
Amortization of fixed capital	Expenditures on maintenance and operation of equipment
Other expenditures	Other special expenditures
	Shop expenditures
	General plant expenditures
	Losses from damage
	Other production expenditures
	Total production cost
	Nonproduction expenditures
	Full cost

Table 55 gives a classification of the expenditure elements for the production of product at shipbuilding enterprises.[2]

98. Types of costings used in shipbuilding. For determining the cost of a unit of product in shipbuilding, preliminary estimate, report-technical and report-estimate, plan and report costings are employed.

The preliminary estimate costings are drawn up separately for the prototype and series vessels, and they are used for determining the approximate prices for vessels under construction. The report-technical costings are drawn up for the prototype vessels, and report-estimate ones for series vessels. These costings are used for setting the wholesale prices for the vessels.

The planning costings are worked out for each vessel to be included in the commodity product. They are designed for planning the cost quotas for building the given vessel and the cost of the plant's commodity product. The report costings are drawn up from the actual expenditures on producing the vessels. This type of costing is used for evaluating plan fulfillment in terms of the costs of shipbuilding products and for disclosing reserves for further reducing them.

Plan, normative and report costings are used for planning, accounting for and analyzing expenditures on the production of nonshipbuilding products.

99. The content of individual costing items for product costs at shipbuilding enterprises. The item "raw products and materials" includes expenditures on basic materials. In individual instances the expenditures on auxiliary materials are also included which are used in the process of manufacturing the given article for ensuring the normal production process.

If the cost of the auxiliary materials used for production purposes is an insignificant proportional amount in the costs of the articles and the distribution of these expenditures is complicated through the estimate rates of a product unit, it is allowable to put them against the expenditures on the maintenance and operation of equipment.

In shipbuilding and ship repairs, the cost of auxiliary materials (compressed air, oxygen, acetylene, and so forth) for production purposes as well as the cost of basic materials used for providing temporary utility facilities in the period of building the vessels are put against the item "other special expenditures."

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[2]As the basis of the current classification, we have used the scheme given in the book: "Ekonomika Sotsialisticheskoy Promyshlennosti" [Economics of Socialist Industry], edited by Prof L. I. Itin, Moscow, Vysshaya Shkola, 1974, p 521.

Table 55

Classification of Elements in Product Costs

1 Элементы себестоимости продукции	2 В зависимости от								
	3 участия отдельных элементов в создании продукции		4 способа отнесения затрат на отдельные виды продукции		5 роста объема производства		6 работы предприятия		
	7 Основные затраты	8 Расходы по управлению и обслуживанию производства	9 Прямые	10 Косвенные	11 Пропорциональные	12 Непропорциональные	13 Зависимые	14 Независимые
a) Сырье и основные материалы	+	—	+	—	+	—	m Нормы	n Цены
b) Вспомогательные материалы	—	+	—	+	—	+	,	,
c) Топливо	h Технологическое	j Прочее	h Технологическое	j Прочее	h Технологическое	j Прочее	,	,
d) Электроэнергия	h Технологическая	j Прочая	h Технологическая	j Прочая	h Технологическая	j Прочая	,	,
e) Покупные малоценные инструменты, штампы, приспособления	i) Рабочие инструменты	j Прочие	k Специальные	l Универсальные	i Рабочие инструменты	j Прочие	,	,
f) Покупные полуфабрикаты	+	—	+	—	+	—	,	,
g Контрагентские поставки и работы	+	—	+	—	+	—	,	,

Key: 1--product cost elements; 2--depending upon; 3--participation of individual elements in creation of product; 4--method of relating expenditures to individual product types; 5--rise in production volume; 6--enterprise operations; 7--basic expenditures; 8--expenditures on management and servicing of production; 9--direct; 10--indirect; 11--proportional; 12--nonproportional; 13--dependent; 14--nondependent; a--raw products and basic materials; b--auxiliary materials; c--fuel; d--outside electric power; e--purchased inexpensive tools, dies, attachments; f--purchased semifinished products; g--contractual deliveries and work; h--production; i--working tools; j--other; k--special; l--universal; m--standards; n--prices.

Table 55 (con't.)

1 Элементы себестоимости продукции	2 В зависимости от									
	3 участия отдельных элементов в создании продукции		4 способа отнесения затрат на отдельные виды продукции		роста объема производства 5		работы предприятия 6			
	7 Основные затраты	Расходы по управлению и обслуживанию производства 8	9 Прямые	10 Косвенные	11 Пропорциональные	12 Непропорциональные	13 Зависимые	14 Независимые		
a) Заработная плата	f Производственных рабочих	i Прочих	f Производственных рабочих	j Прочих	f Производственных рабочих	i Прочих	+	l Расчетные условия		
b) Отчисления на социальное страхование	g То же	»	g То же	»	g То же	»	+	m Процент		
c) Амортизация	h Производственного оборудования, стапелей, слипов и др. гидротехнических сооружений	j Прочих фондов	k Специального оборудования, стапелей, слипов и других гидротехнических сооружений	»	—	+	+	n Норма амортизационных отчислений		
d) Услуги со стороны	—	+	—	+	—	+	+	o Тарифы		
Прочие денежные e) расходы	—	+	—	+	—	+	+			

Note. The + means that the designated cost elements are considered in the given type of expenditures.

Key: 1-14--see previous page; a--wages; b--social security deductions; c--amortization; d--outside services; e--other money expenditures; f--production workers; g--same; h--production equipment, ways, slips and other hydraulic engineering works; i--other; j--other funds; k--special equipment, ways, slips and other hydraulic engineering works; l--calculation conditions; m--interest; n--amortization deduction rate; o--rates.

The item "own-produced semifinished products" reflects the value of the semifinished products of one's own preparatory shops, that is, castings, forged and stamped pieces, as well as expenditures on the partial processing and finishing of own-produced semifinished products. This also includes the value of the finished products under the range of interplant subcontracting and contractual deliveries manufactured for own needs.

The item "purchased preassembled products, semifinished materials and services of cooperative enterprises" includes the value of the finished articles and semifinished products acquired by subcontracting for making up the produced product.

The item "recoverable wastes" indicates the value of production wastes which have formed in the process of processing the raw materials and semifinished materials into the finished product. The value of the wastes is deducted from the item "raw products and materials."

The item "contractual deliveries and work" (used only in shipbuilding and repairs) includes the value of mechanisms and articles fully completed by the contracting plant and ready for assembly on the vessel, as well as contractual work related to the installation of ship equipment and electrical equipment for the vessels.

The item "fuel and energy for production purposes" reflects expenditures on all types of fuel and energy directly consumed in the production process, both received from the outside and generated at the enterprise itself. In particular, this includes expenditures on fuel and electric power for melting units, forging-stamping machines and equipment, the testing of turbines, diesels and other machines (except the vessels), and energy for producing compressed air, oxygen and refrigeration.

The cost of the fuel consumed for testing the vessels is accounted for in the item "raw products and materials," while the cost of the consumed energy in building the vessels, as was pointed out above, is reflected in the item "other special expenditures."

The item "basic wages of production workers" plans and accounts for the basic wages of workers for the work done directly in manufacturing the product, the engineers and technicians who perform production operations, that is, are engaged in manufacturing the product, adjusting, repairing, and so forth. The basic wages of the production workers include the following payments: Payment for performing operations and jobs according to piece rates and quotas, wages for workers employed directly in the production process or individual production operations under the time wage system; payment for average earnings in the period of an official trip involving the carrying out of the production process; additions for the piece-bonus wage system, bonuses for a job relating to technically sound quotas, for the quality of the work performed; bonuses to time workers, additions for the regional coefficient and other additions.

The item "additional wages of production workers" includes payments to production workers stipulated by the labor legislation and by the collective agreements for time not worked in production. This includes: Payment for regular and additional leaves; compensation for unused leave upon dismissal or the transferral of the employee to another enterprise; payment for the preferential hours to juveniles; payment for breaks in work for nursing mothers; payment for the time related to carrying out state and social duties; the payment of severance aid; the payment to donors for the days they are off the job; payment of remuneration for the numbers of years worked, and so forth.

The same item includes the additions to basic wages for production workers above the rates and established categories, namely: Bonuses from the wage fund for the fulfillment of the plan, bonuses from the foreman's fund; additions to average earnings in the event of being transferred to another job out of production necessity or to light work according to the rulings of the VKK [medical consultation commission] and the VTEK [medical commission for determination of disability], for pregnancy and births, during the period of nursing a child; additions paid to workers for 3-6 months for work under new quotas in revising the quotas on the basis of introducing organizational and technical measures; additions to the workers for combining jobs; the addition of the intercategory difference; the addition for overtime; the addition for night work; the addition for work on days off and holidays; the supplement for work in the regions of the Far North and equivalent localities; the addition for the class rating of drivers; surpayments to working brigade leaders for leading the brigade.

The item "deductions for social security" includes the deductions for social security according to the established rates (7.7 percent) of the total basic and additional wages of the production workers.

The expenditures included in the item "expenditures on the preparation and development of production" include the following expenditures: On the development of new enterprises, types of production, shops and units (starting-up expenses); on preparing and developing the production of new types of products and new production processes; on deductions into the development fund for new equipment and the bonus fund for the creation and development of new equipment.

The item "expenditures on the maintenance and operation of equipment" includes expenditures on maintenance, amortization and routine repair of the production and materials handling equipment, valuable tools, as well as wear and expenditures on the replacement of inexpensive and rapidly wearing out tools and attachments in general use. In shipbuilding they use a range of expenditure items for the maintenance and operation of equipment which is common to all the machine building enterprises.

The item "other special expenditures" reflects the following expenditures: On the manufacturing, purchasing and repair of special tools, attachments and fittings; the carrying out of special episodic testing; to pay for

expert evaluations related to the production of individual products; for serving the building of the vessel from its laying down to delivery, and so forth. In planning and accounting the other special expenditures are grouped according to the following items (Table 56).

The item "shop expenditures" includes: The wages of the shop management personnel; amortization and expenditures on the upkeep and routine repair of buildings, installations and general shop supplies; expenditures on experiments, research, rationalization and invention of a shop nature; expenditurss on measures relating to labor safety and other shop expenditures related to the management and serving of production.

The actual shop expenditures also include losses from stoppages, losses from the spoiling of materials in storage in the shops, losses from unutilized parts, assemblies and production fittings the spoiling of which has been the result of planning failures, a shortage of materials and incomplete production (minus surpluses), and other unproductive expenses.

The item "general plant expenditures" includes expenditures related to the managing of the enterprise and the organizing of production as a whole: Wages for the personnel of the plant administration with deductions for social security, expenses on business trips and traveling expenses with the moving of coworkers, for official trips and the maintaining of passenger cars, office, printing, postal-telegraph and telephone expenses, amortization, upkeep and routine repair on buildings, installations and general plant supplies, expenditures on the organized recruitment of the labor force, on training personnel, taxes, fees and deductions, expenditures on enterprise security, on the support of the superior organizations and other expenditures of a general plant nature.

The actual expenditures also include the expenditures of a nonproductive nature, including: Surcharges on the electric power rate (with a low use factor for the capacity of the electrical equipment); losses, spoilage and shortages of raw products, materials, semifinished materials and finished products at the plant warehouses and other unproductive expenditures and losses minus the obtained surpluses of raw products, materials and so forth.

The item "losses from rejects" reflect expenditures on finally rejected products, articles and semifinished products spoiled in the setting of the equipment above the established rates, as well as expenditures on correcting the damage.

Rejects in production are considered to be the articles, semifinished products, pieces, assemblies and jobs which in their quality do not meet the established standards or technical conditions, and cannot be used for their specific purpose or can be used only after correction.

Table 56

Group of Expenditures for Item "Other Special Expenditures"

No.	Item Name	Description of Item
1	2	3
1	Manufacturing, purchase and repair of special tools and specific attachments (for machine building and instrument building products)	Cost of manufacturing, purchasing and repair of special tools and attachments which can be used only in producing individual products (models, chill molds, casting boxes, dies, ingot molds, rolled shafts, and so forth,as well as various special tools and special attachments, regardless of their value)
2	Repair, maintenance in working order, modernization and replenishment of operating stock of special tools and special fittings (for ships and ship repairs)	Expenditures on repair, maintaining in working order, modernization and replenishment of operating stock of special tools and special fittings (cutting, measuring and assembly tools, models, chill molds, casting frams, dies, press molds, as well as tilters, jigs and various devices for the assembly of sections, mocking-up molds, temporary scaffolds and enclosures, and so forth) Including labor intensiveness of work
3	Expert evaluations, consultations, scientific research and individual laboratory work	Expenditures to pay for consultations, expert evaluations and services of scientific research organizations having direct bearing on the manufacturing of the given article or vessel Cost of laboratory research and testing of materials, semifinished products, equipment and individual instruments
4	Upkeep of technical bureaus, departments, laboratories, and so forth	Expenditures which, as a rule, are planned and accounted for within the shop and general plant expenses (expenses on the support of the technical bureaus, departments, laboratories and so forth) related to the production of only certain types of products (except instances when these expenditures are repaid by the client above the wholesale price of the article or from special allocations)
5	Losses from unutilized parts and assemblies of obsolete design (only in accounting)	Losses from unutilized parts and assemblies of obsolete designs when these losses have been a consequence of the current modernization of the given article for the purpose of improving its quality, raising reliability and durability

[continuation of Table 56]

