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CONSTRUCTION PROBLEMS OF NEW SOVIET FARM MACHINES AND IMPROVEMENT OF THEIR PRODUCTION

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In 1950, the scientific-research and planning organizations of the Ministry of Agricultural-Machine Building, VISKhOM (All-Union Institute of Agricultural-Machine Building), GSKB (State Special-Design Bureau), and SKB (Special-Design Bureau) conducted work in plants on the construction of a number of new machines for mechanizing labor-consuming processes in agriculture. During the year, experimental models of 165 new machines and tools were developed, and a considerable number of them successfully passed tests under farming conditions. Some machines for mechanizing work connected with the new irrigation system were put in production in 1950.

The Machine-Experiment Stations gave a good rating to the new Stalinets-8 trailer grain combine [redacted] developed by the Special-Design Bureau at the Rostsel'mash (Rostov-on-Don Agricultural-Machine-Building) Plant. This combine is considerably more productive and has better technical indexes than the Stalinets-6, although it weighs the same. The first small series of Stalinets-8 combines will be produced in 1951 for extensive economic-efficiency tests under field conditions. Designers at the Rostsel'mash Plant, aided by VISKhOM workers, have also constructed a corn-harvesting combine.

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The State Special-Design Bureau achieved remarkable success in developing machines for picking cotton in nonirrigated cotton-growing regions. Cleaning devices have been installed in pneumatic pickers, considerably reducing the amount of impurities in the raw cotton gathered. Tests showed that the self-propelled, pneumatic three-row cotton picker could be recommended for series production. The bureau also developed the UPKh-1.5 field boll cleaner (vorokhoochistitel') and the SGN machine for picking stalks and bolls.

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VISKhOM and SKB personnel, working at the Gomsel'mash (Gomel' Agricultural-Machine-Building) Plant and the Lyubertsy Agricultural-Machine-Building Plant imeni Ukhtomskiy, have developed and tested combines for harvesting ensilage crops, motor and tractor hay stackers, automatic pumping stations, a well-digging machine, and machines for fodder preparation and cattle-farm work.

In 1951, a series of seeders for sowing kok-sagyz in mineral soils will be put out for extensive economic-efficiency testing. For horticulture and truck farming, VISKhOM and SKB personnel working at the Odessa Plant imeni Oktyabr'skaya Revolyutsiya have developed a one-way-suspension plow, a cultivator hiller, and a sugar-beet lifter for the KhTZ tractor.

Several problems, some of which have been included in the work plan for several years, have not yet been satisfactorily solved. A square-nest seeder which deposits fertilizer in the nests and a seeder for the dotted sowing of sugar beets are being worked out by SKB at the Kirovograd Krasnaya Zvezda Plant; a potato-digging combine, by VISKhOM and SKB at the Ryazsel'mash (Ryazan Agricultural-Machine-Building) Plant; and a sunflower-harvesting combine, by SKB at the Rostsel'mash Plant. The construction of these machines has been held up mainly because the scientific research to determine the physical and mechanical characteristics of crops and to evolve efficient working parts for new machines has not been conducted on a sufficiently broad scale. These uncompleted projects will be continued in 1951, and corrections will be introduced in several models tested in 1950.

New machines will be developed for the mechanization of labor-consuming work and the complex mechanization of work in various branches of agriculture. The most important objectives are the following:

1. Machines for work in electrified regions: a side-hill trailer plow, a cultivator ripper and other machines for electric tractors, and an electric combine for grain crops.

2. Machines for planting and digging potatoes: a potato-digging combine for hard soils, a two-row potato planter for vernalized potatoes, a potato planter which simultaneously deposits fertilizer, and a potato grader.

3. Machines and tools for mechanizing forest cultivation: nest seeders for sowing tree seeds by T.D. Lysenko's method, a tree-planting aggregate for flat land, a forest cultivator, a plow, a cultivator ripper, tree planters for steep slopes and for sandy soil, and a rotary forest tiller for a 12-horsepower tractor.

4. Machines to mechanize rubber-plant cultivation: completion of horse and tractor seeders for sowing kok-sagyz in peaty soil and machines for planting the cuttings and for gathering the seed and roots of kok-sagyz.

5. Machines for picking cotton in irrigated and nonirrigated cotton regions: development of a design for a three-row self-propelled pneumatic cotton picker for nonirrigated regions, to be series produced; continuation of work on the construction of two-row horizontal-spindle and vertical-spindle pickers and of a machine for uprooting stalks and bolls and binding them in sheaves; and construction of an experimental cotton picker with electric drive.

6. Machines for mechanizing fodder-raising and cattle-raising farms: stackers for hay and straw, well-digging machines, a roll-press pickup for hay, an ensilage unloader, and a mobile milking machine.

7. Machines for gathering and intitial processing of flax, hemp, and bast (novolubyanaya) crops: a bast combine for cutting green jute, hemp (kenaf), and chingma (kanatnik) stalks and separating the fibrous layer from them; a

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mobile braking-scutching aggregate for hemp; a braking-scutching machine for processing freshly cut hemp (kenaf), chingma, and jute stalks; a machine for gathering Indian hemp; and a flax puller with a binding apparatus.

