JPRS L/8900

1 February 1980

East Europe Report

SCIENTIFIC AFFAIRS

(FOUO 1/80)

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APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000200050002-2

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EAST EUROPE REPORT
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CZECHOSLOVAKIA

CSAV OFFICIAL RECOUNTS 1978 ACCOMPLISHMENTS

Prague VESTNIK CSAV in Czech No 5, 1979 pp 235-241

[Speech by Josef Riman, scientific secretary of the Czechoslovak Academy of Sciences]

[Text] Esteemed and honored representatives of the Party and Federal Government,

Esteemed Comrade Chairman of the Czechoslovak Academy of Sciences,

Esteemed members of the Czechoslovak Academy of Sciences,

Esteemed guests, comrades,

The measure for assessing the work of both of our academies lies primarily--and must lie, in the evaluation of concrete results achieved by scientific research performed at our work sites. Permit me, therefore, to begin with the level of activity in the Czechoslovak Academy of Sciences (CSAV) and the Slovak Academy of Sciences (SAV).

The report of the 1978 CSAV activity presents in the area of natural, technical, biological, and medical sciences, 81 selected achievements which in 1978 were offered through academic research to society. Of these achievements, many can already be evaluated in concrete fiscal terms, or in realistic estimates of contribution to our national economy.

It is commonly known that 1978 brought two great successes of our sciences within the framework of the INTERKOSMOS program. The CSAV, together with certain Czechoslovak government bodies and in partnership with academic and government organizations especially in the Soviet Union but also in the other socialist countries, participated intensively in these successes via six scientific and technical experiments performed on board the orbital complex Salyut 6--Soyuz 28. Both our academies also shared significantly in the implementation and smooth functioning of our first artificial satellite MAGION. In addition to these commonly-known successes, of all the activities listed in the 1978 report, we can without discrimination against the others, cite the following which had considerable practical impact:

1. The discovery and application of the principle of reducing the coking period by one-fifth of the former time, together with increasing the level of utility of less baked types of hard coal, an achievement accomplished in cooperation among the CSAV, the Higher School of Chemical Technology, and the Institute for Exploitation of Fuels.

2. Completion of the electronic portion of the milli-second transmission of timed information by means of the Czechoslovak station OMA of 50 kilohertz, achieved in the CSAV, in cooperation with national enterprise PRAGOTRON, which promises well for the production of circa 25,000 radio-directed hours in the next ten years, with application in transportation, communications, geophysics, and in space research, all this with considerable and measurable saving in hard currencies.

3. Production of the medium wave synthetizer ARB-2, carried out in the CSAV and directly connected with the manufacture of 64 of these instruments in CSAV work sites--an achievement which, again with a calculable saving in foreign currencies, allowed for the timely retuning of our stations to new international wave lengths.

4. The SAV, in cooperation with the Slovak Higher School of Chemical Technology, resolved the method of preparing a photosensitive polymer layer which is the prerequisite for the development and use of testing the Czechoslovak negative offset technique, with a realistic expectation that introduction into production will significantly influence the effectiveness of our polygraphic industry, while also allowing for economy in hard currencies.

5. The CSAV was successful in discovering a substitute for natural leather in material made from polyvinylchloride and polyuretane. Technological problems are now being tested in the East Bohemian Chemical Works, and production in TECHNOPLAST, Chropyne. This achievement provides a realistic perspective for benefits in our licensing policy in which the CSAV has since 1974 had a large share (30-40%). As stated in the Annual Report on Scientific and Technological Development, published by the Federal Ministry for Technological and Investment Development, and the Federal Bureau of Statistics, in 1978.

6. The SAV, working with mathematical bases of artificial intelligence, produced an effective algorism usable for automatic program synthesis and resolution of the problem of artificial intelligence. This achievement represents a theoretical basis for the programming systems for robots.

7. The SAV clarified the molecular substance of latent viral infection in simple blisters, a problem affecting 90% of the population. The work on this subject consists of partial expression of viral information emanating from cellular genome. The SAV, in cooperation with components of the Slovak Ministry of Health, also discovered new information on the existence (in

our country) and epidemiology of a thus far not clarified illness, probably of viral provenance, causing gradual atrophy of brain tissue, the so-called Creutzfeld-Jacob disease.