1	2	3
		(in those instances when these one-shot additional expenditures are repaid not from the fund for the development of new equipment
6	Design and drafting work, compiling of technical plans and service by designers	Cost of work of the TsKB [central design bureau] for serving vessels during construction within the range stipulated by the contract: -cost of serving builder plant by designers of TsKB on the questions of replacements, rectifications caused by the production method, participation in testing, mocking-up, and so forth; -payment of the TsKB for xerox copies of technical specifications; -cost of correcting working plans and other technical specifications related to change in building methods and the improvement of design
7	Energy of all types for serving vessel	Energy of all types for serving vessel on ways, slips and launched: -air for operation of pneumatic tools; -electric power for tempoerary lighting, charging of batteries and electric welding on the vessel; -steam for heating the interior areas of the vessel, for warming tanks in testing for water-tightness and for other needs; -water for testing compartments for water-tightness, for feeding boilers and other needs of the vessel; -water of increased purity for special purposes; -gas as energy (oxygen, acetylene, carbon dioxide)
8	Laying of temporary utilities for serving the vessels on the ways and afloat for all types of energy, as well as the maintaining of the quarters and vessels in a working state	Manufacture, installation, testing, repair and operation of temporary utilities (temporary air line, electric network, temporary heating, steam line, temporary communications, and so forth) for serving the vessels on the ways and afloat for all types of energy (electric energy, steam, water, air and so forth). The cleaning of the vessel during its time on the ways and afloat. Including labor intensiveness of work Note. The wages for workers engaged in the listed jobs under this item are accounted for

[continuation of Table 56]

1	2	3
		only in the instance that the wages are not considered in the item "basic wages of production workers"
9	The running of issuing depots and special services serving the building and delivery of ships	Basic and additional wages and deductions for social security of the workers of the issuing depots and special services, basic and auxiliary materials, expenses on upkeep and operations, and so forth.
10	Serving of vessels with lifting and transport equipment on the ways, slip, in launching and afloat	Cost of work of all types of plant transport related to delivery of the stock of ship equipment and mechanisms from the plant shops to the ways, slips or to the mooring of the vessel afloat: -cost of loading work of floating, rail and truck cranes; -cost of work of tugs in launching vessel and its moving around yard waters, towing vessel for testing, transporting various cargo for the vessel and workers to the mooring of the vessel; -cost of diving work during launching, lifting on the quay, delivery to the dock and other expenses. Note. The maintenance of ways cranes serving the building of the vessel on the ways is not considered in this itme. The wages of the crsne operators for these cranes are considered in the shop expenses.
11	Amortization of ways, slips and other various hydraulic engineering works (covered slip docks, docking basins, and so forth)	Amortization of ways, slips with equipment during the building of the given vessel on them from the moment of the beginning of preparing the ways and the slip until they are freed. Note. In using the ways, slip and other hydraulic engineer works simultaneously for the building of several vessels, the total amortization deductions are distributed to them proportionately to the area occupied by them
12	Docking	Cost of using one's own or other's dock, including payment of expenditures for putting in, lifting, standing, launching and full servicing of the work of the building yard for all types of energy

[continuation of Table 56]

1	2	3
13	Production trips involving the installation, building and testing of vessels and other articles	Payment of per diems, lodging and traveling expenses for workers, engineers, technicians and white collar personnel sent to conduct testing on the product, for gaining the approval of the supplier plants for technical specifications for building equipment, for installing articles on the projects, for participating in the delivering of the product (projects). The payment of the per diems, lodging and travel allowances to workers who provide services to other plants in building the vessels, if such payment is provided under the conditions of the contract.
14	Observance of the USSR Register and technical supervision	Payment for observance of USSR Register and technical supervision at approved rates.
15	Insurance of participants in the testing of vessels and articles	Payment of state life insurance for the participants of the testing of vessels and articles
16	Transporting of disassembled vessels	Payment of rail rate in transporting parts of vessels to assembly point
17	Other expenditures	Expenditures on special clothing Payment for work to workers brought in for building vessels from other yards, the services of other yards Including labor intensiveness of the work Payment for translation of technical specifications to foreign language Payment for inspecting sanitary state of vessel Pilot's fee Other expenditures Total Including labor intensiveness of work of production workers

Rejects are divided into correctable and noncorrectable (final). Correctable rejects are considered to be the articles, semifinished materials (pieces, assemblies) and jobs which after correction can be used in their specific purpose and the correction of which is technically feasible and economically advisable. A final reject is the name given to articles, semifinished products, pieces and jobs which cannot be used in their specific purpose and the correction of which is technically impossible and economically ill-advised.

The article "other production expenditures" reflects all other expenditures not relating to the previous items.

The "nonproduction expenditures" basically include the expenditures related to the marketing of the product, and in particular the expenditures on crating and packing the products, expenditures on delivering the product to the station (pier) of dispatch, loading into the cars, vessels, motor vehicles and other transport; other expenditures related to the marketing of the product.

100. Planning production expenditures. The calculations for the planning of production expenditures at the enterprises are generalized in a summary document which is termed "Estimate of Production Expenditures." It includes the expenditures made by all the enterprise structural subdivisions involved in producing the industrial product. Here an exception is made for the expenditures of the structural subdivisions relating to other national economic sectors (construction, agriculture, the housing and utilities system, and so forth).

The total expenditures reflected in the estimate of production expenditures includes not only the expenditures on producing the commodity product, but also the expenditures related to the increase in the balance of incomplete production, the expenditures of future periods and the providing of services not included in the gross product.

The estimate of production expenditures is compiled by the production planning department for the year with a quarterly breakdown. It is worked out on the basis of the following data: The calculating of expenditures on raw products, materials, production fuel and energy in basic production; the calculating of the amount of basic and additional wages for the production workers in basic production; the estimate of expenditures (the costing of the product) for the shops in auxiliary production; the estimates of expenditures on developing and preparing the production of new types of articles, units, production lines and shops; the estimate of expenditures on the maintenance and operation of equipment; the estimate of general plant and shop expenditures; the estimates of other special expenditures; the estimates for transport and preparatory expenses; the estimates of nonproduction expenditures.

The structure of the estimate of production expenditures is given in Table 57.

Table 57

Estimate of Production Expenditures
(figures hypothetical)

No.	Content of Expenditures	By plan for year, 1,000 rubles
1	2	3
1	Raw products and basic materials (minus recoverable wastes)	5,920
2	Purchased and preassembled articles and semifinished products	1,610
3	Auxiliary materials	530
4	Fuel received from outside	412
5	Energy received from outside	428
6	Wages, basic and auxiliary	5,250
7	Deductions for social security	404
8	Amortization of fixed capital	1,742
9	Other expenditures	813
10	Contractual deliveries and work	7,235
11	Total production expenditures (total of lines 1 thru 10 inclusively)	24,344
12	Expenditures on work and services not included in gross product	1,830
	Including: repayable from fund for development of new equipment	540
13	Change in balances of expenditures of future periods	120
14	Change in balances of reserves for pending expenditures	80
15	Cost of gross product (line 11 - line 12 - line 13 - line 14)	22,314
16	Production costs of commodity product (by special calculation)	20,150
17	Change in cost of balances of incomplete production, semifinished products and own-produced tools (line 15 - line 16)	2,164
18	Nonproduction expenditures	262
19	Full cost of commodity product (line 16 + line 18)	22,314
20	Commodity product in current wholesale prices	26,120
21	Profit (+), loss (-) from production of commodity product (line 20 - line 19)	3,806
22	Expenditures per ruble of commodity product, kopecks (line 19:line 20)	85.5
23	Change in the cost of balance of unsold product (at warehouse or dispatched) (by special calculation)	+210
24	Cost of salable commodity product (line 19 - line 23)	22,104
25	Value of salable commodity product (by special calculation)	25,849
26	Profit (+), loss (-) from product sales (line 25 - line 24)	3,745

101. Planning the costs of commodity product. The cost of the total commodity product and its individual types is planned from the costing items. In the planning calculations for the cost of commodity products, a system of indicators is used, and the basic ones are: The percentage of the decline in the cost of comparable product, the expenditure level per ruble of commodity (salable) product, and the cost of a unit of product.

The delcine in the cost of comparable commodity product represents a percentage savings from the reduction related to the cost of the corresponding product types in the base year. For determining the reduction in the cost of comparable product over the level of the previous year, the planned production volume of each type of comparable commodity product is multiplied by the planned product cost of the year being planned and the average annual cost of the product of the base year. The difference between the first and second product representing the savings from the reduction in the cost of comparable product related to the second of them and expressed in a percentage is the amount of the plan reduction in the cost of comparable commodity product.

The expenditures per ruble of commodity product are determined by dividing the cost of the commodity product by its value in the wholesale prices of the enterprise.

The reduction in expenditures per ruble of commodity product in the plan is established by technical and economic calculations using factors which influence the change in the cost level of the commodity product in the year being planned (Table 58). These factors are appropriately grouped.

I. The factors which bring about a rise in the technical level of production: a) mechanization and automation of production processes, the introduction of advanced production methods and automated control systems; b) the modernization and improvement in the operation of the employed equipment and production method; c) the introduction of new types and the replacement of the required raw products, materials, fuel and energy; d) the change in the design and technical specifications of an article and an improvement in product quality; e) other factors which raise the technical level of production.

II. The factors which bring about an improvement in the organization of production and labor: a) an improvement in production management; b) an improvement in the organization of labor and the use of working time; c) the improving of material and technical supply; d) the elimination of unproductive expenditures and losses; e) a reduction in losses from rejects; f) other factors related to improving the organization of production and labor.

III. Factors related to a change in the structure and volume of the produced product: a) a relative reduction in the conditionally fixed expenditures (except amortization) caused by a rise in the volume of produced product; b) an improvement in the use of productive capital and a related

Table 58

Summary Calculation for the Reduction in Expenditures per Ruble of Commodity Product by the Technical and Economic Factors (figures hypothetical)

Indicators	Total, 1,000 rubles
A. Commodity product in prices compared with previous year	26,120
B. Expenditures per ruble of commodity product of base year, kopecks	87.0
C. Cost of commodity product of year being planned proceeding from the expenditure level of the base year (A x B), 1,000 rubles	22,724
D. Savings from reduction in costs in year being planned by groups of factors, total	410
Including:	
1. A rise in technical level of production	185
2. Improvement in organization of production and labor	35
3. Changes in structure and volume of produced product	138
4. Sectorial and other factors	52
E. Cost of commodity product in comparable prices and conditions with base year (C - D)	22,314
F. Expenditures per ruble of commodity product in prices and conditions compared with base year (E:A), kopecks	85.4
G. Reduction in expenditures in relation to level of base year $\left(100 \frac{F}{B} - 100\right)$, %	-1.8

relative reduction in amortization deductions; c) a change in the structure of the produced product.

IV. Sectorial and other factors: a) a change in the volume of additional work; b) a reduction in product costs related to a decline in expenditures on the production of the subsequent vessels in a series; c) the influence on product costs of the incomparability of expenditures with the production volume.

102. The characteristics of methods for accounting and calculating product costs.

At shipbuilding enterprises all methods of accounting and calculating production expenditures are employed, including: Order, production stage and normative. Here the order and production stage methods are ordinarily employed with elements of normative accounting.

The *order method* of accounting both with the use of elements of the normative method and in a pure form at present is the most widely found in shipbuilding. It is used in accounting for expenditures on production and costing of shipbuilding products, for ship repairs, in manufacturing complicated articles, and in carrying out experimental work and repairs. With the order method of accounting, the individual production order is the object of accounting and costing, as the order brings together all the expenditures on production broken down by the costing items.

The accounting for production expenditures with the *production stage method* is carried out for the production stages, and within them by the product types. It is used in the metallurgical, foundry and forging shops of the machine building enterprises.

The essence of the *normative method* of accounting for production expenditures and product costing is that with it production expenditures are accounted for with a subdividing into expenditures according to the current rates and standards and accounting for expenditures which deviate from the standards. With this method of accounting, the actual product cost is determined by adding the deviations from the standards and changes in the standards to the normative cost (or by subtracting from it). The normative method of accounting and costing in shipbuilding is employed in manufacturing series-produced nonshipbuilding products and shipbuilding products accounted for in lot orders (small shipbuilding).

Accounting for expenditures and product costing in the auxiliary shops and sections producing a simple standard product without semifinished articles and incomplete production are carried out according to the single production stage or simple method. This applies to the costing of steam, compressed air, electric power, oxygen, water, and so forth.

The expenditures related to the serving and management of production are incorporated in product costs in costing it in the following manner. Expenditures on the upkeep and operation of equipment are distributed between the individual product types proportionately to the basic wages of production workers (without additions under the progressive-bonus system). The including of the shop and general plant expenditures in product costs as a rule is carried out proportionately to the total basic wages of the production workers (without the additions under the progressive bonus systems) and expenditures on the maintenance and operation of the equipment.

103. Analysis of product costs in shipbuilding. In analyzing the product costs in shipbuilding at enterprises, a study is made of the indicators for the production expenditures on gross product, the reduction in the costs of all and compared commodity product in percentages; expenditures per ruble of commodity product in kopecks; the cost of a unit of the most important product types. The tasks of analyzing product costs include: Evaluating the tautness of the plan quotas for the above-given indicators, determining the degree of fulfilling the plan for product costs, ascertaining

the factors which influence a deviation in the actual expenditures on producing the product from those set in the plan.

For an analysis of product costs, various sources are employed including plan, report and accounting. The plan sources of information include materials from the five-year, annual and operational plans; the reporting sources are the annual reporting forms including form No 5 "Production Expenditures," form No 6 "Costs of Commodity Product," form No 7 "Expenditures on the Serving of Production and Management," the costing of the most important product types: The periodic reporting under form No 1-c "Report on the Cost of Commodity Product," and others. The informative material for analyzing product costs is found in the normative, planning and accounting documents.

In analyzing the estimate of production expenditures, one determines the deviation of production expenditures for each item and the expenditure estimate as a whole. The basic question of analyzing expenditures per ruble of commodity product is to establish the factors which influence a deviation in the actual expenditures per ruble of commodity product from those set in the plan. These factors are: A change in the structure of the produced product; a change in the wholesale prices at the enterprise; a change in the level of expenditures on individual types of produced products; a change in prices for materials and rates for energy and shipping.