A number of machines are being constructed for mechanizing the cultivation of sugar beets, corn, tea, and other crops.

Scientific research and experimental work should also be conducted on machines needed to apply the new methods of land cultivation, crop care, and harvesting, including:

1. Machines for stage plowing of black earth and podsolic soils to increase the productivity of farm crops.

2. Cultivators for simultaneous between-row and between-nest tilling. Machines of this type will greatly reduce labor consumption in weeding plowed crops.

3. An aggregate of machines for mountainous regions, including machines and tools for operation with special tractors and cable traction from a winch.

4. A tea-picking machine.

To construct these new machines successfully, the organization and work methods of institutes and design bureaus must be improved.

Until recently, in some special-design bureaus, work on the construction of a new machine began with construction of the machine as a whole, without exhaustive preparatory laboratory and field testing of the working parts and individual units. Since machines were often planned without consideration of the technological capabilities of the producing plant, there were delays in putting new models in series production. Insufficient attention has been given to basing designs on sound technological principles, and to giving parts and units the form that will insure the lowest possible consumption of labor and materials.

The 1951 plan provides for further improvement of processes in all enterprises, a wider application of high-speed cutting, electric annealing, and other progressive methods, adoption of continuous production and complex mechanization, and a broader mechanization of auxiliary operations and of heavy and labor-consuming tasks.

The most important objective is the expansion of complex mechanization, including its application in the production processes of the bulkiest agricultural-machine parts.

Mechanized continuous-production lines for shares and moldboards of tractor plows will be put in operation at the Altaysel'mash (Altay Agricultural-Machine-Building) and Odessa Oktyabr'skaya Revolyutsiya Plants. They will include mechanized aggregates for annealing shares by high-frequency current, special rotating furnaces for annealing moldboards, and highly productive bending-hardening presses. Conveyers carry the parts from one operation to the next. Organization of such lines will greatly increase the output of shares and moldboards from existing production space, lower their labor consumption, and considerably improve their quality. In the future, these lines will produce shares and moldboards automatically, and such labor-consuming operations as grinding and polishing external surfaces will be mechanized. Utilizing the experience of the Taganrog Plant in the continuous mechanized production of stamped hook-link chains, workers of the industry should put such a line in operation at another combine plant. The line at the Taganrog Plant has reduced the production cost of the chains and improved their quality. It turns out several million links yearly, with an approximate yearly saving of 6 million rubles.

The continuous mechanized production of frame parts, tractor-plow axles, rake teeth, wheels, seats, propeller shafts, and other bulky labor-consuming parts will be organized in 1951.

The shops of agricultural-machine-building plants have received considerable quantities of highly productive specialized and aggregate equipment in the last few years. In many plants complex units of a machine are completely machined on lines of aggregate machine tools. In 1951, the machining of parts and units of combine motors, of the driving-wheel axle of self-propelled combines, and of parts for cotton pickers and other complex agricultural machines will be performed on such lines to a greater extent.

The disparity between mechanized, highly productive means of making and machining parts, and hand methods of technical control which have prevailed up to now in agricultural-machine building must be eliminated. In 1951, automatic and semiautomatic machines and instruments for mechanized control of the size and quality of combine parts, motors, and plows must be developed and put into use. More than 20 plants are applying the statistical method of control, using instruments for the complex mechanization of measuring and computing.

Improvement and mechanization of machining processes and technical control will improve the assembly of units and machines by greatly reducing finishing operations. They will also make possible the assembly of all machines on a continuous line basis and will lower the high labor consumption involved in assembly. Wider use of mechanized, hand-operated fitting and assembling tools is also provided for.

The improvement and complex mechanization of all painting and drying processes for agricultural machines, including the preparation of surfaces for painting, is still a very serious problem for agricultural-machine builders. Studies will be conducted in the use of aggregates for chemical and mechanical cleaning, and of washing-drying aggregates. Preheated agricultural-machinery enamels will be used more extensively.

Large-scale work will be carried on to mechanize auxiliary operations. Intrashop conveyance, removal and breaking of chips, and setting up and removal of parts from the machine tool by means of rapid-action clamping attachments should be fully mechanized at the Rostsel'mash and Krasniy Aksay Plants. In the press-forge shop of the Tula Plant and the frame shop of the Altaysel'mash Plant, the storage of metals, the feeding of billets into the heating furnace, the loading and unloading of forgings from furnaces, and the conveyance of billets to the storeroom are all being mechanized.

The loading and unloading of metal, coal, completed machines, and other bulky articles will have to be mechanized at basic plants. The complex mechanization of these tasks will be carried out at the Plant imeni Oktyabr'skaya Revolyutsiya at the Rostsel'mash Plant, and at the Khar'kov Serp i Molot Plant.