8. As part of a non-planned program, the CSAV discovered a new method of effective use of waste animal blood for the preparation of antidotes useable for lowering the death rate in the breeding of the principal types of farm animals, calves, farrows, lambs, but also fur-producing ones. The effectiveness of this patented method was tested on 10,000 calves and brought in one okres (Pardubice) a measurable increase in production of 910 tons of meat per year, and according to the Slusovice agricultural cooperative in the Gottwaldov area, bearer of the Order of Labor, there was an increase in calf production of 1200 pieces for 1978. State-wide application of this method could, according to official calculation, provide a saving of circa 324 million korunas per year.

9. In cooperation with TESLA in Hradec Kralove, the CSAV produced a system of pyroelectric sensors for the measuring and regulating of temperature in automated production processes. Its application in the Mohelnice Energy Measuring Works, brought annual conservation of 1.5 million kW/hours, allowing for significant savings in hard currencies if the system is broadly implemented.

Esteemed Comrades,

Dozens of other, similar examples in the 1978 report reflect the current state of cooperation of the CSAV and SAV with society, cooperation which at its peak current level emanates from broad agreements between the management of both academies on the one hand, and management of economic production organizations on the other. This cooperation, anchored during 1972-78 by 10 agreements in the CSAV and 7 in the SAV, has in the course of 1978 been broadened through additional agreements, e.g., CSAV with the management of the dairy industry, with the Federal Ministry of Transportation, and a more precise agreement with the Ministry of National Defense. All these agreements represent today an important, relatively best organized, current form of transmitting the results of academic research to society in the areas of metallurgy, thermomechanics, hydromechanics, engineering, electronics and electrical technology, construction, extraction of raw materials and, last but not least, in biological-medical and biological-agricultural research. In order to intensify this cooperation between academic reserach and bodies representing practical application for the benefit of our society, there were other forms of cooperation via bilateral and multilateral agreements between individual CSAV and SAV institutes and enterprises, or in comprehensive effectiveness and economy campaigns, and in the growing, broadly-based movement of socialist labor brigades and other workers initiatives. This was also reflected in the increase in registration of inventions by 3.5%. The quality of these inventions is confirmed in many cases by international criteria. Also illustrative of these may be specifically the principle of

selective introduction of antidotes based on polymers, including antigene, which, produced under the commercial name Insolmer in cooperation among the CSAV, Higher School of Chemical Technology, and the Institute for Sera and Inoculation Substances of the Czech Ministry of Health, received last April the grand silver medal at the invention exhibit in Vienna, and the gold medal last May at the invention exhibit in Basel. Currently, its production is scheduled in the Institute for Sera and Inoculation Substances. In addition to these achievements with a clearly practical aspect, scientific research in the CSAV and SAV--in accordance with their primary mission of basic research, brought forth a series of significant, original, theoretical findings opening new scientific horizons, of which many emanated from international socialist cooperation.

With respect to social sciences in the CSAV and the SAV, their activity last year was strongly affected by new methods of research planning in social sciences emanating from the Unified Program of Social Sciences, presented to and approved by the CPCZ Central Committee in June 1977. This program outlined priority directions of basic research in this discipline with the principal goal of systematic preparation for the leading Party organs an information base necessary for knowledgeable effective and economic programming and management of further development of our society, especially for the preparation of the 16th Congress of the CPCZ.

Within the framework of fulfillment of the Unified Program for Social Sciences, as early as 1978, the first results in the form of concrete expert reports and monographs of planned tasks, were submitted. The information presented deals with 43 selected, concrete results achieved at the CSAV and SAV work sites in the process of meeting the tasks of the Unified Program for Social Sciences in the area of Marxist-Leninist philosophy, sociology, economy, state and law, pedagogy, history, archeology, art, psychology and linguistics.

Esteemed Comrades,

To the question "what was the role of the bodies which regulate and monitor scientific research at CSAV and SAV work sites," we can reply as follows: Sustained overall attention of Party organs, especially the Science and Education Departments in the Central Committees of the CPCZ and the Communist Party of Slovakia, the attention of municipal, okres, kraj, and CPCZ basic organizations, had already in 1978 led to higher quality political work and Party control both at work sites and in management of both academies. As is known, in early 1978 there were significant personnel changes in the CSAV and SAV management, together with the earlier election of new members. The goal was improving management, ensuring proportionality of disciplines, and increasing personal contact with universities and other organizations. There was further intensification of liaison between work sites and management of both academies, thanks on the one hand to the good work of the liaison departments, on the other to meetings among individual site directors,

management, Party representatives, and Party basic organizations. In this sense, the cadre work in both academies was aimed at meeting current and especially future needs in cadre reserves and improving age structure. Much care was devoted in both academies to improving the quality of Marxist-Leninist education, including instruction in professional world outlook among leading scientific workers or those who aspire to such positions.