In analyzing the costs of individual product types by the costing items one determines the deviation of actual expenditures for each costing item from those established in the plan. For material expenditures the deviation of actual expenditures from their planned amount can occur due to deviations from the established consumption rates for material resources or because of a deviation from the set prices. A deviation in actual wage expenditures from the planned amount can happen because of a change in labor intensiveness or the average cost of one norm-hour. The calculating of the influence of one or another factor on the deviation of the actual material and labor expenditures from the plan can be established by the method of chain substitutions.

Due to the fact that the conditions for planning the cost of building the prototype and first vessels in a series differ substantially from the conditions of planning production expenditures of the series-built vessels, in an analysis the cost of the prototype and first vessels is studied separately.

104. Procedure for establishing wholesale prices for shipbuilding products. In accord with the Decree of the USSR Council of Ministers of 30 June 1966, No 498, two types of wholesale prices--guideline and fixed--were set for vessels and other floating equipment for production and technical purposes produced by the shipbuilding enterprises.

Guideline wholesale prices are worked out for the prototype and series vessels planned for construction, as well as individually built vessels and sectional vessels. These prices are used for carrying out the preliminary intermediate payments for building new-design vessels. They are in affect until the designated date for approving the fixed prices. If a vessel of the given design is to be built at different building yards, then the guideline prices are set in terms of each building yard.

A preliminary guideline wholesale price is worked out by the designer of the vessel as part of the technical specifications of the vessel. After this the draft price is sent for review to the scientific and technical council of the ministry. Appended to the draft calculation of the price are the following conclusions: Of the building yard, the enterprises carrying out the expert evaluation of the price drafts (as a whole for the price, as well as for the labor intensiveness of building), the orderer of the vessel at the building yard, and so forth. A final ruling on the level of the guideline price is taken considering the opinion of the main administrations having control over the building yard, the designer organization, the client and the main production planning administration of the ministry.

The prices for additional work and preassembled articles not provided for in the approved plans for the building of the vessel are incorporated in their prices in setting the current guideline prices or in converting them to fixed prices. In the event that design changes are made in the plans of the vessel and the expenditures on these changes exceed the amount of own expenditures by more than 15 percent of the ones in the approved guideline price, the guideline price of the vessel must be revised without fail.

The fixed wholesale prices are used for the final payments between the shipbuilding enterprises and the clients. Like the guideline prices, they are set individually for each shipbuilding enterprise. The amount of the fixed wholesale price for the individually-built and prototype vessels is set proceeding from the actual expenditures on series vessels on the basis of the cost of the first year of series output (by series groups) calculated on the basis of the report costings and considering the existing actual expenditures on the head and series vessels, as well as the dynamics of the reduction in expenditures on the subsequent vessels in the series.

The draft fixed wholesale prices are worked out by the shipbuilding enterprises themselves and are coordinated with the representatives of the client. After this they are sent to the main administrations of the building yard, the client and the head production planning administration of the ministry.

After seeking agreement from the corresponding administrations of the client's ministries (or departments), the main production planning administration submits the draft fixed wholesale prices to the State Price Committee under the USSR Council of Ministers. For serially built self-propelled vessels using an engine of less than 400 horsepower and for non-self-propelled vessels with a cargo capacity of less than 1,000 tons, the

fixed prices are approved by the ministry. The draft fixed wholesale prices should be submitted to the State Price Committee under the USSR Council of Ministers for prototype vessels no later than 2 months after these vessels have been delivered to the orderer, and for all other vessels, no later than 6 months after the delivery of the first two vessels the construction of which was started prior to the delivery of the prototype vessel.

The fixed wholesale prices set in the above-indicated manner for vessels, with the exception of individually built vessels, are incorporated in the corresponding wholesale price lists.

CHAPTER 12: PROFIT AND PROFITABILITY OF PRODUCTION AT A SHIPBUILDING ENTERPRISE

105. The forming of profit at an enterprise. Under the conditions of a further extension of the economic reform, profit, along with the volume of sold product and the quotas for producing the major product types in physical units, is one of the basic evaluation indicators characterizing the quality of operations in the enterprise (association) and the sector.

Profit is a general indicator which describes the results of enterprise operations, as it reflects not only the production and sales results, but also other economic activities. The economic reform has sharply strengthened the role of profit in the economic encouragement of industrial production and in the material incentives for enterprise employees. Profit is used to form the material incentive fund, the fund for sociocultural measures, housing construction and production development.

At the enterprises (associations) a distinction is drawn between the profits from product sales, balance sheet profit and adjusted profit.

Sales profit is determined in the form of the difference between the receipts from product sales (in the current wholesale prices of the enterprise) and the full cost of the salable product.

The *balance sheet profit* of an enterprise (association) is defined as the total profit from sales plus (minus) the result of the nonsales activities of the enterprise, that is, considering unplanned income and losses (penalties, fines, forfeits, and so forth).

Adjusted profit is the balance sheet profit minus the obligatory payments (the capital payment, interest on bank credit and fixed payments to the budget).

The planned balance sheet profit in accord with the composition and the factors which determine its amount is defined as the total profit: 1) from the sale of commodity product (commodity output); 2) from other sales (subsidiary agriculture, procurement organizations, the motor pool, lumbering and other facilities on the balance sheet of the enterprise); 3) from planned

nonsales operations, with the exception of losses from the activities of the housing and utility systems and expenditures on the economic upkeep of cultural and educational facilities and Pioneer camps of the enterprise which are covered by profit distribution.

The basic portion of profit from industrial operations is made up from the profit of product sales. In the practical operations of the enterprises, often current prices differ from the prices used in the calculations of the volume of salable product. In such instances profit is increased or reduced by the total difference in these prices.

The volume of product sales at the enterprise is assessed in accord with the Standard Instructions of the USSR TsSU for Compiling the Reports of Industrial Enterprises on the Fulfillment of the Product Plan (No 4-102 of 11 May 1971), as well as considering the sectorial instructions approved by the ministry with the agreement of the USSR TsSU. The volume of salable product for a production association is assessed in accord with the procedure for planning and accounting the product and labor indicators for the production associations (combines) as approved by the USSR Gosplan, the USSR TsSU and the USSR Ministry of Finances of 10 March 1976.[1]

The profit from the sale of other products and the services of subsidiary and service production is determined proceeding from the volume (in cost terms) of this product, work and services and their cost.

The profits from nonsales operations include only the income or expenditures considered as profit or losses and related to the normal conditions of enterprise economic activities and having, as a rule, a permanent character.

106. Profitability, its types and indicators. Production profitability is a relative percentage indicator describing the income of the enterprise.

Engerprise profitability is an important fund-forming indicator in setting the economic incentive funds. At enterprises which have been converted to the new conditions of planning and economic incentive, the profitability level is characterized by two indicators: the overall profitability of production and the adjusted.

The level of overall profitability Y_{tp} is defined as the ratio of the total balance sheet profit to the average annual value of the fixed productive capital and normed working capital (in percent)

$$Y_{tp} = \frac{P_b}{F_f + F_w} 100,$$

[1]See: EKONOMICHESKAYA GAZETA, No 14, 1976.

where P_b--balance sheet profit of enterprise, rubles;
F_f--average annual value of fixed productive capital, rubles;
F_w--average annual total of normed working capital of the enterprise, rubles.

The average value of the fixed productive capital, in accord with the decision of the Interdepartmental Commission under the USSR Gosplan of 7 January 1971, for calculating both planned and actual profitability, is determined by dividing by the number of months in the planned (report) period one-half the total obtained from adding the amount of capital on the first of January and the first of the month following the end of the planned (report) period, as well as the value of the fixed productive capital on the first of the remaining months of the period. This method has been accepted for determining the average value of the normed working capital both by the plan and from the report.

In calculating the indicators of overall profitability, in the calculation they use the value of all fixed productive capital on the balance sheet of the enterprise.

The adjusted profitability in the plan Y_{ap} is defined as the ratio of the total balance sheet profit (minus that used under special provision) reduced by the total payment for the fixed productive capital and normed working capital, the interest on bank credit and fixed payments to the average annual value of the fixed productive capital and normed working capital within the rate minus their untaxable portion for the capital payment:

$$Y_{ap} = \frac{P_b - (A + B + K)}{F_f + F_w} 100,$$

where A--the total payment for fixed productive capital and normed working capital, rubles;
B--fixed (rent) payments to the budget, rubles;
K--total payment of interest for bank credit, rubles.

The indicators of the actual total and adjusted profitability of production are determined from the data of enterprise accountancy.

From the given formulas for calculating the production profitability level, it follows that in any instance the profitability level depends upon a change in the amount of profit and the value of the productive capital. A rise in profitability is achieved by the more rapid growth rate of profit in comparison with a growth of the value of productive capital.

Along with the designated methods, profitability of individual types and total product can be calculated as the ratio of profit from product output (sales) to product costs. Under the conditions of a shipbuilding enterprise with a large range of produced product, and with individual and

small-series types of production, the method of calculating profitability in terms of the productive capital for the types of produced product is complicated due to the absence of a procedure for setting the capital intensiveness of the product for each type of article. For this reason such an indicator in practice is used for establishing the profitability of the individual articles and is widely used in price planning.

The profitability of individual articles Y_{ip} can be calculated from the following formula:

$$Y_{ip} = \frac{W - C_f}{C_f} 100,$$

where W--wholesale price of enterprise for product;
C_f--full cost of given product.

A calculation of profitability for all commodity product Y_{cp} can be represented in the form of the following formula:

$$Y_{cp} = \frac{P_c}{C_{cp}} 100,$$

where P_c--profit from the sale of commodity product;
C_{cp}--full cost of sold commodity product.

For studying the effectiveness of expenditures on product output and sales, for determining their repayment rate, and for disclosing profitability of current product output and sales, an analysis is also run on profitability for each product and total commodity product.

107. Planning profit and profitability at an enterprise. Total planned profit in the tekhpromfinplan is calculated after working out the product production and sales plans, the plans for raising production efficiency and product costs. For the calculation two methods are employed: direct calculation and analytical (control).

The direct calculation method is used at the enterprises with a relatively limited product range, with summary planning on the level of the sector or subsector. The amount of profit is defined as the difference between the receipts from sales using the wholesale prices of the enterprise without the turnover tax and the planned cost of these articles. Profit is calculated separately for the balances of unsold product at the start of the planned year, for the planned product output, for the balances of unsold product at the end of the year being planned, and profit from other sales and nonsale operations.

The total profit T_{tp} from product sales in the period being planned is determined using the formula:

$$P_{tp} = P_e + P_{co} - P_{fp},$$

where P_e--the profit for the balances of unsold finished product at the start of the year being planned;
P_{co}--the profit for planned receipts of commodity product;
P_{fp}--profit in the balances of finished product at the end of the year being planned.

Let us give an example for calculating planned profit by the direct calculation method, in thousand rubles (the figures are hypothetical).

1. Balances of unsold finished product at start of year being planned:	
--in terms of production cost	1,380
--in terms of wholesale enterprise prices (minus turnover tax)	1,750
--profit (+), loss (-)	370
2. Commodity product:	
--in terms of full costs	35,500
--in terms of enterprise wholesale prices (minus turnover tax)	40,350
--profit (+), loss (-)	4,850
3. Balances of unsold finished product at end of year being planned:	
--for production costs	1,230
--for wholesale enterprise prices	1,590
--profit (+), loss (-)	360
4. Profit from sold product 370+4850-360 = 4,860	
5. Profit from other sales and nonsale operations	150
Balance sheet profit (line 4 + line 5)	5,010

The basic merit of the given method consists in the simplicity of calculation, since all the calculations have been organized on a direct calculating of product costs and receipts from product sales for the entire range of the produced product. However, this method does not make it possible to disclose in the plan those factors of profit growth and does not focus the enterprise collectives on mobilizing the inner production reserves. In addition, for enterprises with a large range of produced product and a significant proportional amount of "other product" for which, as a rule, planning calculations are not drawn up, the accuracy of calculating the amount of profit by the given method is reduced, and a check on the correctness of its calculation is very labor consuming.

The analytical method of calculating profit is used for disclosing factors for a change in profit, and in particular, from an increase in the production volume, a savings from a reduction in product costs, a change in the assortment, prices, and so forth.

Example of calculating planned profit by the analytical method:

1. The profitability level Y_{cp} is calculated in relation to the cost of the comparable commodity product in the base year.

Let us assume that in the base year, the cost of all comparable product was 18 million rubles and total profit P_c was 2.7 million rubles, then

$$Y_{cp} = \frac{2,700}{18,000} 100 = 15\%.$$

2. The increase in the amount of profit P_1 is determined as caused by the rise in the production volume of the compared commodity product in the year being planned in comparison with the base year with the base profitability level.

Let us assume that the increase in compared product in the year being planned for the prices of the base year will be 1 million rubles then

$$P_1 = \frac{1,000}{100} 15 = 150,000 \text{ rubles}.$$

3. The amount of profit P_2 is calculated from the planned reduction in the cost of compared commodity product. For example, if a cost reduction of 2 percent is envisaged in the plan, then

$$P_2 = \frac{19,000}{100} 2 = 380,000 \text{ rubles};$$

4. The change (increase +, decrease -) in profit P_3 is determined in line with the change in the structure of the salable product (Table 59).

Table 59

Influence of Change in Product Assortment on Profitability Level

Products	Base Period			Planned Period	
	Prop. amt. in total vol. of sold prod., %	Profitability level, % of cost, %	Profitability coefficient, col. 2 x col. 3 / 100	Prop. amt. in total vol. of sold prod., %	Profitability coefficient, col. 3 x col. 5 / 100
1	2	3	4	5	6
A	5	10	0.5	5	0.5
B	20	10	2.0	20	2.0
C	30	15	4.5	40	6.0
D	25	20	5.0	10	2.0
E	20	20	4.0	25	5.0
Total	100	--	16.0	--	15.5

From Table 59 it can be seen that a change in product assortment in the period being planned leads to a reduction in the profitability coefficient by 0.5 (16.0 - 15.5), or a reduction in the amount of profit due to the given factor will be

$$P_3 = \frac{19,000}{100} 0.5 = 95,000 \text{ rubles.}$$

5. The influence in a change in prices P_4 is determined in the period being planned for compared product. Let us assume that in the period being planned due to a revision in prices for the compared product, a reduction of 45,000 rubles is expected in the sales volume. Then $P_4 = -45,000$ rubles.