Further expansion of the use of high-speed methods on metal-cutting equipment has been provided for. During 1949 - 1950, agricultural-machine-building plants converted a considerable number of machine tools that could be adapted by simple modernization to high-speed metal-cutting methods. A more complex preparation of equipment and fittings is necessary for further expansion of high-speed cutting. This applies especially to drills and turret lathes used for machining holes, and also to automatic machine tools occupying an important place in the plants' equipment park. Also to be introduced on a broad scale are the use of hard-alloy-tipped tools for machining holes (drills, countersinks, reamers), the brazing-on of hard alloy tips, and the grinding and finishing of such tools with special attachments. Practical aid will be given to plants in making complex-shaped tools tipped with hard alloys, especially in shaping the tool by the electrical erosion method, and in converting metal-cutting automatics to high-speed methods.

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With the introduction of high-speed tool grinding, new highly productive tools in which the hard alloy blade is mechanically secured to the tool, and cutters with polyhedral hard alloy inserts will be used. These will make it possible to shorten the time spent in auxiliary operations and decrease the consumption of hard alloy in machining parts.

In 1951, centralized tool grinding and finishing, especially of hard-alloy-tipped tools, will have to be organized in the majority of the plants. Technical supervision of the use of cutting tools and dies, attachments, and other kinds of fittings will have to be improved, and in some plants, reorganized.

The operation of plant tool shops must be improved in 1951, since they play such an important part in current production and in preparations for the production of new machines. The tool shops should be completely fitted out with the necessary equipment and attachments, and in the future, called on to do only the work they are supposed to do (make and repair tools, fittings, and attachments). The ministry will organize tool shops along modern lines and strengthen control and management of tool-shop operation. The multiple reconditioning of worn-out tools and hardening of tools by the electric-spark method will be adopted. The continuous method will be introduced in the case of those tools, such as taps and screw dies, which are produced in mass quantities. The new technological processes of mechanical and heat processing of fittings will be adopted, and substitutes for costly steels will be used more widely.

The improving and speeding up billet heating prior to forging or stamping hold an important place among the measures for perfecting technology.

In 1951, single zone and multizone electric-contact-heating units will be set up in a number of plants for making frame parts, axle spokes, metalware, and other parts needed in the production of tractor plows, shallow plows, and combines.

Electrode welding with high-quality coating to improve the quality of welded joints will be applied more widely at plants. Semiautomatic welding under a layer of flux will be adopted at a number of plants. Experience in the welding of flax-puller wheels has demonstrated the feasibility of automatic welding in a number of agricultural machines.

Foundries must further increase the degree of mechanization of basic and auxiliary processes, and organize production lines. In 1951, the casting of the basic part of the tractor plow, the standard, which has been done completely by hand until now, will be done by pneumatic machines at all plants. The core for the standard will be made by a sandblasting machine. The next step in mechanizing plow-standard making will be to cast this part in permanent metal molds.

The technological design bureau of the Plant imeni Oktyabr'skaya Revolyutsiya is working on this problem. Casting in permanent molds (chill casting) has lowered labor consumption, increased yearly output of castings per square meter, and increased wear resistance in parts like the sprocket wheels and gears. Sections using specialized casting machinery, which mechanizes casting production by means of permanent molds, will be created in plant foundries. The ministry's planning organizations have been ordered to provide for such sections in working out plans for new foundries and in remodeling old ones. TsITM (Central Institute for the Organization of Labor and Mechanization of Production) has been commissioned to plan machines and develop technological details suitable for specific agricultural-machine parts.

Agricultural-machine-building plants will mechanize the mixing of mold and core materials, the loading of charges, the knocking-out of castings from flasks, and other heavy, labor-consuming tasks.

In 1951, shot-blasting units should be put in operation, and work on the mechanization of cleaning sections of the casting shops at basic agricultural-machine plants should be completed.

In casting tractor rakes, the use of hot-air blasts in the cupola furnace raises the temperature of the pig iron to 1,450-1,470 degrees, increases the productivity of the furnace, and cuts coke consumption. Units for preheating air will be constructed in a number of foundries that produce modified pig iron and wrought iron.

A new type of steel with increased carbon content will be used to raise the output of Bessemer steel. This steel does not require much superheating for pouring, making it possible to use a transfer ladle holding an entire charge for pouring. This should considerably increase the steel turnover of converters, and in combination with an increase in the pig-iron temperature, should also increase the temperature of the blow. This will in turn make possible a considerable reduction in ferrosilicon consumption in blowing and deoxidation.

The experience of the Kirovograd Krasnaya Zveyda Plant in the use of pig iron with globular graphite, modified by magnesium, should find broad application at other plants in the production of particularly important machine parts, the more so since its use is possible in the ordinary pig-iron foundry without special expenditure on equipment.

Measures taken in the enterprises in 1951 for expanding mechanization and continuous production and for adopting new techniques will raise the technical level of agricultural-machine building even higher, and will further equip all branches of agriculture with highly productive machines for the complex mechanization of processes.

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