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Automotive and Tractor Industry  
Agricultural Machinery  
Chemical Industry and Related Equipment  
Construction, Construction Machinery, and Building Materials  
Electronics and Precision Equipment  
Metallurgy  
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Electric Power and Power Equipment  
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Fisheries  
Fuels and Related Equipment  
Minerals  
Timber  
Water

TRANSLATIONS ON USSR TRADE AND SERVICES

International Economic Relations  
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AUTOMOTIVE AND TRACTOR INDUSTRY

UDC 629.114.2 + 631.3:008:62

IMPROVING MACHINE SYSTEMS AND QUALITY OF TRACTORS

Moscow TRAKTORY I SEL'KHOZMASHINY in Russian No 5, 1978 pp 3-5

[Article by M. S. Sidel'nikov, member of the Collegium, chief of the Technical Administration of the Minsel'khovmash [Ministry of Tractor and Agricultural Machine Building], candidate of engineering sciences: "On Measures for Accelerating the Realization of 'The System of machines, Raising the Technical Standard and Quality of Tractors and Agricultural Machines, and Fuller Satisfaction of the National Economy in the Products of the Industry" ]

[Text] Since the March (1965) Plenum of the CC CPSU, which defined the general directions of the agrarian policy of our party, much work was done in the tractor and agricultural machine building industry on the reequipment of the agriculture of the country.

The production of tractors increased by 1.6 times (doubled in power), agricultural machines -- by 2.5 times and the output of spare parts increased by 60 percent. Some 26 models of tractors and 546 agricultural machines and devices were created and put in production. These include powerful T-150K, MTZ-80, DT-75M, T-70S and T-130 tractors; high productivity harvesting machines such as the "Niva," "Kolos" and "Sibiryak" grain harvesting combines, a six-row complex for harvesting machine and many others. Equipment for agriculture was essentially fully renovated -- a new generation of machines was created.

The expansion of types and volume of output of tractor and agricultural machines made it possible to raise the mechanization level of agricultural production. It reached 100 percent in such basic agricultural work as plowing, cultivation, preparation for planting, planting and harvesting of grain crops and planting cotton and sugar beets. The level of mechanization is 90 percent in planting vegetables; 80 to 86 percent in harvesting sugar beets with combines; 93 percent in digging potatoes (including 40 percent with combines); 49 percent in harvesting cotton etc.

At the October (1976) Plenum of the CC CPSU, the industry was criticized justly for the production of some outdated models and for poor development of the production of machines to go with type T-150K and K-700 tractors. The types of the machines produced are still insufficient to provide comprehensive mechanization of a number of agricultural processes, especially in raising vegetables, tending gardens for agriculture in mountainous regions and several others. The number of certain types of equipment is not being produced in sufficient quantities.

The 25th party congress posed before the tractor and agricultural machine building industry in the Tenth Five-Year Plan period, the five-year plan of efficiency and quality, great problems on the further reequipment of agriculture on the basis of new, more efficient equipment. The scientific basis of this reequipment is the "System of machines for comprehensive mechanization of agriculture." At the beginning of the five-year plan period, it included 852 types of tractors and agricultural machines and 132 devices assigned to the Minsel'khoz mash, of which 474 machines and devices were already in production.

In accordance with the plan for realizing "The system of machines," institutes, design organizations and enterprises of the industry must create not less than 272 new types, and organize the production of 248 more with greater power and productivity, and modernize over 300 machines already being manufactured.

The basic goal of realizing "The system of machines" is to provide for the comprehensive mechanization of cultivating the most important agricultural crops.

An efficient system for controlling engineering progress was created in the industry to solve the posed problems successfully. It is directed to insure the efficient realization of "The system of machines," which specifies:

the modernization of series produced machines, raising their productivity and other indicators of technical standards to meet modern requirements, and, in a number of cases, giving them new operational qualities that insure higher productivity of social labor and eliminating the necessity of creating new machines;

creation of modifications and various grouping of series produced machines, which do specialize work efficiently with a high level of standardization with the basic model;

creation and organization of mass production of standardized units and parts for general industrial purposes;

creation of new machines instead of outdated ones when all reserves of their modernization have been exhausted, as well as the creation of new

machines to cover "white spots" in the mechanization of agriculture. In this case, it is necessary to preserve the continuity of designs and utilize units and parts tested in operation;

creation of scientific and design reserves to develop new generation machines that could provide the following considerable step forward on the road to raising the technical indicators of the operation of the machines produced.

Many design organizations, institutes and plants of the industry plan their work on the realization of "The system of machines" and raise the technical standard in correspondence with the indicated principles, which produce positive results from the standpoint of raising the technical standard, as well as accelerating the realization of this goal and raising the coefficient of meeting equipment requirements.

We will consider several concrete examples of versions of efficient technical and economic ways of working on the realization of this goal and several shortcomings in their organization.

The Minsk tractor builders were given a concrete problem -- to produce a 75 to 80 horsepower agricultural tractor. In building a 50 to 60 horsepower tractor, the designers and the plant could follow the path of developing and organizing the production of an entirely new design without tying themselves to design or technological continuity. The Minsk workers selected for themselves a more complex path -- a path of modernization, which provided the possibility of giving agriculture a cheaper machine with new qualitative indicators. About 60 percent of the parts needed no changes. These parts were finished off in production and were widely checked in operation on machines of the old design and worked reliably on the new machine. The MTZ-80/82 tractor was created quickly and at relatively low cost for agricultural use. It has high operational indicators. It was awarded the government emblem of quality in its second year of manufacture. The use of many new parts of the MTZ-80 tractor on old design machines reduced the number of kinds of spare parts. These same principles will be used by the designers and the plant in raising the power of the machine to 100-110 horsepower, as well as when creating a qualitatively new 150 horsepower tractor.

The SKD-5 "Sibiryak" grain harvesting combine was created along the same principles of modernization, and high technical-economic indicators were obtained.

However, there are also negative examples. At the Altay Engine Plant, work is being done slowly on realizing measures for preparing A-01 and A-41 engines for certification for the government emblem of quality. The plant prefers to work on creating a new engine with different cylinder dimensions, entirely different from the one being produced.

At the same time, due to the efforts of a group of designers of the Chelyabinsk Tractor Plant, the power of the Altay engine was not only increased, but the engine had a very full operating time when tested with the ChTZ tractor. Work is being done successfully on increasing the power of this engine to 180-200 horsepower, which will have great economic effect in the area of production, as well as the area of utilizing Altay Engine Plant engines.