The planned total profit considering the influence of the designated factors for compared product is

$$P_{cp} = P_c = P_1+P_2+P_3-P_4 = 2,700+150+380-95-45 = 3.09 \text{ million rubles.}$$

6. By multiplying the planned cost of uncomparable products and their planned profitability, we can calculate the profit for incomparable products P_{np}. Let us assume that in our example $P_{np} = 1.92$ million rubles.

In addition, at shipbuilding enterprises which produce consumer goods, consideration is given to a change in the turnover tax rates in the period being planned.

Thus, the total planned profit will be:

$$P_{tp} = P_{cp} + P_{np} = 3,090 + 1,920 = 5.1 \text{ million rubles.}$$

The enterprise tekhpromfinplan determines the level of overall and adjusted production profitability. Here the profitability plan is worked out considering an analysis of its level achieved in the base year, as a result of which reserves are disclosed for increasing profitability due to a corresponding improvement in the production structure and the planned measures for improving production efficiency.

108. The distribution of enterprise profit. Under the new management conditions, the procedure for allocating enterprise profit is aimed at the greatest possible rise in production efficiency, a strengthening of the interest of the enterprises and associatons in improving the use of the material, labor and financial resources, at encouraging an acceleration of scientific and technical progress, and at improving product quality and labor productivity. Profit is distributed according to a method which is uniform for the enterprises of all sectors [75]. In distributing the profit of an enterprise (association) excluded from the total profit is the profit which has a strictly specific nature in accord with the decisions of the USSR Council of Ministers and is used in a special procedure.

This includes the following profit: The profit of subsidiary agriculture; from the sale of consumer goods made from waste products and used to form the consumption fund; from the sale of new types of household chemicals; from the sale of new types of cultural and household appliances (within limits of up to 15 percent of profitability in relation to the full costs for each individual item); [the profit] channeled for other purposes in amounts established by decisions of the USSR Council of Ministers.

The designated profit is made available to the enterprises in the instance that they observe certain conditions listed in the decrees and instructions of the USSR Council of Ministers and the instructional provisions. If these conditions are not met, profit is distributed in the general manner.

After excluding the designated portion from the profit, payments to the budget are made including the payment for fixed productive capital and normed working capital, the fixed payments, and the payment of interest on bank credit.

From the remaining portion of the profit (the so-called adjusted profit), the economic incentive funds are formed, including: The material incentive fund, the fund for sociocultural measures at housing construction and the production development fund. Then the remaining portion of profit is used to finance centralized capital investments, to increase own working capital, to repay bank loans obtained to expand and reconstruct the enterprises, for deductions into the ministry reserve for providing financial aid, and so forth. Table 60 gives the distribution of profit in a year being planned.

The free profit balance is remitted to the state budget.[2]

The above-planned profit minus that portion which is used in the special procedure is distributed in the following manner: for payments to the budget for the payments for fixed productive capital and normed working capital and the fixed payments, to pay interest on bank credit in those instances when the actual amounts of these payments are higher than the amounts provided in the plan; for making up a shortage of own working capital formed as a result of the nonfulfillment of the profit plan and the carrying out of above-planned expenditures financed from profit, or for the early retirement of debt for credit granted for this purpose.

Here it is possible to fully or partially use for the designated purposes the above planned profit obtained above the quotas set by the superior organization for additional profit from the carrying out of organizational and technical measures and remaining after the remitting of profit in the established order for additional contributions to the budget of the payment for productive capital, fixed (rent) payments, as well as to pay interest on a bank credit.

[2]The procedure for the payment of the free profit balance to the budget by the enterprises has been established in the instructions [42].

Table 60

Distribution of Balance Sheet Profit of a Shipbuilding Enterprise
(figures hypothetical)

No.	Allocation of Profit	By plan for year, 1,000 rubles
1	2	3
1	Balance sheet profit	5,010
	Including:	
2	Profit used in special procedure (deductions into consumption fund and so forth)	60
3	Profit subject to subsequent distribution (line 1 - line 2)	4,950
4	Payment for fixed productive capital and normed working capital	1,280
5	Fixed (rent) payments	--
6	Interest on bank credit	130
7	Material incentive fund	750
8	Fund for sociocultural measures and housing construction	300
9	Production development fund	220
10	Financing of centralized capital investments	970
	Retirement of Credit	
11	For capital investments (credit repaid from production development fund)	65
12	For expenditures on expansion and organization of the production of consumer goods (with shortage of money in production development fund)	35
	Retirement of Carryover Debt on Bank Loans Granted to Carry Out Measures for	
13	Production of new products	145
14	Improvement in product quality	55
15	Financing of increase in own working capital	480
16	Covering losses from operation of housing and utility system	45
17	Expenditures on running cultural and educational facilities and enterprise Pioneer camps	75
18	Deductions to ministry for forming financial aid reserve	70
19	Deductions to superior organizations for profit redistribution	80
20	Total (from line 4 + to line 19)	4,700
21	Grand total of distributed profit (line 2 + line 20)	4,760
22	Free profit balance to be paid to budget (line 1 - line 21)	250

If the enterprises and organizations which have permitted a shortage of own working capital to form have not been given quotas for receiving additional profit (a reduction in losses for the planned loss enterprises) from the carrying out of organizational and technical measures, the above-planned profit is not used to make up for the designated shortage. This shortage is made up by reducing the profit deductions into the economic incentive funds by up to 30 percent.

The enterprises and organizations which have not fulfilled the quotas for receiving additional profit from the carrying out of organizational and technical measures which could be used to make up the lack of own working capital must reduce the deductions into the economic incentive funds (by up to 30 percent) by the amount of the unreceived profit (the savings from the reduction in losses), and use the designated money for:

1) Making up the shortage of own working capital;

2) Additional deductions into the material incentive fund, the fund for sociocultural measures and housing construction and the production development fund within the set amounts. Here the above-planned profit can be channeled for the designated purposes minus the profit used in the special procedure, the interest for bank credits, the payment for productive capital, the fixed payments, and the profit used to make up the shortage of own working capital;

3) Paying bonuses for the socialist competition;

4) Making up losses from the operation of the housing and utility system within the amounts which exceed the total stipulated in the financial plan;

5) Repaying bank loans granted to carry out measures related to the production of new products, improving the quality, reliability and durability of products with a term up to 1 year under the condition of repayment, and for repaying loans within this period from the profit obtained from the sale of the designated articles;

6) Repaying a bank credit granted for expenditures on introducing new equipment, mechanization and improvement of production methods (with a shortage of money in the production development fund), within the limits of the additional profit (savings) obtained in the report year from the measures credited;

7) The repayment of a bank credit granted for expenditures to expand and organize the production of consumer goods (with a shortage of money in the production development fund), within the limits of the additional profit obtained in the report year from the measures credited;

8) Deductions into the reserve of the ministry (department) for providing financial aid;

9) For other purposes within the amounts stipulated by decisions of the USSR Council of Ministers.

The difference between the total above-planned profit and the designated payments and deductions is remitted to the budget in the form of the payment of the free balance of above-planned profit.

In accord with Point 5 of the Decree of the USSR Council of Ministers of 10 August 1967, No 774, the enterprise collectives which have been converted to the new system of planning and economic incentive are to receive bonuses for the results of the all-Union and republic socialist competition from the above-planned enterprise profit, and with a shortage of this money, from the free profit balance of the enterprise.

The enterprises which have not fulfilled the profit plan allocate the actually received profit (minus the profit used in the special procedure) in the following manner: first from the profit in the established procedure they pay the budget the payment for the fixed productive capital and normed working capital and the fixed payments, and also pay the interest on bank credit. Then the deductions are made into the material incentive fund, the fund for sociocultural measures and housing construction and the production development fund. The remaining portion of the profit (minus the designated payments and losses) is distributed between the total channeled to cover other planned expenses of the enterprise and the free profit balance which is to be paid to the budget in proportions determined by the financial plan of the enterprise (association).

Deductions into the reserve for providing financial aid are set in the established percentage of actual profit.

CHAPTER 13: ECONOMIC INCENTIVE FUNDS

109. Economic incentive funds and their classification. For the purposes of strengthening material incentives for the production collectives to improve production efficiency, to better quality and to increase the volume of sold product at the industrial (shipbuilding) enterprises and associations, in accord with the Decree of the CPSU Central Committee and the USSR Council of Ministers of 4 November 1965, No 729, from profit deductions and other sources economic incentive funds are to be created, including: The material incentive fund, the fund for sociocultural measures and housing construction, and the production development fund.

Along with the above-indicated funds, the enterprises also form other special funds which encourage the development of individual types of production or the achieving of certain results in enterprise operations. Such funds include: The consumption fund, the fund for bonuses paid for the delivery of export products, the bonus fund for the creation and introduction of new equipment and production methods, full mechanization and automation of production, the bonus funds for the results of the socialist competition, social financing for the early completion of vessels under construction, and so forth.

Of important economic significance is a classification of the incentive funds in terms of their specific purpose and sources of formation. The classification by specific purpose indicates whether or not the enterprise is within its right to fully utilize the formed funds and what type of economic interests can be satisfied by these funds (Fig. 3).

The classification of economic incentive funds by formation sources makes it possible to disclose from what sources one or another fund was formed, and which of these sources are internal and which involved from other enterprises and organizations (Fig. 4).

However, the use of both the first and second classification of the economic incentive funds in planning, accounting and analysis is difficult since many funds have a multipurpose nature of use and are formed from several sources.