In training and education, methods have been perfected in many disciplines, e.g., chemistry, technical, and economic sciences. Special attention has been accorded to candidates for higher positions with the aim of raising their managerial adaptability to different disciplines. By tradition and experience, one can cite, among others, for example, the second running of a two-week candidates' course in molecular biology with the participation of lecturers from 8 CSAV and Ministries of Education and Health institutes, top scientists and coordinators, including even full members of the Academy. Compared with 1977, in 1978 this course was attended by twice as many candidates, i.e., 58, from eight biological and medical disciplines of the CSAV and SAV and Ministries, including Defense.

This time around, each course candidate was issued copies of the lectures, published with the help of the Czechoslovak Scientific and Technological Society. These texts currently represent a realistic base for our handbook on molecular biology.

As to all the other elements in the area of monitoring CSAV and SAV work with respect to the plan of basic research, level of information dissemination, foreign contacts, economic, technological and other functions, we can state with justification that 1978 marked an overall increase in activity directed at discovery of inner reserves, their more effective use, with the aim of meeting successfully the tasks of the Sixth Five-Year Plan and preparing ahead of time for the Seventh Five-Year Plan.

During 1978, important restructuring measures were implemented in both academies, aimed at the creation of conditions for purposeful concentration of capabilities for selected tasks of science, its selected sectors and directions, in accordance with the conclusions of Party documents directed at ensuring the development of our society. These changes in the CSAV applied especially to physical, goelogical and geotechnical sciences. In the SAV, they occurred mainly in biology and medicine. In the CSAV, the first stage of construction on the regional ecological center in Ceske Budejovice was completed ahead of schedule, thus making it possible to begin research activity allowing our science to come to the aid of the needs in the South Bohemian kraj. In the SAV, the first scientific and technological complex in the field of cybernetics was founded. The work concept in many disciplines in both academies was brought to higher precision. In natural, technical, biological, and medical sciences alone, 10 of these concepts were implemented in the CSAV. Precision of concepts was preceeded by increased precision of disciplines' concepts in the collegia of both academies.

Esteemed Comrades,

During 1978, both academies devoted more attention to ensuring the development and application of new, prognostically significant methodological and technological principles in appropriate sectors of technical, natural, and biological sciences. Further development was ensured in our raster electron-microscopic techniques for the purposes of electron lithography, in electronics, optoelectronics, broader application of computer technology in the biological sciences by the broadening of mathematical modeling to the level of molecular biological processes. We ensured the development of micromorphological analysis of the heteroduplexes of information molecules, as the modern approach to molecular charting of genes. Also ensured was the development of methodology for hybridizing techniques, both at the level of cellular hybridome construction and their specific clones, and at the level of molecular development of methodology through recombination of desoxyribo-nuclear acid molecules, both by establishing the appropriate base for enzymological and sequential analysis, and by establishing a base for appropriate vector and host cells, as a prerequisite for developing the technology of gene engineering. In 1978, representatives of both academies jointly prepared a proposal for our National Statute for work in the area of gene engineering. The proposal was then discussed by the appropriate CSAV and SAV collegia and readied for discussion with the health ministries of both our republics. In cooperation with Soviet science, we implemented a number of successful experiments using new, and to us often inaccessible, analytical approaches in the area of our natural, technical, and biological sciences. One example is the analysis of the anti-matter molecule, realized via the neutron spread method in the laboratories of the United Institute for Nuclear Research in Dubna near Moscow, which for the first time pointed to the relationship between the functional properties of anti-matter and the degree of its spatial gyration.

As to the state plan for basic research--and thanks to the good work and informed, quality methodology of the CSAV and SAV planning components, the preparation of the state plan for basic research for the Seventh Five-Year Plan with respect to direction and themes, was completed ahead of schedule. This made it possible to put forth 12 selected, priority, closely-targeted projects of basic research for mid-period needs of the development of our society, and confront these projects with the recently-prepared state long-term program and analysis of the so-called outer limits of our economy. This completed activity also permits both academies to begin setting up priorities in the long-term development of our science in the context of the intended development of our society on the one hand, and on the other, the integration process of our science with Soviet science and that of the other countries of the socialist community.