Designs of new "Niva" and "Kolos" combines have still not utilized potential possibilities for raising reliability, as well as operational productivity. Yet, as shown by results of tests, these combines with a proper attitude on the part of designers and technologists toward the problems of utilizing their potential possibilities could, in the very near future, be brought up to the level exceeding world standards and receive the government emblem of quality. By further improvement in the design and technology of their production, qualitatively new machines could be obtained that meet all requirements of the users, including the creation of modifications for doing special work.

The secret of the successes of the Minsk Tractor Plant, the Krasnoyarsk Combine Plant and a number of other plants is in that at these enterprises equipment is created to meet requirements of the "System for quality control" with the necessary technical-economic substantiations at all stages of the work, as specified in the regulations of the ministry on developing technical tasks and projects, machine testing and readiness for production. Ways for solving the problem of satisfying user requirements in equipment are analyzed thoroughly on the basis of technical-economic calculations. Where these conditions are not met, inefficient incomplete machines are released for production, as a result of which an unhealthy process of design and additional technological finishing continues for a long time in the course of production. This harms not only the collective of the plant, but also the national economy of the country.

Managers of the VPO [All-Union Production Association], GSKB [State special design office] and plants, and especially economic services of the industry, should evaluate more strictly the readiness of machine designs to be given for government testing, increase the importance of the economic evaluation after plant tests and special test stand tests, and eliminate cases where the GSKB treats the plant tests formally and does not organize part by part debugging of the design and making accelerated stand tests, in violation of the order established in the industry.

Speaking of efficient ways for realizing "The system of machines," the necessity of typicalizing and making the created equipment universal in every possible way must be especially stressed. The efficient way is to create a family of machines of one type on the basis of a basic model with highly standardized modifications. Thus, the creation of a highly

standardized family of planters on the basis of the SZ-3.6 planter made it possible to reduce the kinds of rigging by 3.5 times and accelerate considerably the process of organizing the production of these machines. Similar results were obtained in creating a family of universal-plowing tractors on the basis of the MTZ-50 and MTZ-80 tractors; tractor-mounted sprayers on the basis of the On-400 sprayer, etc.

Universalization and creation of combined agricultural machines must also be developed further as the most important direction of technical progress in the industry. Reserves of this direction are indicated by the example of the GSKB on a complex of machines for processing grain after harvesting, which reduces the types in "The system of machines for 1976-1980" from 13 to 8 by standardization.

It is necessary to concentrate especially on the problem of covering "white spots" in the comprehensive mechanization of agriculture. KB [Design office] and their economic services must expose first those which, when covered, will eliminate the most laborious nonmechanized operations. Otherwise, the necessary effect will not be achieved. For example, cultivating and harvesting 90 percent cotton is mechanized (when machines are available). The laboriousness of cultivating a quintal of this crop is 26 man-hours of which only about six man-hours involve mechanized operations. Therefore, GSKB on machines for raising cotton should direct their activity toward seeking and creating in the first priority machines for unmechanized operations.

The man-hours for mechanized and manual operations were determined for all machine complexes in the industry. Problems of mechanizing the latter must be included in the plans for the research work of institutes and the GSKB so that the problem of covering "white spots" will become manageable and the research work -- purposeful.

The fullest satisfaction of agricultural requirements must be solved not only by raising the machine output, but also by raising their technical standards, productivity, life and reliability of operation. Increasing the service life of a machine by a year is equivalent to increasing the machine pool by 12 percent or a six-month increase in the volume of production in the industry.

Therefore, engineering-technical services of the VPO, KB and plants are faced with an acute problem of raising further the reliability and service life of machines, and increasing their efficiency that would make it possible to raise wholesale prices. These services must present users with efficient indicators of the machines and coordinate the additions to the prices with them.

Problems of further research and the introduction of higher quality materials are very important. In recent years, scientific research and design organizations of the industry did a certain amount of work on

developing and expanding the use of new materials in the designs of tractors and agricultural machines to raise their technical standards, reduce consumption of materials and save scarce materials. However, the scales of scientific developments and the volumes and schedules of introducing new materials in production still do not meet the requirements for increasing the strength and life of the manufactured machines, and on this basis, reducing the need for spare parts and increasing the national economic effect. It is necessary to strengthen and expand considerably the work on finding new materials and more efficient shapes, on strengthening parts, and introducing economic replacements for scarce materials.

Efficient realization of "The system of machines" involves making a technical-economic evaluation of the optima of the adopted solutions at all basic stages of creating and organizing the production of new machines and the modernization of series produced machines.

At present, in connection with the changeover of the industry to the new system of planning and economic incentive, the requirements of the efficiency level of the new equipment are being changed considerably. While before we were satisfied with a positive economic effect of using the new machine in the area of operation, now this is insufficient. Under the new conditions, it is necessary to obtain the maximum national economic effect in the area of operation, as well as in the area of machine production.

The amount of the economic effect and the corresponding upper limit of the price, as well as the production cost of the new machine must justify incentive additions to the wholesale price obtained by the industry. Therefore, all of them must be determined at the very initial stages of machine development. At the stage of considering orders and the initial requirements for developing the machines, it is already necessary for the user to present estimated requirements and the highest price for the product as specified in GOST 15.001-73, and the possibility of creating a machine with the required parameters and efficiency to be made in the shortest possible time. However, in a number of cases, the GSKB accept for development agricultural equipment requirements with insufficiently substantiated important economic indicators with the result that much effort and money is spent on creating poor equipment.

At the stage of developing the technical task, it is specified that the developer must present the technical-economic substantiation of the efficiency of the product, including the calculation of the limiting and wholesale prices, the national economic effect in the area of operation and the area of production, as well as the optimum coefficient of the version. Regrettably, work on the economic evaluation and selection of the optimal version of the new or modernized machines being produced is not well-done in a number of cases. For example, calculations of the Altay Tractor Plant SKB are based on comparing only one version of the new production machines with the machine being replaced.

In a number of cases, design organizations permit a reduction in the wholesale price at the technical task stage, showing thereby a higher rated efficiency of the new machine. For example, the wholesale price of the PSK-6 carrot sorter was cut to half of the actual price which, in organizing series production of the machine, made it more difficult to establish a correct price that would insure profitability in producing and operating the new machine.

In connection with the establishment of incentive additions to the wholesale prices, which are the basic source of economic incentive funds of the enterprises, the problem of accelerated volume of production of the new machine to the full planned output becomes of great importance because then the enterprise receives the proper economic effect from the introduction of the new equipment. Here is a wide area of activity not only for designers, but also for KB economists, enterprises and economic services of the industry. Regrettably, it must be stated that a number of VPO, PO and plants in the industry are slow in organizing the output of new machines, especially machines, the wholesale prices of which, had increased. This situation due to the fact that manufacturers of the new equipment do not get ready for production on time and do not create the necessary capacities for producing the machines.