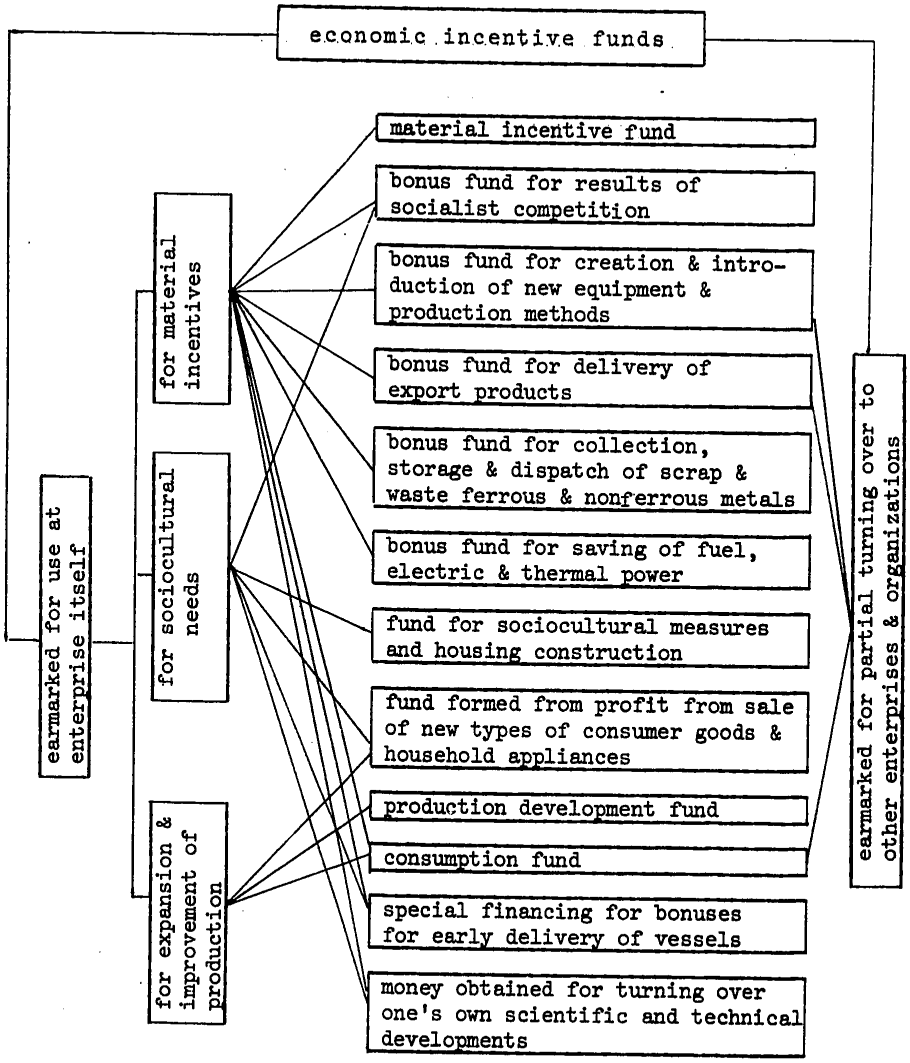

Fig. 3. Classification of Economic Incentive Funds by Specific Purpose

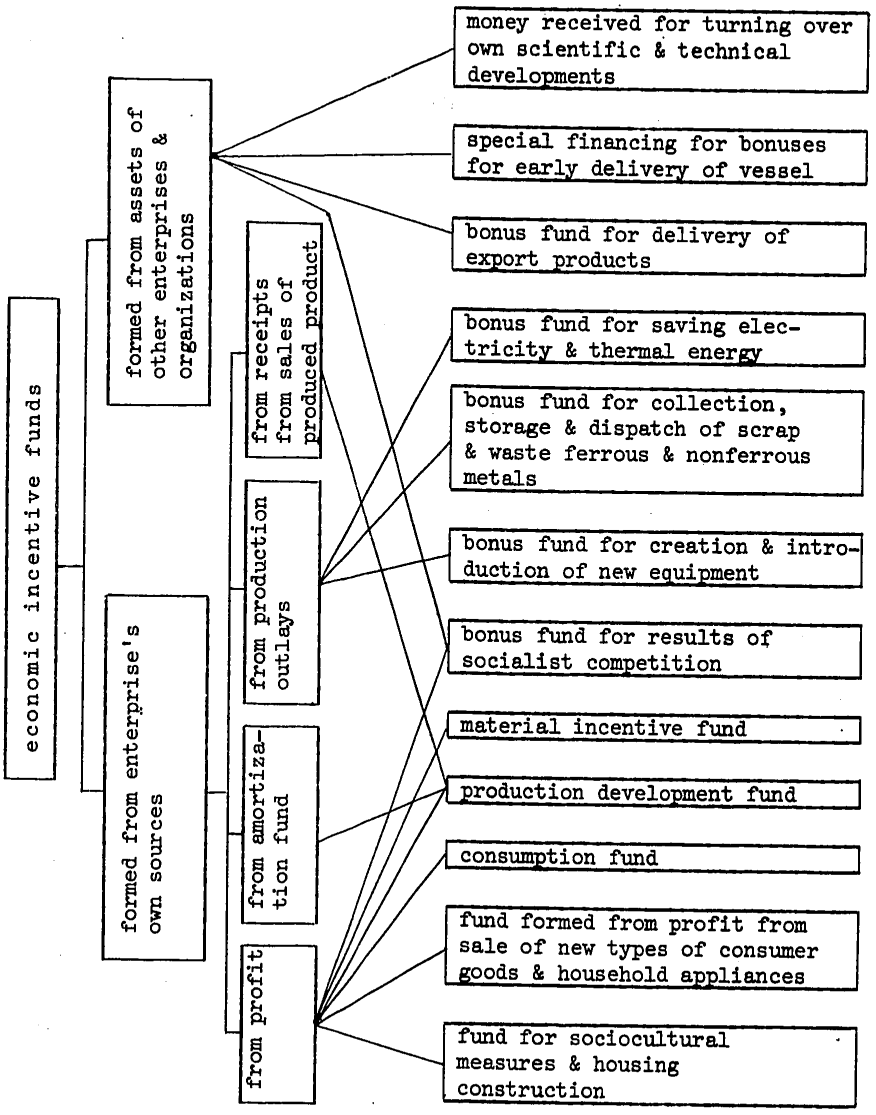

Fig. 4. Classification of Economic Incentive Funds by Their Formation Sources

The most convenient in practical terms is a classification of economic incentive funds by which all the economic incentive funds are brought together in three groups.

The first group includes the incentive funds formed at the enterprises under the conditions of their operation under the new system of planning and economic incentive, including the material incentive fund (MIF); the fund for sociocultural measures and housing construction (FSCMHC).

The second group includes the production development fund (PDF).

The third group includes all the other funds and special financing sources which are created at shipbuilding enterprises for encouraging the development of the specific types of production and for achieving certain indicators in enterprise operations, namely: The consumption fund; the bonus fund for the delivery of export products; the bonus fund for the creation and introduction of new equipment and production methods; for bonuses paid according to the results of the socialist competition; the bonus fund for the collection, storage, delivery and dispatch of scrap and ferrous metal wastes; the bonus fund for the saving of fuel, electric and thermal power; the fund formed from profit from the sale of new types of cultural goods and household appliances; special money to pay bonuses for the early delivery of vessels; money obtained for the delivery of one's own scientific and technical developments.

110. Planning economic incentive funds in a five-year plan. Economic incentive funds are planned in three stages: The first in the five-year plan (with a distribution by years); the second in the annual (current) plan; the third in adjusting (altering) the annual plans.

A five-year plan of the ministries and departments sets the total deductions into the material incentive fund from the profit for the last year of the five-year plan. This calculation is made on the basis of the rates worked out by the USSR Gosplan and approved for the ministry. In the designated rates the amounts of profit deductions into the material incentive fund for the last year of the five-year plan is set in percent of the total wage fund of all the personnel according to the plan for the same year.

The ministry allocates the planned amount of the material incentive fund for the last year of the five-year plan between the departmental enterprises (associations).

In accord with the approved planned fund and the dynamics in the changes of the fund-forming indicators, the enterprise (association) plans the material incentive fund for the years of the five-year plan. The ministry differentiates the fund-forming indicators for the production associations (combines), enterprises and organizations considering the main tasks confronting their collectives, in encouraging, as a rule, the fulfillment of the following labor productivity indicators: A rise in the proportional amount of

superior quality product in the total volume of product output; the level of profitability or return on investment; a rise in the volume of production output or profit; a reduction in product costs; the development of production capacity in accord with the normed dates of its development.

The total number of fund-forming indicators set for each enterprise (association) should not exceed three or four. The fund-forming indicators, as a rule, should include quotas for the growth of labor productivity and a rise in the proportional amount of superior quality product in the total volume of product output.

As the basis for planning the amount of the FSCMHC as well as the PDF for the five-year plan, the actual profit deductions for these funds are used for the last year of the previous five-year plan (the base year). As for the total profit deductions into the designated funds by the years of the five-year plan, these are determined for the FSCMHC proceeding from the rise (reduction) in the fund-forming indicators on the basis of stable rates, and for the PDF, proportionately to the rise in balance sheet profit minus that portion of it which is used in the established procedure for a specific purpose (that is, the profit from the sale of consumer goods made from wastes, from the sales of new types of household chemicals during the first year of the series production of these items, and so forth).

111. The rates for forming the economic incentive funds. Beginning in 1972, the purpose of the rates for forming incentive funds has changed.

For the Tenth Five-Year Plan, for the enterprises (associations) in industry, standard MIF increase (reduction) rates were set for the individual fund-forming indicators in percent of the total material incentive fund for the 1975 plan (Table 61). These rates when necessary could be differentiated by the superior organization considering the solution to the main problems confronting the collectives of the individual enterprises (associations).

The amount of the increase (reduction) in the MIF in setting the annual plans was determined by multiplying the amount of the increase (reduction) in each of the fund-forming indicators in the annual plan in comparison with the five-year plan by the corresponding rate and total of the MIF for the 1975 plan (Table 62).

According to the current statute, the amount of the MIF of the enterprises (associations) for fulfilling the plan in terms of the total production volume (profit) is not to be increased if the given enterprise (association) has not fulfilled the quotas set for it in the annual plans in terms of the proportional amount of superior quality product in the total production volume.

The profit deductions for the enterprise (association) MIF for each percentage achieved prior to 1976 for the proportional amount of superior quality

Table 61

Standard Scale for Increase (Reduction) Rates of MIF for Individual Fund-Forming Indicators

Fund-Forming Indicators	a	Note
1	2	3
1. For each percent of exceeding (reducing) growth rate of labor productivity in comparison with quota of five-year plan for corresponding year of five-year plan	2.0	Given rate can be differentiated by superior organization depending upon the level of labor norming achieved at the enterprise (association)
2. For each point of exceeding (reducing) proportional amount of superior quality product in total production volume of product in annual plans in comparison with quotas of five-year plan for corresponding year	2.0	Designated rate can be differentiated by superior organization considering achieved proportional amount of superior quality product in total production volume
3. For level of overall profitability (in annual calculation, %):	2.0	
to 15	1.0	
from 15.1 to 30	0.5	
over 30.1	0.6	
4. Return on investment (in annual calculation in kopecks):	0.3	
to 120		
from 120.1 to 210		
over 210.1		
5. For each percent of exceeding (reducing) growth rate for volume of production output or profit	not over 1.0	

Key: a--Rate of increase (reduction) in MIF in % of planned total of MIF

consumer goods (commodities with the Sign of Quality) in the total production volume are made at an amount of 1 percent of the MIF according to the 1975 plan, and for each percentage achieved in 1976 and subsequent years in the proportional amount of the designated commodities in the total production volume, at an amount of 2 percent of the MIF according to the 1975

Table 62

Sample of Calculating MIF for 1978 (figures hypothetical)

Indicators	Unit	Approved in 5-year plan for 1978	1978 draft plan	Deviation of draft from approved plan
I. Initial Indicators				
1. Labor productivity per employee	In % of 1975	150.0	151.2	1.2
2. Proportional amount of superior quality product in total volume of product output	%	22.0	23.5	1.5
3. Volume of product output	In % of 1975	154.0	155.0	1.6

II. Established Rates in % of Total MIF

a) For each percent of exceeding (reducing) growth rate of labor productivity in comparison with quota of 5-year plan 2.0

b) For each point of exceeding (reducing) proportional amount of superior quality product in total production volume in comparison with quotas of 5-year plan 2.0

c) For each point of exceeding (reducing) growth rate of production volume in comparison with quota of 5-year plan 1.0

III. Total MIF for 1975 Plan 1,020 mil. rubles

IV. Total MIF for 1978 in 5-Year Plan 1.1 mil. rubles

V. Adjusted Total MIF According to Approved 1978 Plan will be

a) Increase in MIF due to increase in growth rate of labor productivity in annual plan in comparison with quota of 5-year plan $\frac{1.2 \times 2 \times 1,020}{100}$ by 24,500 rubles

b) Increase in amount of MIF due to increase in proportional amount of superior quality product in total production volume in annual plan in comparison with quota of 5-year plan $\frac{1.5 \times 2 \times 1,020}{100}$ by 30,600 rubles

[continuation of Table 62]

c) Increase in total MIF due to increase in growth rate of production volume in annual plan in comparison with quota of 5-year plan $\frac{1.6 \times 1 \times 1,020}{100}$	by 16,300 rubles
Total increase in MIF total	by 71,400 rubles
VI. Total MIF for 1978 (point IV + point V)	1,171,400 rubles

plan. These rates can also be differentiated by the superior organization depending upon the operating conditions of the enterprises (associations). The money for forming this portion of the MIF is set aside from above-plan profit, and in the event that this is lacking, from the ministry reserve.

As for the rates for forming the FSCMHC, these are set in percent of the total MIF and are determined by dividing the total FSCMHC of the enterprises (associations) stipulated in the five-year plan for the appropriate year by the total MIF for the same period.

All other funds as well as the money of special funds earmarked for economic incentives at enterprises are planned proceeding from the current regulations which regulate the procedure of their formation.

The bonus fund for the delivery of export products is formed in an amount of 3 percent of the value of the ships, equipment and other machine building articles in the USSR wholesale prices condiering the price surcharges for export and tropical conditions.

The bonus fund for the collection, storage and dispatch of scrap and ferrous and nonferrous metal wastes is planned in the following amounts: a) for scrap and wastes of ferrous metals at 0.7 percent with a delivery plan up to 10,000 tons a year, and 0.5 percent with a delivery plan over 10,000 tons a year: b) for scrap and wastes of nonferrous metals, 0.6 percent.

The bonus fund for the creation and introduction of new equipment and production methods, full mechanization and automation is formed from special deductions included in the enterprise product costs, and this amount has been set at 1 percent of the annual wage fund of the industrial production personnel.

112. Determining the actual amount of the economic incentive funds. The actual amount of the MIF and FSCMHC at the enterprises (associations) is calculated quarterly in a running total from the start of the year, that is, for the first quarter, 6 months, 9 months and year. Advance

deductions to the MIF can be made monthly within the amounts provided for in the plans for the first and second months of the quarter.

The essence of the calculations in determining the actual amount of the MIF (that is, the funds actually to be deducted) comes down to correcting (adjusting upwards ot downwards) their amount provided in the annual plans in line with the overfulfillment or underfulfillment of the plan for the individual fund-forming indicators, as well as in terms of fulfilling the plan for product deliveries in the range and assortment stipulated by the contracts and orders.

In the event of the nonfulfillment of the plan in terms of the fund-forming indicators, the enterprise (association) incentive funds are formed in reduced amounts in the established manner. The minimum total incentive funds (within the limits of the actual total from the start of the year) here cannot be below 40 percent of the planned total funds for the last quarter in which a nonfulfillment of the plan was committed.

The central question in the system of figuring the actual amount of the MIF is the adjusting of the stable rates in calculating the MIF during the year. For the purpose of providing an incentive for the enterprises (associations) to maximally seek out reserves for improving production efficiency and accepting taut plan quotas, a procedure has been instituted according to which the enterprises (associations) which have overfulfilled the plan quotas for the fund-forming indicators make additional deductions into the MIF for each percentage of overfulfilling the plan for these indicators at the set stable rates reduced by not less than 30 percent. With the underfulfillment of the plan for the fund-forming indicators, the deductions for the MIF are reduced proceeding from the percentage of the underfulfillment of the plan for each of these indicators and the same stable rates increased by at least 30 percent. The specific amount of the reduction (increase) in the stable rates here is set by the ministry with the agreement of the sectorial trade union.

The designated adjustment of the rates does not extend to an adjustment upwards (or downwards) in the PDF.

As for the FSCMHC, the rates of its formation are not adjusted since this fund is created depending upon the calculated amount of the MIF.

For all other economic incentive funds, their actual amount is formed according to the methodology of their planning (see the previous question).

113. The use of the material incentive fund. The planning and actual calculating of the use of money in the MIF should be carried out by periods of the year, basic areas of use, categories of workers and the internal plant subdivisions.

The money of the MIF is used: a) to provide bonuses for workers, managers, engineers, technicians, white collar personnel and other employee categories according to the established bonus systems; b) for one-shot commendation of outstanding workers, engineers, technicians, white collar personnel and other employees of the enterprise for carrying out particularly important production quotas in the area of further improving production, introducing new equipment and developing the output of new types of products for which, as a rule, the work volume, the date of completing it and the amount of material incentive have been set ahead of time; c) to pay remuneration to workers, managers, engineers, technicians, white collar personnel and other employee categories for the overall operating results of the enterprise for the results of the year; d) to provide bonuses to employees for the results of the internal plant socialist competition; e) to provide one-shot aid to the enterprise employees (as a rule, not more than 5 percent of the MIF money); f) to pay for leaves for the portion of the average wages of employees paid from the material incentive fund.

It is also possible to provide a one-shot commendation for employees in the form of monetary remuneration or as gifts.