In the area of foreign contacts, late 1978 brought an impetus to better define their current concept. This was aided by the visit of a delegation consisting of representatives of the Central Committee's Science and

Education Department and both academies in Moscow and Novosibirsk, which resulted in higher definition of our bilateral cooperation with Soviet science. This cooperation represents an axis from which will generate all our future bilateral and mililateral scientific contacts within the socialist community, as well as needed contacts with science of the rest of the world, including developing countries, with the aim of more effective enhancement of state policy in scientific and foreign affairs by means of scientific contacts of both academies.

Finally, careful attention was also paid in 1978 to concrete working relationships between the academies and universities as a system of joint vessels which must in the future be ever more enmeshed and integrated because our common denominator is our work force and its specialized, scientific, moral, and political qualifications. In direct conjunction with these tasks, conditions were prepared for the broadening of the forms of joint academy and university work sites, whose only representative in the CSAV has since 1956 been the Joint Laboratory for the Chemistry and Technology of Silicates (which currently faces important new tasks).

The principles which in 1978 guided CSAV and SAV activity emanate from the following materials: Unified Program of Social Sciences After the 15th Party Congress, Action Program through 1980, and Status and Needs of Further Development in Natural and Technical Sciences in the CSAV and SAV. In addition, the SAV in 1978 prepared a number of other documents focusing on the needs of Slovak science, one of which can be cited as example, namely, the basic material on the development of biological and medical sciences in the SAV.

The survey of CSAV and SAV in 1978 can be concluded by stating that all work of both academies focused not only on meeting tasks, but simultaneously, on long-range, comceptually sound implementation of two principal future tasks of our science, which are:

1. In accordance with resolutions of the 15th Party Congress and all post-congress Central Committee documents, to effectively accelerate in selected areas the development of the national economy and our society as a whole.

2. In accordance with resolutions of the 25th CPSU Congress valid for the development of integration among the socialist countries, to effectively participate in the integration of our science, Soviet science, as well as that of the other countries of our camp.

Both these tasks motivated in 1978 all activities of both academies and became the linch pin for precision in concepts and, in close cooperation with appropriate Party and government organs, also the basis for the charting of long-range strategy for our science, as the prerequisite for the formulation and implementation of state policy in science, valid throughout the scientific and technological base of our federation.

Both these tasks were faced by workers and management of both academies with seriousness and responsibility, bearing in mind the not only still valid but even more applicable to contemporary conditions, basic thesis of state strategy in science forged by V.I. Lenin at the very birth of the soviet state, namely, "the only thing in a socialist state which must not be neglected even for a minute, is science," science which, according to Karl Marx, "only in a socialist society can apply in its entirety the individual and joint functions as a common transformation force of society," science which today in the era of scientific and technological revolution, pursued in a class-divided world, is an ever more potent instrument of the class struggle, a strategic, economic, and power instrument, as well as an important political factor on the international scene.

Esteemed Comrades,

The level of fulfillment of both principal tasks in the CSAV and SAV provides, based on work performed in 1978, a realistic hope for thoughtful preparation of well-founded quality pledges of both our academies for the approaching 16th Party Congress, which includes consistent care for the further development of our science, as well as our best efforts, since this is for us, workers in the academic field, forever binding, in order that individually and collectively we may meet our tasks totally, without compromise and at the highest quality level. Thank you for your attention.

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CZECHOSLOVAKIA

SECOND INTERNATIONAL SYMPOSIUM ON NUCLEAR REACTION OF EXCITED NEUTRONS

Prague VESTNIK CSAV in Slovak No 5, 1979 pp 288-290

[Article by Igor Ribansky]

[Text] The Second International Symposium on Neutron-Excited Reactions was held in the Scientific Workers' House of the Slovak Academy of Sciences in Smolenice from the 25th through the 29th of June 1979. The symposium was organized by the Institute of Physics at the Slovak Academy of Sciences in cooperation with the Nuclear Center at Charles University in Prague, the Department of Natural Sciences at the Comenius University in Bratislava (represented by the Chair of Nuclear Physics), and by the Union of Slovak Mathematicians and Physicists. The participants in the symposium were 38 foreign and 26 Czechoslovak experts. The purpose of the symposium was to exchange information on the current situation of theory and experiment in the field of nuclear reactions with average excitation energies. The emphasis was on the mechanism of the reaction, emission of compound particles, gamma emission, the effect of the structure of the nuclei on the course of the reaction, and related problems (density of states, carbon moment, structure of highly excited states), as well as experimental techniques in fast-neutron physics (intensive neutron generators and charged-particle detectors).