The most efficient way for developing capacities is reequipment by utilizing the following main directions of technical progress:

active introduction of advanced technology;

development of the active part of fixed capital as a basis for efficient utilization of capital investments;

raising the level of continuity of technological processes on the basis of organizing production on flow line principles, creating reserves and organizing their storage, as well as mechanizing intershop and inter-operation transport;

provide an efficient system of preparing for the production of products with a full supply of equipment, fixtures and tools at the start of series production.

The order of solving these problems in the industry is regulated by a number of norm documents, including "The system for controlling product quality," "The System for evaluating the technical standard of production," "The system for controlling the technical standard of equipment" etc. Each plant must develop a plan for the reequipment of production that provides the necessary development of capacities by intensifying production. As a result, not less than 30 percent of the total increase in capacity in the current five-year plan period must be obtained by improving production technology.

The new system of planning, financing and economic incentive introduced in the industry is directed to providing a most efficient realization of "The system of machines." It should be noted that under the new conditions, organizations such as, for example, the Minsk Tractor Plant GSKB, the GSBK for Antierosion Equipment, etc., having provided for the industry to receive price additions for quality and efficiency of the equipment, have the possibility of greater stimulation of the work of their staff workers. At the same time, in a number of design organizations, the volume of material incentives decreased due to the insufficiently productive work on creating progressive machines.

The problem is that design and technological organizations, on the basis of creative initiative and extensive technical and economic analysis, should present for government tests only machines with finished designs, which would make it possible to put in production high technical standard machines and accelerate the realization of "The system of machines." This would make it possible to create sufficient material incentive funds.

Efforts of the VPO, design organizations, technological and economic services, technical administrations of the ministry and the institutes of the industry must be directed toward fulfilling all progressive solutions to insure the five-year plan for realizing "The system of machines." Regrettably, a number of design organizations and VPO stretch out their schedules for manufacturing and testing models of new and modernized machines. A number of design organizations of VPO "Soyuzkombineprom" and "Soyuzpochvomash" are behind schedule. The realization of "The system of machines" is also retarded by untimely assimilation of equipment after it was recommended for government tests. Thus, for several years, the VPO "Soyuzpochvomash" has not assimilated the production of already created machines. The VPO "Soyuzmashkhlopkovodstva" delayed for three years the assimilation of the SST-3 planter for planting saxaul.

The problem is to accelerate the debugging and testing of models, prepare for production on time and create capacities for the production of the required quantity of new machines, insuring the fulfillment of the plan for realizing "The system of machines for 1976-1980."

The successful realization of "The system of machines" will insure the fulfillment of the directives of the 25th party congress and the Tenth Five-Year Plan on equipping the national economy with high quality powerful tractors and agricultural machines and strengthening the base for efficient operation of enterprises and associations in the industry under conditions of the new system of planning and economic stimulation.

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## CHEMICAL INDUSTRY AND RELATED EQUIPMENT

### LAGGING CONSTRUCTION ON CHEMICAL FERTILIZER FACILITIES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Aug 78 p 1

[Article by Yu. Tsygankov, instructor in the Division of Construction, CC CPSU: "On Fertilizer Projects"]

[Text] Reviews published earlier in this newspaper have reported on the exceptionally large and complicated tasks scheduled this year with respect to the construction of mineral fertilizer enterprises and raw materials to operate them. Some 17.4 million tons of mineral fertilizers, 6.4 million tons of ammonia, almost 4 million tons of sulfuric acid, and a number of other items--such is the planned increase in capacities in this most vital sector. Plans call for spending 2.7 billion rubles of capital investments and putting into operation fixed assets worth 3.4 billion rubles. Such volumes of increase in capacity are being scheduled for the first time in this country.

The July 1978 Plenum of the CC CPSU precisely mapped out the ways of further comprehensive development of agriculture for the sake of enhancing the well being of the Soviet people. One of the most important conditions for implementing the decisions of the plenum is to rapidly increase the production of mineral fertilizers.

"Considering the planned volumes of production of farm and livestock products," said Comrade L. I. Brezhnev at the Plenum, "deliveries of mineral fertilizers to agriculture in the next five-year plan are to be raised to 135 to 140 million tons, and feed additives to seven million tons."

In connection with this, more and more responsibility is assigned to participants in construction for on-time completion of all mineral fertilizer industry enterprises without exception.

How well is this vital program being implemented to promote the further enhancement of farm fertility?

It should be noted that measures being undertaken by ministries and departments and local party organs to step up the pace of construction of mineral fertilizer industry enterprises, as well as broadly expanded socialist

competition among construction workers, are yielding substantial results. In the first six months, the volume of completed work with respect to this round of projects rose by 25 percent compared with the same period last year; throughout the USSR Ministry of Construction of Heavy Industry Enterprises the rise was over 30 percent. Organizations of the Ministry of Construction and Ministry of Power and Electrification managed overall to overfulfill the semester target (by 102 and 110 percent, respectively). Close to them are the organizations of the USSR Ministry of Industrial Construction--96 percent, or in the case of priority projects--more than 100 percent. Despite the achieved increase in volumes of completion, organizations of the USSR Ministry of Construction of Heavy Industry Enterprises still lag seriously behind--overall, they completed the semester's target by only 83 percent, and on priority projects by 79 percent.

At present, mineral fertilizer projects are totaling up the results of integrated socialist competition, based on the "Workers' Baton" principle. Representatives of most of the competing collectives have visited one another, checked on progress in contract fulfillment, shared experience, and uncovered shortcomings in the organization of construction operations and labor. The results have been discussed at party-economic membership meetings and workers' assemblies. All of this has helped to raise the labor commitment in production collectives.

Initiators of competition for on-time and ahead-of-schedule completion of facilities are holding the banner of leadership high. The following collectives have successfully completed the semester program and are continuing to operate at a fast pace: Apatitstroy [Apatite Construction Trust] (V. Novikov, manager; V. Chekrygin, party committee secretary); trust No 3 (V. Voronov, manager; V. Potapenko, party committee secretary), which is building Soligorskiy Combine No 4; Kuybyshevgidrostroy [Kuybyshev Hydraulic Engineering Construction Administration] (N. Semizorov, chief, A. Kosentsov, party committee secretary), which is building a unique complex in Tol'yatti. Special mention must be made of the work of Sumkhimstroy [Sumy Chemical Construction Trust] (R. Sumbatov, manager, V. Pikin, party committee secretary). During the first half year they coped with a very intensive schedule in the construction of a sulfuric acid facility and a liquid fertilizer complex. In this they are being helped by the machine builders of Association imeni Frunze of the Ministry of Chemical and Petroleum Machine Building, who are installing some of the technological equipment at the site and have pledged to bring it up to operating conditions. An excellent example of business cooperation!