The enterprise (association) leader together with the trade union organization distributes the MIF according to the designated areas and also approves the estimate for the disbursement of this fund and sets the amount of the bonuses and other payments from this fund for the employees.

The money of the MIF which is left to the association is used to provide bonuses for the association employees for carrying out particularly important quotas, as well as for replenishing the money of the MIF made available to the individual production units in line with a temporary decline in the economic indicators of their operations for reasons which do not depend upon them, and for providing bonuses to the winners in the association's socialist competition. The money of the MIF left to the association can also be spent to pay bonuses to employees of the association management under the established bonus systems, to pay remuneration for the operating results of the year, and for granting one-shot aid. A superior body is not permitted to confiscate and redistribute the money of the MIF, with the exception of the instances defined by the USSR Council of Ministers. The unused balances of these funds remain at the disposal of the enterprises (associations) and are carried over to the following year.

114. The use of the fund for sociocultural measures and housing construction. The money of this fund is earmarked for satisfying the primary sociocultural needs of the enterprise (association) collective. It can be spent for the following: a) the construction, expansion and major overhaul of housing, children's preschool institutions, preventoria, dining rooms and buffets at enterprises; b) for proportional participation of the enterprises in the joint construction of housing and sociocultural projects; c) for the construction and major overhaul of clubs, Pioneer camps, vacation houses, boarding houses and sanitoriums, tourist and

suburban vacation facilities, sports facilities and other projects for cultural and health purposes, for acquiring specialized transport (ambulances, mobile movie projectors), equipment and supplies for the above-listed installations as well as for the plant dining rooms and buffets in the established procedure; d) for acquiring medicines of medical facilities, trips to vacation homes, boarding houses, sanitoriums, to tourist facilities and trips on Soviet territory (without paying the cost of travel), for carrying out cultural, educational and physical culture measures, and so forth; e) for improving the diet of children in the creches, nurseries and Pioneer camps; for reducing the cost of food in the enterprise dining rooms (buffets); f) for recovering above-plan expenses on the running of cultural and educational institutions and Pioneer camps.

115. The use of the production development fund. The money of the production development fund is earmarked for financing capital investments for introducing new equipment, the mechanization and automation of production, the modernization of equipment, the replacing of fixed capital, the acquiring of hauling transport (for production purposes), improving the organization of production and labor (including the purchase of accounting machines and typewriters and other office equipment), as well as for other measures helping to develop production, to raise labor productivity, to reduce product costs, to improve its quality and to raise production profitability (without new construction).

Here the enterprises can also carry out construction and installation work related to the replacement and installation of equipment, the expanding of production, service and warehouse facilities, as well as the organization of consumer goods production. The money of the production development fund can also be channeled to cover expenses on the transfer of scientific and technical developments (specifications) and providing help in their use.

116. The use of the other economic incentive funds. The money of the bonus fund for the creation and introduction of new equipment is used in the following areas. Some 50-75 percent of the money of this fund is turned over to the superior organization for creating a centralized bonus fund. The remaining portion of the money of this fund is used to pay bonuses to workers, managers, engineers, technicians and enterprise specialists. The amount of the one-shot bonuses for the creation and introduction of new equipment, for the development and introduction of effective methods for the organization of labor and production are set depending upon the annual economic efficiency obtained in the national economy as a result of carrying out the designated jobs (Table 63).

The specific amounts of bonuses for the individual measures related to new equipment within the limits between the maximum and minimum amounts are set by the superior organization, when the bonuses are paid from the centralized fund, and by the enterprise (association) leader when the bonuses are paid from the money left at the disposal of the enterprise (association). Not more than 10 percent of the total amount of the bonus is spent to pay bonuses

Table 63

Amount of Bonus for Creation and Introduction of New Equipment, the Development and Introduction of Efficient Methods for the Organization of Production and Labor (figures hypothetical)

Annual Economic Effectiveness	Amount of Bonus in % of Annual Economic Effectiveness
to 10,000 rubles	from 6 to 25%, but not over 2,000 rubles
from 10,000 to 20,000 rubles	from 5 to 25%, but not over 3,400 rubles
from 20,000 to 50,000 rubles	from 4 to 17%, but not over 6,000 rubles
from 50,000 to 100,000 rubles	from 3 to 12%, but not over 10,000 rubles
from 100,000 to 500,000 rubles	from 2 to 10%, but not over 35,000 rubles
from 500,000 to 2 mil. rubles	from 1 to 7%, but not over 80,000 rubles
from 2 mil. to 5 mil. rubles	from 0.7 to 4%, but not over 150,000 rubles
over 5 mil. rubles	from 0.5 to 3%, but not over 200,000 rubles

for enterprise employees who have actively aided in the introduction of new equipment.

The consumption fund is used for the following purposes: 60 percent is spent to expand the output of consumer goods, to improve their quality, to prepare new samples of these goods, as well as for the building and repair of housing, above the capital investment plan; 35 percent of the money of the consumption fund is used to pay bonuses to engineers, technicians, workers and white collar personnel taking a direct part in organizing the production of consumer goods; 5 percent is transferred to the superior organization.

The bonus fund for the delivery of export products is used to pay bonuses to workers, managers, engineers, technicians and white collar personnel participating in the production of export products. Up to 5 percent of this fund can be turned over to pay bonuses to employees of design bureaus (which are not part of machine building plants) and which have taken a direct part in carrying out export orders.

The bonus fund for the results of the socialist competition is fully used to pay individual bonuses to workers, managers, engineers, technicians and white collar personnel of the enterprise who have excelled in the competition, if the total amount of the calculated fund does not exceed 2,000 rubles. If the total exceeds 2,000 rubles, then 60-70 percent of this fund is spent on individual bonuses, and the remaining portion is used to improve cultural and personal services, and for building housing and cultural-service facilities.

Table 64

Analysis of Economic Incentive Funds
(figures hypothetical)
(thousand rubles)

Economic incentive funds formed at enterprise	In previous year	In Year Being Analyzed		
		Under adjusted plan	Actual	Deviation from plan
1. Material incentive fund	1,176	1,227	1,236	+9
2. Fund for sociocultural measures and housing construction	474	491	494	+3
3. Production development fund	846	1,071	1,065	-6
4. Bonus fund for delivery of export products	54	48	32	-16
5. Special financing for early delivery of vessels and so forth	98	--	131	+131

The money of the bonus fund for the collection, storage and dispatch of scrap and waste ferrous and nonferrous metals, and for special financing for the early delivery of vessels is used to pay bonuses to employees, engineers, technicians and white collar personnel direclty involved in carrying out the designated work.

117. Analysis of economic incentive funds. An analysis of economic incentive funds at shipbuilding enterprises is confronted with the following major tasks: Determining the completeness and soundness for forming the individual funds, studying the movement of the money of the economic incentive funds, and determining the degree of efficient use of these funds.

In analyzing the questions of the formation of the economic incentive funds, it is essential first of all to study the general indicators for the formation of the designated funds at an enterprise. Then one should establish the dynamics of the change in their amount in comparison with the previous year, and determine the degree of fulfilling the plan in terms of the formation of the individual funds. This analysis, in using hypothetical figures, can be carried out with the aid of Table 64.

The basic factors which influence the deviation of the actual amount of the MIF formed out of profit from the plan, in particular, are, the overfulfillment

(underfulfillment) of the plan for the fund-forming indicators (sales volume, level of production profitability, labor productivity, and the proportional amount of superior quality product); the nonfulfillment of the plan for the basic range of produced products; the nonfulfillment of the plan for balance sheet profit.

An analysis of the movement of the money in the economic incentive funds is carried out in order to compare the amount of money in each of the funds as calculated and spent during a year or another report period, and to compare the balances of each of the funds at the beginning and end of the period being analyzed. The movement of money in the economic incentive funds can be analyzed from the data in form No 10 of the annual report. The questions of the efficient use of the economic incentive funds hold a special place in the analysis. These questions must be studied in close correlation to the organization of economic accountability and above all internal plant economic accountability.

CHAPTER 14: FINANCIAL WORK AT A SHIPBUILDING ENTERPRISE

118. The contents and organization of financial work at a shipbuilding enterprise. Financial work is one of the most important components in the economic work of the enterprises (associations). Its basic tasks are: To provide the financial resources for fulfilling the quotas of the national economic plan for the most important economic indicators of enterprise operations; control over the safekeeping and efficient use of own working capital assigned to the given enterprise; providing proper use of bank credit, prompt repayment of payments to the budget, to suppliers, the bank, and to enterprise employees; mobilization of unused reserves for the purpose of improving the efficient use of fixed capital as well as material, labor and financial resources.

The financial work at shipbuilding enterprises, as a rule, is carried out by the financial department, and at small- and medium-sized enterprises these departments at times are part of the financial and marketing departments or are included in the bookkeeping office (planning department), where the positions of senior economists and economists for financial work are introduced.

The enterprise (association) leader appoints the chief of the financial department (senior economist) to his position; he is subordinate to the leader or his deputy.

The "Standard Statute on Organizing Financial Work at Socialist State Enterprises and Organizations" approved by the USSR Ministry of Finances, the USSR Gosplan, the USSR Gosstroy, the USSR Gosbank and the USSR Stroybank in 1971 states that the chief of the financial department, along with the enterprise leader, bears responsibility for carrying out the financial plan, the safekeeping and correct use of working capital and special funds, the prompt providing of money for expenses provided under the plan, and the economic expenditure of this money for its specific purpose. Along with the enterprise leader and the chief of the financial department, the chief of the planning department also bears responsibility for the fulfillment of the profit plan and turnover tax, and the chief of the departments of material and technical supply and marketing is responsible for the correct

use of working capital and the preventing of the accumulation of above-norm materials and commodities.

The financial departments of shipbuilding enterprises usually consist of several groups. More often they have the following groups: Operations, plan analytical, the writing out of bills, the accepting of bills, claims and cash.

The basic duties of the financial workers at shipbuilding enterprises consist in working out the financial and cash plans and credit applications; issuing the indicators of the approved financial plan and the quotas stemming from it, and the limits on the rates and standards to the individual internal plant subdivisions; controlling the completeness and promptness of the receipt of income and the correct use of enterprise money; carrying out work in compiling the operational financial plans (payment calendars); participating in the elaboration of the standards of own working assets, providing the prompt drawing up of requestable credits and their repayment at the established dates.

The questions of financial relations at enterprises involving the process of the reproduction of fixed capital, that is, their acquisition, amortization, repair, and so forth as well as the questions of product sales, monetary accumulation and production profitability have been examined in the present handbook, respectively, in Chapters 8, 12 and 13. As for the financial questions of using working capital, they have been taken up below.

119. The composition of working capital. For carrying out the process of expanded socialist reproduction, the shipbuilding enterprises, along with the fixed productive capital which is physically embodied in the form of buildings, equipment, ways, slips and so forth, it is also essential to possess productive working capital and cash and disposable stocks.

The productive working capital includes the stocks of basic and auxiliary materials, fuel, purchased semifinished and preassembled products, incomplete production, as well as inexpensive and rapidly wearing out supplies.

The cash and disposable stocks include the stocks of finished products at the warehouses, goods dispatched to purchasers, and money in the payment account, in the cash office and in checks.

The money tied up in productive working capital and in the cash and disposable stocks of the enterprises is usually termed the *working assets.*

In the process of the circulation of economic activity at a shipbuilding enterprise, the working assets move from form to another, that is, initially they are advanced as money, then they are used for the purchasing of raw products, materials, fuel and wages, and then they enter the production stage, and, finally, the commodity form. After the sale of the product the assets reassume a monetary form.

The demand for working assets at enterprises at individual periods of the year may vary. In some periods, an enterprise requires minimum amounts of these assets, and in others, due to the unevenness of incomplete production, a delay in shipping, the payment for products, and so forth, the need for working assets can increase sharply.

The working assets of enterprises are divided into own, equivalent, outside and borrowed. Own working assets are assigned to the enterprise and are reflected in its charter capital. The amount of own working assets is set for the enterprises, as a rule, in an amount necessary for meeting the minimum demand.

In addition to own assets, the working assets of the enterprises also include equivalent to own, as well as outside funds. The equivalent to own assets are the so-called fixed liabilities. These represent the money which the enterprise is constantly using in its activities, however they do not belong to it. The fixed liabilities include: the minimum liability of the enterprise for wages and social security deductions, the reserve for pending payments and other types of debt which have a permanent nature.

The most significant source of forming working assets at shipbuilding enterprises is the debt of clients for paying for products (ships) by partial readiness. Due to the fact that the shipbuilding enterprises have a long production cycle, they are permitted to receive intermediate payments from the clients by the stages of the partial completion of the vessels. The amount of this portion of the fixed liabilities is determined by a special calculation on the basis of the plan for producing shipbuilding products.

The outside funds of the enterprise are various types of debt.

The additional needs of enterprises for working assets are satisfied by bank credits.

120. Establishing the overall amount of the own working capital rate. After setting the rates for each type of normed working capital for materials, purchased semifinished products, fuel, incomplete production and so forth (see Chapter 9), the overall rate of working capital for the enterprise is found by adding the working capital rates in monetary terms for each type of normed working capital. Such a method for setting the working capital rates is the most accurate and economically the soundest. However it is very labor consuming, and for this reason it is advisable to employ it for calculating the working capital rate once every 3-5 years. In the interval between the stages, for the calculation it is essential to use data on the amount of working assets over a certain period calculated by the above-indicated method, from which one excludes the surplus and unnecessary stocks and adds the additional stocks of normed working capital of each type as they arise in the period being planned with a change in the production, supply and marketing conditions.

The basic drawback of this method of determining the capital rate is its orientation on the already existing production conditions, that is, on the achieved level, although, as is known, the level of production cooperation, the shortening of the production cycle, the acceleration of transport ties and other factors influencing the speed of working capital turnover constantly change, in helping to accelerate its turnover rate.