The symposium was opened by Dr M Blazek, ScD, director of the Institute of Physics at the Slovak Academy of Sciences and chairman of the organizing committee. In his address he welcomed the participants and stressed the role of even modest-scale research centers in the development of selected areas of nuclear problems. The symposium was divided into four sections according to the following topics: neutron reactions with the escape of charged particles; statistical pre-equilibrium models of nuclear reactions; gamma emission in neutron-excited reactions, and intensive sources of fast neutrons. Several keynote reports and pre-selected short contributions were presented in each section.

In the first section Prof Turkiewicz of Warsaw reviewed the results of experiments with (n,α) reactions at $\sim$14 MeV, and the theoretical trials with interpretation of such reactions. It appeared that the theory of direct processes--specifically, PWBA--applies surprisingly well in reactions on

light nuclei, and that the corresponding mechanism is of the pickup type. For nuclei heavier than A$>$100), the carbon distribution of the hard part of the spectra may also be satisfactorily explained by the theory of direct processes (knock-on), however, the fundamental part of the spectra clearly displays a pre-equilibrium character whose form may be expressed as a model of pre-formed particles, which again, however, represents the knock-on mechanism.

Prof Vonsch of Vienna dealt with the spectrometry of charged particles in neutron-excited reactions. An outstanding progress has been achieved in recent years in the development of telescopes used in proportional counters as flow detectors instead of the semiconductor detectors which have shorter life expectancy due to neutron-caused radiation damage. Most attention was focused on an original detector developed in Vienna, facilitating simultaneous measurements of the spectra and carbon distributions, and at the same time, reading of the background.

In another section, which had the highest attendance, the participants in the symposium heard five lectures presented by invitation.

Professor Cindro of Zagreb read a report on the results of analyses of n, 2n) reactions. He pointed out that in no case can the equilibrium theory describe the behavior of excitation functions, and that it is inevitable to include the pre-equilibrium emission.

Professor Gadioli of Milan, a vehement advocate of the exciton model, stressed the capacity of that model to provide quantitative description of reactions of the (nucleon, xn, yp) type, whose effective cross-sections differ as much as 10^5 times. He pointed out that this model provides excellent interpretation of nucleon emission following the capture by the nuclei. He offered further results of an experiment expanding the exciton model to the description of the carbon distribution in the products of the reaction. Pertinent calculations are based on the theory of the nuclear mass and in general, they agree very well with the experiment.

Professor Seeliger of Dresden discussed in detail the hitherto experiments with the expansion of the exciton model by caluclations of the distribution of the emitted particles. He outlined various shortcomings of current models and stressed that it is important to resolve the problem within the framework of non-equilibrium statistical physics. This method makes it possible to include the phenomena under study in the density of states, while the exciton model remains consistently statistical.

Engineer Ribansky of Bratislava dealt with the problem of the emission of compound particles in the exciton model. He reviewed the models in current use, pointing out their shortcomings. Using a modified exciton model which emphasizes the role of the surface of the nucleus in the mechanism of the reaction, he presented the results of an analysis of (n,α) spectra of reactions measured at$\sim$14 MeV, which indicated that the combination of the pre-formation model and of the coalescence model can well describe the experiment, and that the system of parameters of those models is quite simple.

Dr Ignatiuk of Obninsk read a report on methods of calculation of the spectra of emitted nucleons with the application of the central theory of direct reactions including multilevel processes. His objective was to prove how much space remains open for the contribution of the exciton model and of pre-equilibrium theories in general. The conclusion was that practically the whole spectrum may be described as a combination of the presented approach with a balanced model. Stormy debates with the proponents of the exciton model, however, narrowed the gap between individual positions; the work of the physicists in Obninsk may be regarded as a significant step toward formal substantiation of the existence of phenomenologic pre-equilibrium theories.

In another section, which, in terms of topics, was less homogenous, Dr Drake of Los Alamos reviewed the current situation in the conception of the process of radiation capture of fast neutrons on nuclei from Si up to Pb. He demonstrated that the direct-semidirect theory does not produce satisfactory results when describing the functions of excitation. He discussed feasible methods for modification of the effective charge factor by including specific properties of terminal states, and underlined the correlation between the intensity of the potential of symmetry and the depth of giant dipole resonance (GDR). But including the isospin effect and giant quadrupole resonance, it was possible to pinpoint the maximum GDR and to explain the interference drop or the excitation functions of the low-energy part of the GDR.