Rather good prerequisites for on-time and ahead-of-schedule completion have been laid down by the builders and installers at the Samarkand and Chardzhou superphosphate plants, also priority projects in Novgorod, Odessa, Cherkassy, Almalyk, and Ventspils.

However, one third of the mineral fertilizer production projects have entered the second half year lagging seriously behind confirmed schedules. Thus, not a single one of the six ammonia facilities scheduled to go into operation

in the first half has yet produced any output; four of them (in Kemerovo, Cherepovets, Gorlovka, and Dneprodzerzhinsk) are being built by subunits of the USSR Ministry of Construction of Heavy Industry Enterprises. The main cause of the delayed completion of these facilities has been the failure of the Ministry of Chemical and Petroleum Machine Building and the Ministry of Foreign Trade to handle equipment component supply problems on time, failure to organize the transporting of such equipment properly, and the lack of adequate coordination in the execution of construction, installation, and startup and adjustment work. It is now especially vital to make up for lost time as quickly as possible, because the second half will be substantially more intensive than the first.

Especially alarming is the state of affairs on projects being built by the USSR Ministry of Construction of Heavy Industry Enterprises, where the situation is critical with respect to facilities for the production of 1.7 million tons of ammophos at the Cherepovets Chemical Plant, 990,000 tons of carbamide in the Gorlovka Stirol Production Association, and 760,000 tons of ammonium nitrate in the Kemerovo Azot Production Association. These projects do not yet have the necessary number of workers, and the front for stepping up the pace of installation work has not been fully prepared. The situation is acute on projects in Dzhabul'skaya Oblast. Thus, only 10 percent of the annual works volume has been completed on the sulfuric acid facility; in the case of the second phase of the yellow phosphorous facility--only 7 percent; development of the raw phosphorous base of the Karatau Production Association is lagging seriously behind. Recently, additional steps have been undertaken in Vologod'skaya, Kemerov'skaya, and Donetskaya Oblasts to get these projects moving, but the Dzhabul'skaya Oblast builders and installation workers are counting on urgent aid from other oblasts in Kazakhstan, which is, incidentally, extremely slow in coming.

Things are also not going well on some priority projects being built by organizations of the USSR Ministry of Industrial Construction (a carbamide facility in Grodno and an ammonia facility in Berezniki); also the USSR Ministry of Construction and the USSR Ministry of Power and Electrification and Glavmosoblstroy [Main Administration for Construction in Moscow Oblast] (an ammonia facility in Dorogobuzh and Kokhtla-Yarva, a sulfuric acid facility in Balakovo, and a double superphosphate facility in Voskresensk).

On a number of mineral fertilizer projects, a substantial lag has developed because of delayed deliveries of equipment. To this day, for example, the Khabarovsk Plant of the Ministry of Power Machine Building has not delivered GTT-12 units for the production of mild nitric acid, without which it is impossible to complete facilities for the production of ammonium nitrate, to builders of the Pridonskiy Chemical Plant in Voronezh'skaya Oblast and the Kemerovo Azot Association. Moreover, until recently, work had not been completed on the component installation of the same unit for a priority complex carried over from last year at the Dorogobuzh nitrogen fertilizer plant. Also lagging seriously behind is the equipment component installation and materials supply for ammonia complexes at the Berezniki nitrogen fertilizer

plant (eight units of basic technological equipment and 50 units for the chemical water treatment plant have not been delivered), facility No 3 at the Tol'yatti nitrogen plant (60 percent of the pipeline components are lacking) and facility No 2 in the Golovka Stirol Production Association, the carbamide facility in Grodno (2 GM-50 boilers have not been charged, 80 equipment units are lacking), the sulfuric acid facility in Kingiseppe, and a number of other priority projects.

It is also worth noting that the Ministry of Chemical Industry has not adequately trained operations personnel for facilities to be put into operation. According to present regulations, mineral fertilizer enterprises are to transfer half of the operations personnel staff one-half year before facilities are to be completed to take part in construction and installation work. In fact, however, this vital reserve for expanding labor resources is not being properly put to work on lagging projects.

While stepping the intensity on startup facilities, it would be wrong to ignore project starts. After all, in less than one-half year they will decide the fate of the even more difficult startup program of construction of mineral fertilizer enterprises of 1979 with a total capacity of about 21 million tons. Proper concern is being shown for future works completion, for example, by the collective of Novomoskovskkhimstroy [Novomoskovsk Chemical Construction Trust] (manager A. Muzhichkov, party committee secretary M. Volkov). The degree of readiness of the large-tonnage ammonia installation being built by this trust, which is to be put into operation during the first half of next year, is rather high. At the nearby sulfuric acid site in Yefremov, however, the situation is different. Yefremovkhimstroy [Yefremov Chemical Construction Trust] (manager F. Kovalev, party committee secretary Ye. Rybin) is obviously in no hurry to complete the start program. The same thing is observed in the sulfuric acid facility work of Gomel' Trust No 10, Cherepovetsmetallurgkhimstroy [Cherepovets Metallurgy and Chemical Construction Trust] and Meleuzkhimstroy [Meleuz Chemical Construction Trust] (Bashkir ASSR), the nitroammophoska complex work of Krasnodarkhimstroy [Krasnodar Chemical Construction Trust], and the nitrogen facility group work of Rustavi Trust No 1.

The July Plenum of the CC CPSU also set forth the task of accelerating the development of production of chemical means of plant protection. This year, 10 facilities are to be put into production at 15 projects being built in this sector. In July, as was planned, two of them were completed in the Volgograd Kaustik production association. But the level of completion of construction plans on most of the other projects does not exceed 70 to 80 percent. The work is not going well yet at the Ufa Chemical Plant, in the Kalush Khlorvinil Production Association, the Fergana Nitrogen Fertilizer Plant, the Volga Organic Synthesis Plant, and the Navoi Electrochemical Plant. Characteristically, construction volumes on these enterprises are relatively low, and they could be expanded rapidly.

The success of the matter on all projects, without exception, is determined primarily by active efforts locally, by raising the responsibility of those doing the work. Contracting ministries, client ministries, and USSR Gosstab Soyuzglavkhimkomplektr [Main Administration for the Supplying of Equipment, Instruments, Cables, and Other Components to Enterprises of the Chemical, Pulp and Paper, and Chemical-Pharmaceuticals Industry Under Construction and Undergoing Remodeling] must prepare all the necessary conditions to assure full implementation of the current year's startup program and the necessary construction readiness on next year's projects.