121. Sources of forming working capital. Own and borrowed funds can be the sources for the forming of working capital at shipbuilding enterprises. The enterprises are given their own capital during the period of their organization from the state budget, and then this capital is added to in the process of operations chiefly from their own income.

The amount of each enterprise's own working capital is adjusted annually in accord with the calculated working capital rate. In those instances when a reduction in the rate has been planned for the end of the year being planned in comparison with the start of the year, in the enterprise financial plan provision is made to confiscate the corresponding portion of own working capital; when an increase in the rate is planned for the end of the year or quarter, provision is made to add to the own working capital.

Working capital is ordinarily transferred to the corresponding account of the superior organization or to the state budget. The working capital rates of the enterprises are most often increased by: an increase in fixed liabilities; a surplus of own working capital at the start of the year; enterprise profit; the delivery of inexpensive supplies, tools and spare parts purchased from money for major overhauls and capital construction; receipt of money from superior organization through redistribution channels. Only as an exception is money given from the state budget to replenish own working capital of operating enterprises.

One of the important sources for replenishing working capital is the fixed liabilities, that is, the permanent minimum liability for wages and social security deductions, the reserve to cover future expenditures and payments; suppliers for unbilled deliveries; creditors for paying for partially completed products; money to be confiscated under turnover crediting; money of the amortization fund for material inventories for major overhauls; temporarily free money in special funds used to finance planned measures; other fixed liabilities.

The amount of the increase or decline in the fixed liabilities for each item is determined by a special calculation.

Thus, the amount of the minimum wage liability is determined proceeding from a 1-day wage fund in the fourth quarter of the year being planned and the number of days between the end of the calculation period and the day of paying wages for the month. For example, the dates for paying wages have been set at the 7th and 22d of the month, and the 1-day wage fund is 60,000 rubles. The minimum wage liability in months which have 30 days will be:

7 days x 60,000 rubles = 420,000 rubles

122. Crediting of shipbuilding enterprises. Shipbuilding enterprises for forming working capital can receive all types of short-term credits, including: Credits against inventories of materials and commodities, for bills en route, payment credits, and so forth.

Because of the unstable level of the amount of incomplete production, the frequent conversion of shipbuilding enterprises to producing a new product (developing the production of new types of vessels) and, consequently, the systematic appearance of a need to accumulate above norm material stocks and other factors, in shipbuilding there is the widespread practice of crediting by granting planned loans for above-norm inventories of commodities and materials. The loans are granted under the condition of a specific purpose and prompt repayment with the paying of interest for their use. In crediting the bank shows a differentiated approach depending upon the results of the production, economic and financial activities of the enterprises. On the one hand, the bank grants advantages to enterprises which have successfully fulfilled the product sales and profit plans and have maintained their own working capital, and on the other, applies credit sanction measures against the enterprises which have not observed these conditions.

Crediting for the turnover of materials and wage expenditures has not been widespread in shipbuilding.

123. Expenditures covered from specific budget financing. In addition to expenditures on the production and sales of products and also expenditures on the reproduction of fixed capital, the shipbuilding enterprises also make so-called operational and other expenditures. These expenditures are financed both from the money of the enterprise itself as well as from the state budget. The money of the state budget is used to finance expenditures on invention and production improvement which are of sectorial and national economic significance; expenditures on the conservation of water and air basins; the running of nurseries, creches, technical schools, vocational-technical schools, courses for the skill improvement of specialists, and so forth. Estimates should be drawn up for each of the areas of expending this money, and effective control should be organized over its economic use.

124. The income and expenditure balance. The income and expenditure balance (the financial plan) is the concluding and very important section of the tekhpromfinplan at shipbuilding enterprises. It reflects the income and receipt of money, expenditures and deductions, credit relationships and relationships with the budget. In accord with the accepted planning methodology the enterprises work out long-range, current and operational financial plans. Both generally in the process of financial planning as well as in compiling a financial plan, the following problems are resolved: The coordinating of the basic quotas for product sales, costs,

profits and profitability; the disclosing and mobilizing of production reserves for the purposes of the most rational and effective use of production capacity, for the growth of labor productivity, profit, an improvement in product quality, for achieving the greatest results with the least expenditures; providing the enterprise with the necessary financial resources for normal production and economic activities, and for creating conditions for an effective system of management and control over enterprise operations.

The financial plan reflects the financial calculations for all types of activities at a shipbuilding enterprise: Basic activities, capital construction, major overhaul, the housing and utility system, sociocultural measures, and so forth.

The compiling of the plant income and expenditure balance is preceded by the elaboration and coordination of the planning calculations. The basic ones are: Amortization deducations, payments to the state budget for the use of productive capital, deductions into the economic incentive funds, the rates of own working capital, deductions from profit into the budget, and so forth. An inseparable part of the financial plan is also the estimate expenditures on carrying out scientific research, on the training of personnel, and on the running of children's and preschool institutions, the economic support of clubs and other sociocultural institutions which are supported by the plant trade union committee.

For a majority of items the amount of expenditures in the financial plan is set in a total corresponding to the amount of income (for example, amortization deductions and expenditures on major overhauls, and so forth). For certain items income and expenditures are planned only for the total change in the balance or their sources (for example, a change in the own working capital rates, a change in the total fixed liabilities, and so forth).

The income and expenditure balance is drawn up for the year with a quarterly breakdown. The form of the financial plan is recommended in the standard procedure for working out the tekhpromfinplan.

The financial plan, in being a component part of the tekhpromfinplan, is worked out on the same dates as the enterprise tekhpromfinplan. It is approved by the enterprise leader.

125. The payment calendar. The compiling of a payment calendar is an area in the operational financial work at the enterprise. The calendar reflects, on the one hand, the sources for the receipt of money, and on the other, the expenditures on carrying out enterprise operations, that is, the payment calendar encompasses the entire movement of enterprise money.

126. The credit application. All shipbuilding enterprises 45 days prior to the start of the quarter being planned submit credit applications to their main administrations. At the main administrations, on the basis of these applications, summary applications are drawn up which are then

remitted to the ministry and from here they are submitted to the USSR Gosbank and the appropriate gosbank department at the location of the credited enterprises. A credit application is a calculation of the planned demand for individual types of credits for the forthcoming quarter and an explanatory note for this. The availability of materials, equipment, design-estimate specifications and so forth at the enterprise is a requisite condition for including a demand for credit to introduce new equipment and other measures related to improving production in the credit application. For establishing the soundness of obtaining loans for above-norm material and commodity inventories, lists are drawn up for the movement of the objects for which a credit is requested.

127. The cash plan. The enterprise cash plans play an important role in correctly organizing monetary circulation in the nation. The cash plan is the plan for the turnover of cash in the enterprise cash office, and it reflects the receipt and disbursement of cash through the enterprise cash office. The enterprise draws up the cash plan 45 days prior to the start of the quarter being planned, and submits it to the gosbank department which serves it. The plan consists of four sections, and is compiled according to the form and in the procedure approved by the USSR Gosbank. The first section of the cash plan reflects the receipt of money, with the exception of money received in the bank, the second shows the expenditures of cash, the third gives the calculation of wage payments and other types of labor payments for the quarter being planned, while the fourth section shows the calendar for the payment of wages to the employees and other payments equivalent to wages. Control over the carrhing out of the cash plan is provided on the basis of data on the operational accounting of the income and expenditure of money by specific purpose.

128. Analysis of financial activities and financial state of an enterprise represents one of the concluding sections in comprehensive economic analysis of economic activities at shipbuilding enterprises. This is carried out from the data of the balance sheet for the basic operations of the enterprise. Its most important tasks are: a calculation of the availability of own and equivalent working capital, an analysis of the state and normed and unnormed working capital, an analysis of the use of bank credits, the establishing of the degree of observing payment discipline, ascertaining the level and dynamics of assets and liabilities, determining the amount and directions for the immobilization of own working capital, and so forth.

The amount of own and equivalent assets can be determined using Table 65.

The in the analysis the reasons are ascertained for a deviation in the total of own working capital from the rate. Most often the reasons are: the overfulfillment or underfulfillment of the profit plan, as well as deviations in the total actual financing or confiscation of working capital provided under the plan by the superior organization.

Table 65

Analysis of Available Own and Equivalent Assets
(figures hypothetical)

(in thousand rubles)

Indicators	At year's start	At year's end	Change over yr. (+, -)
1	2	3	4
1. Sources of own and equivalent assets:			
a) result for group 1-11 of first section of balance sheet liabilities	18,341	19,832	+1,491
b) fixed liabilities within rate	6,250	6,400	+150
2. Total for section I (col. 3 and col. 4) for balance sheet liabilities	24,591	26,232	+1,641
3. Fixed capital and noncirculating assets (total for section I of assets)	18,353	19,812	+1,459
4. Available own and equivalent assets (line 2 - line 3)	6,238	6,420	+182
5. Rate of own working assets (total for section II, cols. 3 and 4 of assets)	6,100	6,300	+200
6. Surplus (+) or shortage (-) of own working assets for balance sheet (line 4 - line 5)	+138	+120	+18
7. Surplus or shortage of own working capital in % of rate	+2.3	+1.9	--

In analyzing the state of normed working capital, the deviation is established for the actual availability of assets by their individual types from the amount established by the rate. An important question in analyzing the financial operations of an enterprise is to determine the turnover rate of the working assets. The turnover rate of working assets is characterized by a system of indicators: the turnover rate of working assets in days; the turnover rate coefficient (the number of turnovers per year); the total working capital freed from circulation or additionally put into enterprise circulation.

The average duration of the turnover of working capital in days K (for a month, quarter or year) is determined as the ratio of the product of the average balance of working capital W and the number of days in the period D to the total product sales P over this period:

$$K = \frac{WD}{P} .$$

In the process of calculating the indicators for the turnover rate of working capital, the number of days in the period is assumed to be equal to 360 for a year, 180 for 6 months, 90 for a quarter, and 30 for a month. The turnover rate can be calculated not only for the normed but also for all working capital.

In analyzing the use of bank credit, attention must be paid to how completely the enterprise has used its right to receive a credit, whether the credits have been fully secured, whether the credits have been used according to their specific purpose, and whether they have been repaid on time.

The state and dynamics of debts and assets can be studied at the enterprise from the data in the "C" section of the balance sheet assets. In the process of this analysis, it is essential to ascertain the justified and unjustified debts. The justified debts include all types of debt the existence of which is inevitable even with the normal process of operations, for example, debt for apartment rent for the last month, debt for accountable persons on an official mission, and so forth. Then it is essential to analyze the dynamics of debt and assets, and to disclose the reasons and guilty parties for their formation.

Of important significance in the process of analyzing the financial state of the enterprise is a determining of the amount and directions of the immobilization of working capital (that is, its withdrawal from economic circulation). In the process of this analysis, the types of working capital immobilization are established as well as the reasons of its occurrence, and measures are worked out to eliminate it. The basic reasons for the immobilization of working capital at shipbuilding enterprises include: the presence of above-norm inventories which are uncredited by a bank; uncredited commodities which have been dispatched but for which the payment date is not due; the debt minus that credited by the bank; investments of working capital in expenditures on capital construction, major overhauls, and so forth.

CHAPTER 15: INTERNAL PLANT ECONOMIC ACCOUNTABILITY

129. Basic principles in the organization of economic accountability in the subdivisions of a shipbuilding enterprise. Internal plant economic accountability is a development and deepening of enterprise economic accountability. The "Statute Governing a Socialist State Production Enterprise" approved by the Decree of the USSR Council of Ministers of 4 October 1965, No 731, and the "Statute on a Production Association (Combine)" approved by the Decree of the USSR Council of Ministers of 27 March 1974 state that the economic activities of the production units, shops, sections, divisions and other elements of the enterprises and associations are to be carried out, as a rule, on the basis of internal economic accountability. Thus, the internal production (internal plant) economic accountability is recommended as a compulsory economic system for production management within the enterprises and associations.

Regardless of the common aims of economic accountability of an enterprise and internal plant economic accountability, there are substantial differences in their organization, and these must be considered without fail in carrying out measures aimed at deepening internal plant economic accountability. These differences are determined by the differing status of the production enterprises (associations) and the internal plant (internal production) subdivisions within the system of social production.

A socialist state enterprise (association) is a legal entity, it has an independent balance sheet, a payment account at the bank, and fixed productive capital and working assets have been assigned to it; its rights, duties and responsibilities are defined by legislation. As for the internal plant subdivisions, economic accountability in their operations is based on another basis, in particular, the internal plant subdivisions do not buy or sell anything, they do not possess an independent balance sheet, and do not have the rights of a legal entity. For carrying out production quotas, in accord with the rates and standards, the necessary production resources are made available to them, as well as sources of material and moral incentive.

The results of the production and economic activities of the internal plant production subdivisions are monitored by comparing the plan quotas for the established range of indicators with their actual fulfillment.

The material liability of self-supporting enterprise subdivisions in an ideal case should be manifested in the compensation by self-financing subdivisions for losses caused to other subdivisions by shortcomings in the work of the given subdivisions. However a system of covering losses and paying penalties under intershop claims does not always provide positive results, since it rarely diverts the leaders of the self-financing enterprises from solving the production problems confronting their collectives. For this reason, at the shipbuilding enterprises, where the use of internal plant prices for products is difficult, it is quite sound to feel that the question of applying economic sanctions is more often solved by a corresponding reduction in the owed amount of the material incentive fund or the lifting of bonuses for individual employees for the failure to fulfill the economic accountability obligations.

For organizing effective internal plant economic accountability at the enterprise, the following should be provided: The leaders of the internal plant subdivisions should be granted the right to dispose of the means of labor, subjects of labor and labor force assigned to them; the presence of statutes governing economic accountability of the internal plant subdivisions and the procedure for forming and utilizing the material incentive funds, for the conditions and indicators for paying bonuses to the shop employees; the granting of rights to the subdivision leaders themselves to calculate the plan indicators for their activities on the basis of a limited number of basic indicators approved by the plant administration; the presence of a shop tekhekonomplan [technical and economic plan]; the presence of a precise system of planning and accounting units; the presence of progressive standards and rates for the consumption of materials, semifinished products, fuel, tools, labor resources, and so forth to be consumed by the internal plant subdivisions; the presence of fixed internal plant prices for materials, semifinished products, spare parts, tools, various types of services, and so forth; the presence of the required weighing and metering equipment and instruments in the internal plant subdivision; the accounting and analyzing of results for the production and economic activities of the self-financing subdivisions.