Dr Haoust of Bruyeres-le-Chatel dealt with the options in obtaining data on the deformation of the nuclei by scattering of fast neutrons. Such experiments facilitated further specifications of the parameters of the non-spherical optical potential and helped gain new information about the structure of vibrating and rotating nuclei.

The last section focused on intensive sources of fast neutrons. Dr Pivarc of Bratislava acquainted the participants with the characteristics of an intensive neutron generator now under construction in the Institute of Physics at the Slovak Academy of Sciences. Dr Hourst of Valduc described the very efficient neutron generator in Valduc, and enumerated the experiments conducted on that instrument as well as those planned for the future. According to the prevailing general opinion, intensive sources of fast neutrons will help to a considerable degree obtain new, unique information on the structure of the nuclei as well as resolve problems related to the construction of nuclear power installations, particularly thermonuclear ones.

In conclusion Professor Seeliger praised the high degree of expertise of lectures and contributions presented. In particular he stressed the wealth, informality and especially the critical approach demonstrated in discussions, for which there had never been enough time.

In general, the participants viewed the symposium as an undertaking able to measure up to the strictest criteria.

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CZECHOSLOVAKIA

TYPES OF PLASTICS, MANUFACTURERS LISTED

Prague STROJIRENSKA VYROBA in Czech No 9, 1979 pp 700-703

[Article by Engineer Emil Neuhausl, State Research Institute for Engineering Materials, Prague: "Plastics Manufactured in Czechoslovakia and Their Significance for Engineering Industry"]

[Text] The development of engineering production must count on an increasingly broader application of plastic materials which attained a permanent, unusually important place in the structure of the material base. The world production of polymers is now approaching the 50 million ton annual limit, which is three times the value of the world production of non-ferrous metals. Since the specific weight of plastics is substantially lower than the weight of metals, the scope of the production of plastics in its volume is in reality distincly higher.

Over the past 20 years the production of plastics in the world developed at such a rapid rate that it is without precedent in any other field. Originally regarded as "substitutes" for classic materials, plastics have become important construction materials indispensable for modern industry. At least 50 types of basic plastics that have been tested and approved in practice are now available in the world market to serve engineers and technologists. Plastics are produced in various modifications. It is interesting that polyolefins, styrene polymers and PVC represent more than two-thirds of the total volume.

The developing production and utilization of plastics in the CSSR proceeded analogically with the world development. The traditions of our plastics industry go back to the 1930's; the factory which is now Kablo national enterprise in Bratislava launched the first production of phenolic plastics in 1920. However, manufacture and processing of plastics in the CSSR did not develop more intensively until after World War II. Only the Fifth and Sixth Five-Year Plans, in other words, the post-1970 period, brought about a quantitative reversal in the manufacture of plastics.

Manufacture of the basic line of Czechoslovak polyolefins, styrene polymers and PVC was initiated in the newly built facilities of the Chemopetrol

- In reinforced plastics (composites) also the areas of medium and higher degrees of mechanical stress.

3. The area of electro-insulating applications (insulating parts and components, insulated conductors, dielectrics for low and high frequencies).

4. The area of anti-corrosion applications (chemical engineering, equipment for food industry, and a major part of engineering products which must be resistant to the environment).

5. Thermal insulation (plastics used particularly in the form of expanded materials, sandwiches) for temperatures up to 150° C.

6. Dimensionally precise products, such as finishing components and parts for engineering products.

7. Components, parts and products that require some surface treatment (painting, varnishing, metal coating, etc.) for the final finish of the product (for instance, engineering consumer goods, containers, casing, pallets, etc.).

8, Special areas of application, utilizing certain characteristics typical primarily for a selected type of the plastic material, for example:

- low friction coefficient and slight weat (PA, PTFE, POM, PET) for the area of operations with adhesives and paste-like materials, etc.

The importance of plastics in engineering industry stems from their following advantages:

- They make it possible to replace metals, particularly the non-ferrous ones, and other classic materials (leather, wood, etc.);

- They make possible substantial reductions of the bulk of parts and equipment, as well as savings of energy;

- They may be processed into goods by means of highly efficient technologies with possible complete automation of processing operations;

- Plastics suitable for new construction designs may be easily combined with other construction materials;

- They substantially simplify the maintenance (they do not require any surface treatment against corrosion and other environmental effects);

- Technological design of plastic goods makes it possible to achieve advantageous esthetic solutions; simplified assembly;

- They eliminate painting, varnishing or other surface treatment (they are manufactured in a large choice of colors).

municipal enterprise and the existing production in the Slovchemia and Unichem municipal enterprises was modernized and intensified. The implementation of this far-reaching program, based on the decisions of the 14th and 15th CPCZ Congresses, nearly doubled the volume of manufacture of plastics in the CSSR; in conversion to 1 citizen, it amounts at present to as much as 52 kg, which is more than, for instance, in Japan, Great Britain and France. The basic types of plastics manufactured at present in the CSSR are shown in Table 1.