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CSO: 1821

## CHEMICAL INDUSTRY AND RELATED EQUIPMENT

### CONSTRUCTION PROBLEMS IN DONBASS PETROCHEMICAL PROJECTS

Moscow EKONOMICHESKAYA GAZETA in Russian No 32, Aug 78 p 2

[Article: "Donbass Petrochemistry"]

[Excerpts] The Basic Directions of Development of the USSR National Economy for 1976-1980, adopted by the 25th CPSU Congress, calls for increasing the output of synthetic resins and plastics by 1.9 to 2.1 times. This increase is supposed to come basically from expanding the production of polyethylene, polyvinylchloride, and polystyrene--new and effective types of polymer materials, primarily destined for structural purposes. Products made from them are coming into increasing use in the machine building sectors, replacing many parts made of metal, and they are also used in the production of consumer goods.

By 1980, our country plans to boost the output of polyethylene to 1.2 million tons versus 420,000 tons in 1975. About 27 percent of the increase will be provided by putting into operation a complex for the production of high-pressure polyethylene in the Severodonetsk Azot Association. Its projected capacity is 240,000 tons. Also to be started up at the same time is a facility for the production of the raw material--ethylene--at the Lisichansk petroleum refinery, with a capacity of 300,000 tons per year. Both enterprises are located in Voroshilovgradskaya Oblast. They are linked by an ethylene pipeline. The first output is supposed to be produced this year.

#### Capacity, Economy

The facilities to produce ethylene in Lisichansk and polyethylene in Severodonetsk are unique installations in terms of capacity and technical outfitting. Their economic effectiveness is high. Thus, the cost of the ethylene complex is 1.5 to 2 times cheaper than the construction of a facility of the same capacity on the basis of installations built earlier. The recovery period of capital investments in the construction of the polyethylene facility is just 2.5 years.

The ethylene complex was designed by VNIIPKneftexhim [All-Union Scientific-Research Institute for the Planning and Design of Petrochemical Enterprises]

in Kiev, and the polyethylene complex was designed by the Severodonetsk branch of GIAP [State Scientific Research and Planning Institute of the Nitrogen Industry and Organic Synthesis Products].

The design applications in both complexes reflect the latest achievements of science and technology. More than 400 industrial enterprises in our country and four foreign firms are taking part in the delivery of equipment, special materials, pipes, and metal structures for these projects. The main suppliers include: the Sumy Production Association imeni Frunze, Dzerzhinskkhimmash [Dzerzhinsk Chemical Machine Building], Chirchik Chemical Machine Building, Bugul'ma Mechanical, Chernovtsy and Salavat Machine Building, Volgograd imeni Petrov, Angara Repair-Mechanical, Ryazan' Teplopribor, and other plants. Most of the suppliers are successfully filling orders for the new projects.

Both sites where the projects are going up are located on the grounds of the existing enterprises. The construction-installation work is proceeding under crowded conditions. This requires especially accurate organization of the whole construction process, strict compliance with planned timetables and production and labor discipline.

#### Advanced Construction Methods

Both of these priority projects have used the unit method of preparation, organization, and administration of construction. It is based on weekly-daily planning and daily control over target completion. The use of computers has made it possible to determine more accurately element-by-element requirements for structural components, products, and semi-finished goods. This in turn has created favorable conditions for production-line completion of operations within the confines of each unit. This kind of organization of production and labor, concentration of material and labor resources, and the introduction of advanced experience are helping to achieve substantial success during the course of construction-installation work.

As for the ethylene complex in Lisichansk, the production line-combined installation of pyrolysis furnaces has yielded substantial effect. For the first time in Soviet practice, moreover, use has been made of a conveyor line to install technological metal components. Flare units have been installed in large blocks by means of self-propelled cranes and hydraulic hoists.

The installation of equipment in prelined blocks and pipelines in enlarged segments has made it possible to reduce labor outlays by almost 14,000 man-days and to save 150,000 rubles.

The construction of the polyethylene complex in the Severodonetsk Azot Association has also made extensive use of advanced methods of works production. Gantry utility lines are assembled and installed on stands

in large component blocks, with conduits built in, and aluminum tanks and technological metal components are assembled on a production line.

Party, trade union, and Komsomol organizations have exerted considerable efforts to spread the experience of the leaders among labor collectives.

### Lessons of the Project

Despite some success achieved on individual segments of both projects, on the whole the state of affairs needs improvement.

The main reason is that Voroshilovgradkhimstroy [Voroshilovgrad Chemical Construction Combine] has not taken adequate steps on time to eliminate lags on vital projects. Last year, as a result, a disproportion was allowed to develop in the works completion timetables on priority complexes. The readiness of the polyethylene facility turned out to be higher, but both facilities were supposed to be put into operation at the same time.

Officials of the general contractors, Lisichanskkhimneftestroy [Lisichansk Chemical and Petroleum Construction Trust] and Severodonetskkhimstroy [Severodonetsk Chemical Construction Trust], have not managed to coordinate the activities of the numerous subcontracting specialized organizations. Planning for the work of administrations, sections, and crews, has not been accurately done.

Problems of supplying the projects with planning-estimate documentation and complete sets of equipment have not been resolved efficiently enough by the clients--the Lisichansk Petroleum Refinery and the Severodonetsk Azot Association.

Project designers of VNIIPKneftekhim are responsible for some serious shortcomings. There have been substantial delays in getting documentation for the gas pipeline, the nitrogen compression, and the flare installation to the builders. Last year it was necessary to revise project documentation while construction was underway, also to do a lot of additional work.

The projects in Lisichansk and Severodonetsk are carryover-projects; they were supposed to go into operation last year. But the first phase of the polyethylene complex was turned over for startup and adjustment work rather late, in October. On the ethylene complex, this work began in December.

The lack of coordination has had a negative effect not only on the timetables but also the cost of the construction. For example, the increase in the cost of the ethylene complex, compared to the initial cost, now stands at nine million rubles. In the past half year, Lisichanskkhimneftestroy has completed three annual construction-installation works plans on the project, but the facility has not yet been completed.

At present, adjustment work is in full swing on the ethylene complex. The approved schedule with regard to types of operations is being implemented by and large. Final insulation work is underway. Ethylene production is scheduled to start in August 1978.

It is the task of all participants in the full completion of the facilities of the ethylene complex to undertake vigorous measures to see to it that the new deadline becomes more than just a paper timetable as has occurred in the past. This is all the more important considering the fact that the first technological line for the production of polyethylene in the Severodonetsk Azot Association is ready to receive the raw material--ethylene. All of the installed equipment has been tested, and the pipeline to transport the ethylene is ready.

Many enterprises in the country are waiting for the finished product--polyethylene. Yet to complete the process for producing it will require about two months after the ethylene begins to arrive.