The internal plant economic accountability at shipbuilding enterprises is ordinarily viewed in various aspects: in the first place, the economic accountability of the shops in basic and auxiliary production; secondly, the economic accountability of the functional departments and services, and, thirdly, economic accountability of the production sections, brigades and individual executors.

130. The choice of a system of indicators for the economic accountability activities of shops. The system of economic accountability indicators should be based upon a consideration of the specific production conditions in each internal plant subdivision. They should help to solve the most important problems confronting the collectives of the production shops; they should provide comparability of the operating results of the individual shops and the plant as a whole; they should serve

as an objective basis in providing material incentives; they should provide an optimum balance of physical and cost indicators.

The plan of the self-financing subdivisions should provide a minimum number of indicators and only those on which the given collective can have a direct influence. Ordinarily three groups of indicators are distinguished in the plans for the internal plant self-financing subdivisions: directive, that is, approved by the plant leadership; calculated, that is, determined by the self-financing shop itself; evaluation which is used as the basis for determining the results of operations and forming the shop material incentive funds. The list of directive indicators planned for the basic production shops is given in Chapter 2.

The results of the economic accountability activities of the shops at a majority of the shipbuilding enterprises are judged on the basis of using the indicators of costs or expenditures on the production of commodity product.

131. Planning production and economic activities of the self-financing shops in basic production. A number of demands are made upon planning indicators for the economic accountability activities of the basic production shops. These include: The aggregate of shop plans should correspond to the plant plan; the indicators for the shop production program should be interrelated; the internal plant plans should encompass the same planning period as the enterprise tekhpromfinplan; the criteria of plan tautness at the enterprise should be uniform for all the self-financing shops.

The composition of the directive and calculated indicators for the internal plant economic accountability in the basic production shops at a majority of enterprises is planned according to the sectorial procedural instructions.[1]

The economic accountability indicators for shop operations are planned by working out five-year (with an annual breakdown), annual (with a quarterly breakdown) and quarterly (with a monthly breakdown) plans for the production and economic activities of each subdivision. The internal plant technical and economic indicators of the shop for the year are reflected in their tekhekonomplans which are worked out with the broad involvement of the shop employees.

The planning of the individual indicators for the operations of the basic production shops basically conforms to the procedure for the planning of

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[1]See: "Organization of Internal Plant Economic Accountability at Shipbuilding Enterprises (Basic Provisions)," Moscow, TsNIITEIS, 1971, pp 13-14.

indicators of the same sort for the plant as a whole, and this procedure has been examined in the corresponding chapters of the present handbook.

The methodology of planning the number of employees and the wage fund for the self-financing shops is analogous to the setting of these indicators in the labor plan of the plant as a whole.

The money of the material incentive fund allocated to the shop is planned proceeding from the indicators of the growth rate of the shop production volume provided for the corresponding year of the five-year plan.

The cost of commodity product is planned for the shops for the basic PUYe [planning and accounting unit] set for assessing the output of commodity product. As was pointed out above, as the basic PUYe it is possible to use: the shop-stage, the group-shop-stage and the shop-vessel for shipbuilding, the machine-set for products of interplant cooperation and other nonshipbuilding products.

The cost of the basic PUYe is planned for all orders, both those comprising and not comprising the commodity product.

The planned cost of the basic PUYe should be calculated on the basis of the current or expected rates. In the absence of rates, as the basis of the calculation for the planned cost of the PUYe for ships under construction, it is possible to use: the lists of the specific material consumption standards for materials; the lists of interplant cooperation for purchased products and semifinished materials; the lists of forged pieces, castings, stampings drawn up for each consumer shop for the own-produced semifinished product; the quotas of labor intensiveness worked out by the department of the chief production engineer for each shop and section broken down for the PUYe for labor intensiveness; the average wage rates of the production workers per norm-hour set by the department of labor and wages for each shop for the year being planned for wages.

The planned cost of the basic PUYe can be set from the following costing items:

For prototype vessels	For series-produced vessels, interplant cooperation products and other nonshipbuilding products
1. Basic wages of production workers	1. Materials
2. Shop expenditures	2. Purchased products and semifinished materials
	3. Own produced semifinished materials
	4. Basic wages of production workers
	5. Shop expenditures

If at the plant by the moment of starting the construction of the prototype vessel the lists have already been worked out for the specific consumption standards for materials and semifinished products in terms of the basic PUYe, then the cost of the prototype vessel should be planned for the same costing items as for the serially produced vessels.

132. Planning the production and economic activities of the self-financing shops of auxiliary production. This has a number of particular features in comparison with the planning of production and economic activities for the basic production shops. The most important of them are that in planning the production volume for auxiliary shops, along with using the indicators for commodity and gross product in monetary terms, wide use is also made of physical indicators, for example, in the transport shops, the run in ton-kilometers, machine-hours of operation, and so forth; in repair shops, a unit of repair complexity, and others.

The next feature in planning the activities of auxiliary shops is that with the economic use of the services (steam, electric power, transport services and so forth) provided by the auxiliary shops for the consumer shops, the cost of a unit of their product can exceed the plan but not at the fault of the auxiliary shops. For this reason for the auxiliary shops the most important evaluation indicator approved for their activities should be not the cost of a unit of service but rather the total production expenditures.

The nonfulfillment of the plan for services (work) by the auxiliary shops as a consequence of the absence of a demand for the services by the client shops should not be considered a negative aspect in the activities of the auxiliary shops. In this instance their plans should be corrected, and the obtained savings should be put in the service of the given auxiliary shop. Since the approach to planning the production indicators and evaluating the results of operations of auxiliary shops differs substantially from the solution to this question in terms of the activities of the basic production shops, let us give the composition of the designated indicators which are most often used in organizing the economic accountability activities of the auxiliary production shops at the shipyards (Table 66).

133. Accounting and analysis of operational results of self-financing shops. The most important condition for the functioning of an effective system of internal plant economic accountability at an enterprise is the organization of the accounting of operational results for the self-financing subdivisions. The use of economic accountability relationships within the enterprise confronts accounting with the following tasks: The completeness and thoroughness of depicting the accounted for objects; the promptness and efficiency of receiving the general indicators; the accuracy and reliability of the accounting information.

In accounting for the results of the economic accountability activities of the internal plant subdivisions, all types of accounting are used, including bookkeeping, operational and statistical. Bookkeeping accounting for

Table 66

Composition of Indicators for Production and Evaluation of Operating Results of Auxiliary Shops

machine repair	tool	power	transport
I. Production Volume Indicators			
1. Commodity product, 1000R 2. Major & medium repair on equipment[1] 3. Routine equip. repair 4. Routine maintenance 5. Manufacture of spare parts for repair, 1000R 6. Equip. modernization 1000 R 7. Manufacture of non-standard equip. 1000R 8. Assembly, disassembly of equipment, 1000 R 9. Work & services to enterprise shops in 1000 R. 10. Services to outside, 1000 R 11. Reserve for emergencies & unforeseen work, norm-hr	1. Commodity product, 1000 R 2. Production plan by range, pieces 3. Repair plan for tools & attachments 1000 R 4. Amount of work on second order tools, 1000 R 5. Amount of work under plan for new equipment, 1000 R 6. Amount of other work carried out, 1000 R	1. Commodity prod. 1000 R 2. Production of individual types or power sources: --electric power, kwh; --steam in tons; --compressed air, m^3	1. Commodity product, 1000 R 2. Freight shipping (by types of transport) 3. Freight handling work (done mechanically) machine-hr 4. Freight handling work (done manually) man-hr
II. Indicators for Evaluating Operating Results & Economic Incentives			
1. Fulfillment of equip. repair sched., units 2. Observing expend. estimates for repair & maintenance 3. Reduction in labor itens. for unit of repair difficulty for types of repair & maintenance	1. Quality of manufactured tools, attach. 2. Consumption of tools, attachments by types & articles 3. Reduction in labor intensiveness of making tools, fittings	1. Continuous supply of plant shops with all types energy & no stoppages caused by power plant 2. Observance of expenditure estimate for types of energy	1. Observance of estimates for individual types of transport & freight work 2. Stoppages of indiv. types of transport, hr. 3. Consumption of fuel, lubricants for types of transport per 100 km of run.

[1] In 1000 rubles, units and units of repair difficulty.

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the operating indicators of the self-financing subdivisions is usually carried out on a centralized basis by the enterprise bookkeeping office which accounts for the movement of the plant assets in terms of the objects of internal plant economic accountability. Operational accounting is carried out by the employees of the production and technical services of the enterprise and the self-financing shops.

All the operating indicators of the self-financing subdivisions are accounted for in accord with the methodology of their planning, and this makes it possible to provide comparability of the plan indicators and the actual results of their fulfillment.

Ordinarily the reciprocal claims among the self-financing shops as well as penalties are not accounted for in the systematic bookkeeping. As a rule, these are shown in the reports for the total result of the operating indicators of the self-financing subdivisions and are taken into account in evaluating their work.

134. Economic accountability in sections and brigades. For the purposes of extending and developing economic accountability at an enterprise, its elements must be extended to the sections, brigades and individual executors of the work.

The composition of the indicators in the plan of the sections and brigade is significantly narrower than for a shop. It includes the following quotas: For the production program; the number of employees; the wage fund; labor productivity; product costs for the portion which depends directly upon the activities of the section. The shop chief sets the plan indicators for the sections.

In the assembly shops, an assembly unit or production set can be the unit for the volume of production in the section; a ton of castings, forged pieces and so forth can be the unit in the preparatory shops. In planning expenditures on production, most often the sections are given quotas for one or several cost elements (materials, fuel, energy or wages).

The use of the principles of economic accountability at the work areas consists in the fact that the workers assume obligations for the growth of labor productivity, for saving materials, fuel, and energy, they open up personal savings accounts, and so forth, and in accord with the fulfillment of these their activities are encouraged.

135. The use of the principles of economic accountability in the functional departments of the plant administration. Since the functional departments are not directly involved in the production process, and they are not given the means of production and the results of their work cannot be expressed as the end product of the plant in a monetary form, the functional departments cannot operate on economic accountability. However their activities cannot be outside the sphere of economic accountability relationships. For this reason, at many enterprises for assessing the work

results of the functional departments, indicators are used which are indirectly linked with the system of economic accountability indicators at the plant, for example:

1) For the department of the chief designer, this may be the economic effect obtained from introducing new equipment and carrying out other organizational and technical measures; the economic effect obtained by producing higher quality product; the fulfillment of the plan for the elaboration and turning out of specifications; the reduction in losses in the shops due to the prompt making of changes in the blueprints;

2) For the department of the chief production engineer, this can be the fulfillment of the plan for raising production efficiency for the areas related to the service of the chief production engineer; the fulfilling of quotas to reduce the labor intensiveness of vessels and articles; carrying out the schedule for the technological preparation of production; the economic effect from measures related to improving production methods.

Thus, for assessing the work results of the departments and services of the plant administration, indicators are created which to the greatest degree describe the work results of these subdivisions in the area of increasing the production efficiency of the entire plant.

136. Evaluating the work results of the self-financing subdivisions and the system of material incentive. The effectiveness of internal plant economic accountability depends largely upon the correct determining of the operating results of the self-financing subdivisions. The operating results of the self-financing subdivisions are provided on the basis of evaluating plan fulfillment for the directive as well as certain calculated indicators. The materials for summing up the operating results of the self-financing shops are: the data of the monthly reports, the forms and dates of submission are set by an order of the plant director, as well as the results of analyzing the operating indicators of these subdivisions.

The place of the self-financing subdivisions in the internal plant socialist competition in terms of the results of their work during the month is set at the enterprises by different methods, among which one of the most widely found is the method of points. Here a certain number of points is set for a 100 percent fulfillment of the plan and for each percentage of its overfulfillment using a previously worked out scale; with the nonfulfillment of the plan, minus points are given depending upon the degree of plan nonfulfillment for the individual indicators, and after this the points are added up and the subdivision which has the largest number of points is considered the winner.

Proceeding from the evaluation of the operating results of the self-financing subdivisions, the tautness of their plan quotas and the place held in the internal plant competition, the amount of the material incentive funds is determined for the employees of these subdivisions both from the general material incentive fund and from the wage fund.

The money of the bonus funds and the above-indicated portion of the wage fund is distributed between the employees of each internal plant subdivison on the basis of the bonus statutes in effect at the enterprise, and this includes: for the fulfillment and overfulfillment of the output standards, the quality of the performed work and produced product, the reduction in the consumption of raw products, materials, fuel and energy; for the fulfillment and overfulfillment of the plan in terms of other qualitative and quantitative indicators.

Ordinarily not more than two basic indicators are set for which the fulfillment and overfulfillment of the plan entail a bonus. In shipbuilding for paying bonuses to engineers, technicians and white collar personnel, such indicators can be: the volume of commodity product or commodity output, a reduction in product costs, labor productivity and the return on investment. Certain additional conditions are set in the statutes governing bonuses for shops and departments, as these reflect the specific work of the given subdivision. Among the additional conditions along with the basic indicators, there can be such conditions as the observance of the necessary ratios between the growth rate of labor productivity and wages, the fulfillment of quotas for reducing labor intensiveness of the manufactured product, meeting the percentage of the progress in the technical completion of vessels under construction, and so forth. With the nonfulfillment of the required conditions, a bonus is not paid. With the nonfulfillment of the additional conditions, the amount of the bonuses for the given category of engineers, technicians and white collar personnel or the individual executors is reduced, but by not more than 50 percent.

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