From the review it appears that the basic line of plastics is available in our country readily and in adequate amounts. The following new materials were introduced in the market after 1975: linear polyethylene (LITEN), polypropylene (MOSTEN), PVC (NERALIT), and ABS (FORSAN).

Institutes for research and development are preparing the groundwork for an appropriate and profitable application of our polymers in national economy, particularly in engineering, and processing the data necessary for designers and technologists in the form of construction and technological guidelines, information on materials, norms, etc. Despite their considerable quantitative increase, however, special types designated for engineering enterprises and plants, are, and will continue to be even in the future, in short supply. Therefore, every measure is welcome that leads to some improvement in the situation of the selection of the so-called construction plastics. For that reason, it is gratifying that in the future the chemical industry may be expected to produce modified polymers, or as the case may be, newly developed types, particularly the following:

alkaline polyamide for injection and molding;
modified polyphenylene oxide;
polyethylene terephthalate, suitable primarily for injecting (the amorphous, crystalline type, and the fiberglass-filled type) but also for pressing;
polyolefins filled with mineral fillers;
thermoplasts filled with fiberglass;
epoxy molding materials with improved molding properties and longer pot life;
modified melamine materials designated for injecting, transfer molding and molding.

If we consider the entire scale of the currently used plastics and their properties, then the selection of engineering applications may be summarized according to the following lines:

1. Applications which require reduced bulk of components and equipment (for example, automobiles, rail cars, shops, airplanes, and other means of transportation), primarily with energy-conserving effects.

2. The area of mechanically stressed applications:

- In unreinforced plastics only for lower degrees of mechanical and thermal stress;

Table 1. Plastics Manufactured in the CSSR

Type of Plastic	Abbrev.	Trade Designation	Manufacturer	Forming Technologies	Line of Semi-finished Products (Manufacturer)
1	2	3	4	5	6
1. Polyethylene-branched (low density, high pressure)	rPE	BRALEN	Slovnaft Bratislava	Injection Extrusion Blowing	Panels, tubes, foils (Fatra, Napajedla; Plastika, Nitra)
2. Polyethylene-linear (high density, low pressure)	lPE	LITEN	Chemical Works of Czechoslovak - Soviet Friendship, Litvinov	Injection Extrusion Blowing	Panels, tubes, foils (Fatra, Napajedla; Plastika, Nitra)
3. Polypropylene	PP	MOSTEN TATREN	Chemical Works of Czechoslovak - Soviet Friendship, Litvinov	Injection Extrusion Infection Extrusion	Tubes, foils, tapes (Plastika, Nitra)
4. Polystyrene - standard Polysterene - tough	PS hPS	KRASTEN	Kaucuk, Kralupy	Injection Extrusion	Panels, rods, sections, foils (Plastika, Nitra; Plastimat, Liberec) foam (Plastika, Nitra)
5. Acrylonitrile butadiene-styrene terpolymer	ABS	FORSAN	Kaucuk	Injection	Panels (East Bohemia Chemical Factories Synthesia, designation UMASTYR ABS)

6. Polymethyl methacrylate and copolymers	PMMA	UMAPLEX	VCHZ Synthesia		Panels, blocks, rods
		PERLAPLEX	VCHZ Synthesia		Panels, blocks, rods
		AKRYLON	PCHZ Zilina		Panels, blocks, rods
		UMASTYR MS (copolymer MMA-S)	VCHZ Synthesia	Injection Extrusion	Panels (VCHZ Synthesia, PCHZ, Zilina)
		UMACRYL KI (copolymer MMA-S)	VCHZ Synthesia	Injection	
		(DENTAKRYL)	Spofa (Dental) Prague	Embedding Casting	
7. Polyvinyl chloride and copolymers	PVC	SLOVINYL (SLOVIPLAST)	W. Pieck Chemical Works, Novaky	Extrusion Sheeting Blowing Molding Injection	Softened: (NOVOPLAST, Fatra, Napajedla) Tubing, tubes, foils, panels, sealing profiles, hollow containers hard: (NOVODUR, FATRAKARD, Plastika, Nitra; Fatra, Napajedla) Panels, tubes, blocks, rods, wires Expanded: (TECHNOPOR, Technoplast, Chropyne) Panels, containers
		NERALIT	Spolana, Neratovice		
8. Polyamide 6	PA 6	SILAMID	Vah River Area Chemical Works, Zilina	Injection Extrusion	Vah River Area Chemical Works, Zilina: panels, blocks, rods, foils, tapes, tubes
		SPOLAMID	Spolana, Neratovice	Injection Extrusion	
		(ALKAMID)	ZAZ, Jaromer	Casting	ZAZ, Jaromer: blocks, rods, panels, cases