This year in Severodonetsk schedules call for starting up not only the first technological line but also the second phase of the polyethylene complex. Severodonetskkhimstroy and, especially, the subcontracting organizations of the Ukrainian SSR Ministry of Installation and Special Construction Work, are moving too slowly in the installation of equipment. The semester plan has not been fulfilled there. A serious lag on the second phase of the polyethylene facility was noted at the beginning of the year. Nevertheless, no timely steps were taken to provide the priority projects with builders and qualified installers of a number of trade specialties.

Officials of Voroshilovgradkhimstroy and its Lisichansk and Severodonetsk trusts deserve serious criticism for failure to meet completion timetables on vital petrochemical projects in the Donbass. Also guilty of shortcomings are VNIIPKneftekhim and GIAP, which have failed to provide high-quality project-estimate documentation.

The USSR Ministry of Construction of Heavy Industry Enterprises, the USSR Ministry of Petroleum Refining and Petrochemical Industry, and the Ministry of Chemical Industry must thoroughly investigate works progress both in Lisichansk and in Severodonetsk; they must create all of the necessary conditions to speed up the completion of these facilities. It is vital to institute routine strict control over schedule implementation and to strengthen planning discipline on each section.

As is well known, a recent CC CPSU conference of union republic party central committee, kray and oblast party committee secretaries, and ministry and department officials discussed the course of implementation of the decree of the CC CPSU and the USSR Council of Ministers dated 26 January of this year "Ensuring the Completion in 1978 of the Most Important National Priority Industrial, Agricultural, and Social Projects." In particular, the conference focused attention on the necessity of speeding up the construction of

enterprises on a compensation basis, also other important production facilities, and stepping up the pace of construction work on projects in the second half year. The remarks made at the conference are fully applicable to the projects in Lisichansk and Severodonetsk. The final prestartup work is in full swing there now. Very soon the Donbass, which is known for its coal and metal, will become a major supplier of valuable petrochemical products.

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CSO: 1821

## CHEMICAL INDUSTRY AND RELATED EQUIPMENT

### CONSTRUCTION DELAYS IN UKRAINIAN CHEMICAL FERTILIZER FACILITIES

Kiev PRAVDA UKRAINY in Russian 15 Jul 78 p 3

[Article: "Lessons Warn Us. Review of Chemical Projects"]

[Text] "Deliveries of mineral fertilizers to agriculture in the next five-year plan are to be raised to 135 to 140 million tons." This is stipulated in the decree of the July Plenum of the CC CPSU "Further Development of USSR Agriculture." This task is being handled by the builders and chemical workers today. This year, facilities capable of producing 3.329 million tons of fertilizer are to go into operation in the Ukraine.

How well did the builders work on the chemical enterprises in June--the final month of the first half year? Organizations of the Ukrainian Ministry of Industrial Construction completed 113 percent of the plan in June and 107 percent of the plan for the half year; organizations of the Ukrainian Ministry of Construction of Heavy Industry Enterprises completed only 96 and 95 percent, respectively. Here is a table showing the completion of the monthly and semester targets on the main priority complexes:

Name of Association	Priority Complexes	Planned Completion Timetable	Planned Completion (percent)	
			June	Semester
Rovno Azot	Complex liquid fertilizers	Fourth Quarter	120	112
Sunny Khimprom	Nitroammophoska	Fourth Quarter	74	110
	Complex liquid fertilizers	Fourth Quarter	107	104
Cherkassy Azot	Sulfuric acid shop	Fourth Quarter	121	104
	Complex liquid fertilizers	Fourth Quarter	109	110
Gorlovka Stirol	Ammonia, first phase	Second Quarter	380	94
	Ammonia, second phase	Fourth Quarter	70	85
Dneprodzerzhinsk Azot	Carbamide	Fourth Quarter	78	104
	Ammonia	Second Quarter	115	89

The table shows that subunits of the Ukrainian Ministry of Construction of Heavy Industry Enterprises are doing the worst work. Construction-installation work plans for the semester were not completed on the first phase of the ammonia production complex in the Gorlovka Stirol Association, also on the same kind of complex in the Dneprozerzhinsk Azot Association. According to the state plan, these facilities were supposed to go into operation in June and start producing in the second half. But to this day a large volume of construction-installation and startup and adjustment work has not completed.

Blame for the delay must go primarily to the general contractors-- Donetskyzhstroy [Donetsk Heavy Industry Construction Combine] (I. Voytov, chief) and Dneprometalleurgstroy [Dnepr Metallurgy Construction Combine] (V. Reshetilov, chief). But they are not alone. The clients also lagged severely behind in supplying sets of equipment--the Stirol Association (P. Apatkin, director) and Azot Association (Yu. Fenin, director). And when the equipment did begin to arrive, the installation and specialized organizations of the Ukrainian Ministry of Installation and Special Construction Work were not able to mobilize their resources quickly enough. In June, what is known as a crash program was instituted on the first phase of the ammonia complex in Gorlovka, but it did not succeed in making up for lost time.

The situation remains grave in Dneprozerzhinsk. This newspaper reported that as of 1 June the amount of work not completed by organizations of the Ukrainian Ministry of Installation and Special Construction Work on the ammonia complex exceeded three million rubles. Dneprometallurgmontazh [Dnepr Metallurgy Installation Trust] (V. Sidorenko, manager), Zaporozhmetallurgmontazh [Zaporozh'ye Metallurgy Installation Trust] (V. Vizkun, manager), and other specialized organizations last month brought in 500 more workers than the plan called for. Alas, they did not accomplish much. As of 1 July, about 1.8 million rubles remained unspent.

The lessons of Gorlovka and Dneprozerzhinsk warn us that it is easy to get off stride and difficult to get back in the groove. Even though a fast pace has been achieved in the construction of most of the basic priority mineral fertilizer complexes, we must not be complacent. All it takes is for one colleague enterprise not to fulfill its obligations and immediately the whole schedule is thrown off and the technological sequence of the project is disrupted.

And there are plenty of symptoms of failure to meet schedules by individual organizations. On mineral fertilizer projects being built by the Ukrainian Ministry of Industrial Construction, for example, plan overfulfillment is being achieved at the expense of general construction work, while the organizations of the Ukrainian Ministry of Installation and Special Construction Work are not completing targets at all. In June they completed only 94 percent of the plan.

Not all of the projects are supplied with the necessary components and materials. Builders in the Rovnopromstroy [Rovno Industrial Construction Combine] are justified in complaining about the lack of 670 tons of metal structural elements. This causing delay in the installation of shelving in the complex liquid fertilizer facility in Azot Association. If Ukrstal'konstruktsiya [Ukrainian Steel Construction] (V. Brezhnev, chief) does not deliver all of the components in July the project will inevitably wind up in a difficult situation.

A slump took place in June in the remodeling of the nitroammophoska facility in the same association--almost two times less was completed than in May. The reason? This newspaper found that the Azot Association (I. Popov, director) did not deliver the technological equipment for the complex. Moreover, the builders did not have working blueprints.

In the Cherkassy Azot Association, Krivorozhstal'konstruktsiya [Krivoy Rog Steel Construction Trust] (V. Golubenko, manager) is intolerably behind in the installation and delivery for chemical protection of tanks for the warehouse for complex liquid fertilizers. And the association itself (V. Sorokin, director) has not provided the project with chemical protection materials. The Sumy Khimprom Association (A. Kravchenko, director) has to this day not delivered to the sulfuric acid complex two heat exchangers, 70 tons of 10 mm rolled sheet stock for shaped sections of the gas conduits of the contact-compressor compartment, and 14 tons of fluoroplastic pipes for the rinsing department and inter-shop utility lines.

An air separation shop has been put into operation in the ammonia facility at the Idessa port plant; this has made it possible to nitrogen-purge the pipelines of the transloading complex on time, which was accepted for operation on 30 June. But construction on the other facilities is lagging behind schedule. Chernomorsantekhmontazh [Black Sea Sanitary Engineering Installation Trust] (V. Ptashkov, manager) is not keeping up with the welding work.

The builders and chemical workers have been enthusiastic in their reception of the decisions of the July Plenum of the CC CPSU. They are aware of their responsibility for putting mineral fertilizer facilities into operation on time--vital stimulators of high crop yields. There is no doubt that they will work even more intensively and will complete all priority complexes within timetables stipulated by plans and socialist obligations.

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CSO: 1821

## METALWORKING EQUIPMENT

UDC 658.561:621:006.065

### STANDARDIZATION CENTER FOR THE MACHINE BUILDING INDUSTRY

Moscow STANDARTY I KACHESTVO in Russian No 5, 1978 pp 6-8

[Article by V. A. Greshnikov, candidate of technical sciences, director of the VNIINMASH Institute, Izdatel'stvo Standartov]

[Text] The leading role in the future growth of the economy of the country and the creation of a material base for technical reequipment of all branches of the national economy belongs to machine building and instrument making.

The "Basic Areas for Development of the National Economy of the USSR in 1976-1980" provides for further development of machine building as the base for technical progress in all branches of the national economy, accelerated technical reequipment of production, the broad introduction of advanced engineering and technology, significant improvement of quality of the produced machinery, equipment and instruments and also expansion of the intrabranh and interbranch specialization on the basis of standardization and unitization of products, components and parts, standardization of technological processes, and the introduction of standard adjustable equipment.

In recent years standardization has come to be considered an important means of control of the national economy. This function of it is implemented primarily in the form of the development and introduction of national, interbranch systems of standards aimed at solving large-scale national economic problems which can include the organization of the planning, design and production of new equipment, the delivery of products to the production facilities, the systems of design and process documentation, and so on.

A large volume of work is being done toward the creation of state normative-technical documents in the investigated field by the All-Union Scientific Research Institute for Standardization in Machine Building (VNIINMASH).

In the first phase of its activity (1958-1965) the institute developed interbranch standards for production means, the most important forms of production and technological processes and machine building. It coordinated the work of the branch committees and the departments of the machine building industry in the area of standardization and normalization.

The activity of the institute during this period was aimed at implementing the resolutions of the congresses of the CPSU and the resolutions of the USSR Council of Ministers as of 16 October 1959 with respect to improving the work in the field of standardization and the normalization of like parts, component parts, and the transition to the manufacture of products for mass application with respect to the state standards. Here it is possible to include the planning and coordination of operations with respect to standardization and the creation of scientific-theoretical principles of standardization and normalization in machine building; the planning, coordination of operations and the creation of scientific principles of interbranch standardization and unitization, the development of interbranch machine building standards for tools, attachments, dies, general components and machine parts; the investigation and approval of the machine building standards and recording of them; scientific and technical reviews of the branch normative-technical documentation.

In the Eighth Five-Year Plan (1966-1970) the institute solved qualitatively new problems with respect to the creation of the scientific-theoretical and procedural principles of standardization, unitization and aggregation, complex mechanization and automation in machine building and instrument making. During this period, the planning and coordination of work with respect to complex standardization and interbranch unitization and aggregation were carried out; scientific problems and quality criteria, service life and reliability of machines, assemblies, components and parts were developed, systems were created for insuring production quality at the industrial enterprises and standard methods of testing machine building and instrument making products were devised.

In the Ninth Five-Year Plan (1971-1975) the institute went from the development of individual standards to complex standardization and unitization based on the systems approach and the creation of such interbranch systems of standards as the following:

- A united system for the process preparation of production;
- The system for delivery of products to the production facility;
- The united system of design documentation;
- The united system of process documentation;
- The united classification and coding system;
- The system for standardization of machines and instruments;
- The system of labor safety standards.

The majority of problems solved by the institute are interbranch and dynamic. The dynamics of these problems consists in the fact that they require constant development and improvement. Such is the nature, for example, of

the problem of the YeSKD [united system of design documentation], the YeSTD [united process documentation system], and the YeSTPP [the united system for technological preparation of production].

The institute has performed a great deal of work with respect to implementing the resolutions of the Central Committee of the CPSU and the USSR Council of Ministers of 10 November 1970 "On Improving the Role of Standards in Improving the Quality of Production Output" and the resolution of the Central Committee of the CPSU on the course of implementation of this resolution adopted in November 1975.

It is necessary above all to discuss such important matters of national significance as the introduction of the YeSTPP.

In 1976, the VNIINMASH jointly with the ministries developed two theoretical documents defining the goals for the Tenth Five-Year Plan in a given field.

The "Complex Program for the Introduction of the YeSTPP" combining the branch plans of the industry into a common program of measures for the introduction of the YeSTPP into the national economy contains specific assignments for the ministries with respect to years of the Five-Year Plan to improve the application of standard technological processes and standard adjustable means of technological equipment and also measures for the fulfillment of assignments. These assignments are included for the first time in the State Plan for Development of the National Economy of the USSR in 1976-1980.

The "Complex Program of Operations with Respect to Development of the YeSTPP based on standardization and automation of the processes of design, technological planning and control of the production of the products of machine building and instrument making in 1976-1980" provides for the following:

Performance of work on the further development and improvement of the set of standards and procedural materials of the YeSTPP considering the experience of introducing them in the branches of machine building and instrument making;

The creation of a set of standards and guidance documents for the automated design system;

The development of the set of standards establishing the general technical requirements, types, basic parameters, reliability and quality indexes of the technical means for complex automation of production processes.

In the development of the complex introduction program, all of the branch ministries of machine building and instrument making have published directive documents in which the procedure and times for introduction of the YeSTPP and the pilot institutes are defined.