Type of Plastic	Abbrev.	Trade Designation	Manufacturer	Forming Technologies	Line of Semi-finished Products (Manufacturer)
1	2	3	4	5	6
9. Cellulose derivatives	CA	UMAFOL (CA, CAB) UMACEL (CN)	VCHZ Synthesia, Pardubice	Die casting	Film fillers foils, panels, foil wrap Special foils
10. Phenol formaldehyde materials		OSTRAVIT	MCHZ, Ostrava	Molding	KARTIT K-resistant paper
		(RESOL KS) (SURALIT) (UMAFORM)	VCHZ Synthesia	Transfer molding Injection Casting	(Gumon, Bratislava) panels, tubes, rods TEXTIT-reinforced cloth SKLOTEXTIT - rein-fiberglass cloth
		(UMACOL B)		Pasting Bonding Impregnation Lamination	(Gumon, Bratislava) panels, tubes, rods KOROSET A, KOROSET T (SLZ, Uhnusta-Likier) tubes, shaped pieces. Laminated wood, Slovak Timber Works, plant in Hodonin) POROFEN - phenol foam, panels, containers
11. Polyester resins		CHS-POLYES-TER	Association for Chem. and Metall. Production, Usti and Labem	Casting Laminating: Contact spraying Molding Winding	Laminates: Kovona, Karvina; Plastimat, Prague; Vertex, Litomysl; RND, Ejpovice
		PREMIX (molding material)	Association for Chem. and Metall. Production, Velvety	Casting Transfer molding	Prepregs: Skloplast, Trnava

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12. Epoxy resins		ChS-EPOXY	Association for Chem. and Metall. Production, Usti nad Labem	Casting Pasting Laminating	Prepregs: VUKI, Bratislava (for electrical engineering)
		EPODUR		Molding Transfer molding	VZLU, Prague-Letnany (for structural purposes)
		EROSIN	Chem. Works of the City of Plzen	Casting Bonding	
13. Melamine and ureaformaldehyde resins	MF	UMALUR	VCHZ Synthesia	Molding	UMAKART D
	UF	U (UF)		Transfer molding Injection Laminating	ECRONA - decoration material
	M (MF) MK (MF)				(VCHZ Synthesia) AKULIT - fiberwood panels, impregnated (Solo, Susice) UMACOL C, CM, CMR, ME - wood adhesive (VCHZ Synthesia)
14. Casein resins	CS	UMACAL	VCHZ Synthesia, Pardubice	Casting	Rods, tubes, tapes, quarterings
15. Silicon resins	SI	LUKOPREN	VCHZ Synthesia, Kolin	Casting Embedding Molding Bonding Laminating	Panels, profiled products, castings, laminates
16. Polyurethane elastomers	PUR	POLYTAN	ZAZ, Jaromer (from imported materials)	Die casting Casting	Panels, blocks Profiled products

From the viewpoint of engineering, however, plastics also have certain limitations, among which we should mention their relatively low mechanical strength, notch sensitivity, high thermal expansivity, and significant thermal correlation of properties in the range of temperatures in which they are generally used--from -50 up to +150° C).

Nevertheless, it may be said that plastics, which are becoming important material components, may play a vital role in the solution of the unsatisfactory situation in the material base, especially in the area of scarce metal materials which cannot be fully covered in the future.

Plastics manufactured in the CSSR are now in the forefront of interest; their application is in full agreement with the procedures in our plants and enterprises, because in many applications polymers imported thus far from the capitalist states may be replaced by polymers made in Czechoslovakia. Naturally, an adequate amount of detailed information on the properties and workability of those materials must be made available to designers and technologists.

For that reason our journal STROJIRENSKA VYROBA [Engineering Production] set as its goal gradually to provide information to our wide technological public in a series of related contributions concerning basic properties and applicability of the latest types of plastics manufactured in the CSSR.

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END