A number of ministries have large projects for the creation of branch systems for technological preparation of production (OSTPP) based on the YeSTPP standards.

In 1977, more than 1500 associations and enterprises introduced the YeSTPP standards, including 90 enterprises of Gor'kiy and the oblast.

For example, the introduction of the YeSTPP standards permitted the Gor'kiy Aviation Plant imeni S. Ordzhonikidze, the GAZ Production Association, the Gor'kiy Milling Machine Plant and other plants to improve the productivity of labor by 40 to 50%, to reduce the times required to assimilate new products by 1.5 to 2 times and to obtain a cost benefit in the amount of more than 15 million rubles.

In the expanded board of the USSR State Standard (January 1977), the experience of the advanced industrial enterprises of Gor'kiy and the oblast with respect to production of the YeSTPP was approved, and it was recommended that it be studied and extended in the branches of industry.

In accordance with the introduction program, the institute is engaged in procedural direction of the introduction of the YeSTPP at 29 Moscow enterprises, including the automobile plant imeni Likhachev, GPZ-1 plant, the automatic line plant imeni 50th Anniversary of the USSR, "Krasnyy Proletariy," "Dinamo," "Mossel'mash," "Kompessor," "Manometr," and so on.

Thus, as a result of the coordinated actions of the USSR Gosstandart [State Standards Committee] and the branches of industry, an important step has been made in the transition from the introduction of the YeSTPP in a comparatively small group of base enterprises to its introduction in all enterprises of machine building and instrument making in the Tenth Five-Year Plan.

This large-scale project has been promoted to a high degree by the YeSTPP introduction service which has at its disposal the YeSTPP-77 exhibition, the consultation-procedural center and a permanently active seminar. This service has established strong relations with the branches of industry. It is working under the procedural guidance of the Coordination Council for the Introduction of the YeSTPP under the VNIINMASH.

The institute is participating actively in the creation of the complex standardization programs.

At the present time the "Program for Complex Standardization of the Products of Instrument Making (YeSSP)," has been developed and approved which provides for the extension of the advanced principles of GSP standardization to the measurement and automation means used in all branches of the national economy.

The nomenclature of 15 complex standardization programs of the most important groups of instrument making production has been approved, and the creation of the basic YeSSP standards has been started.

Jointly with the branches of industry, the institute has established standardization levels with respect to 124 types and groups of the most important products of machine building and instrument making.

A program plan has been developed for the creation of the NTD complex for unitization in 1976-1980 and, accordingly, the basic documents have been prepared which establish a united organizational and procedural approach to performing the work in the given field.

Jointly with the labor protection division of the All-Union Central Trade Union Council (VTsSPS), a coordination plan has been prepared for the development of labor safety standards in 1976-1980 providing for the development of 1088 state standards for norms, requirements and monitoring methods with respect to types of dangerous and harmful production factors; the safety requirements on production equipment and production processes, the requirements of worker protection means and quality control methods.

The coordination plans have been developed for solving the problem of reliability and standardization of methods of calculation and strength testing of machine building products.

The achievements of the institute have become possible as a result of its close cooperation with the organizations and enterprises of the branches of industry, the institutes of the USSR Academy of Sciences and the higher institutions of learning.

Thus, more than 75 branch specialized scientific research institutes, the institutes of the academies of sciences of the USSR, the Belorussian SSR and the Ukrainian SSR, a number of training institutes and 106 base enterprises participated in the development of the YeSTPP, and 200 branch organizations participated in the creation of the YeSKD classifier and so on.

The automatic line plant imeni 50th Anniversary of the USSR, the Special Design Office for Automatic Lines and Special Machine Tools and the VNIINMASH have adopted a joint plan of measures for scientific and technical cooperation which provides for the development and delivery of products to the production facilities; the improvement of the technological preparation of production on the bases of the YeSTPP and also the methods and means of monitoring and testing, certification of products; the introduction of the complex production quality control system; a broad program of operations for standardization and unitization of products, improvement of the technological nature of the structural designs, automation of the solution of the problems of preparation of production. It is proposed that the cost benefit from the introduction of these measures will be about 1 million rubles per year.

The basic area of work of the USSR Gosstandart in the Tenth Five-Year Plan is improvement of the scientific and technical level of standards and technical specifications. Here the transition to the broad utilization of

the program-purpose method of developing complex programs for the most important scientific and technical, economic and social problems in planning is theoretically important.

The main goal of the institute in the Tenth Five-Year Plan is the introduction and further development of the YeSTPP on the basis of the approved complex programs. It is necessary to expand the introduction base, intensify the procedural aid to industry, more deeply study and generalize the accumulated experience, and make broader use of it for the introduction and development of the YeSTPP. Here it is necessary to consider the qualitative changes connected with the expanding application of the automation of the production preparation processes.

The experience of the advanced enterprises and branches of industry, just as foreign experience indicates that the most prospective area for improvement of production control and improvement of its efficiency is the complex automation of all of the operations with respect to technical preparation of production. On this level it is necessary to activate the work of the institute and the branches of industry with respect to the creation and introduction of the system for automation of design operations (SAPR).

It is also necessary to consider that in the Tenth Five-Year Plan the YeSTPP will emerge on the international level in connection with its introduction in the CEMA member countries.

The improvement of the strength and reliability of products, a reduction in the test cycle, development of model tests on physical and mathematical models must become a new prospective area in this five-year plan. It is necessary to combine the work with respect to strength on the scale of the country and expand the contacts with the GosNIIImash Institute imeni Academician A. A. Blagonravov.

The standardization of methods of calculating strength and testing products will promote a significant reduction of the metal consumption of the production, the saving of metal resources with simultaneous increase in reliability and service life of the machines.

The initiative of the advanced collectives of the enterprises, the scientific and design organizations of Moscow which have decided to work under the motto of "Quality Guarantee from Design to End Product" has important significance for the national economy of the country. This initiative was approved by the Moscow City Committee of the CPSU and the USSR Gosstandart.

In the development of this initiative the USSR Gosstandart has worked out a broad program of operations providing, in particular, for the creation of several groups of support enterprises and design organizations in Moscow. Each group is made up of collectives bound together by unity of purpose: developers of technical documentation, manufacturers and basic users of products and also suppliers of materials.

Practice quite clearly indicates that the introduction of the interbranch systems of standards, the implementation of the programs of complex standardization and unitization, the work of standardization within the framework of the CEMA, the ISO, the International Electrotechnical Commission and other international organizations are insuring a significant improvement in production efficiency and quality. The further development of this work is a necessary condition of the successful solution of the problems of the Tenth Five-Year Plan.

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BASIC PROBLEMS OF STANDARDIZATION IN MACHINE BUILDING

Moscow STANDARTY I KACHESTVO in Russian No 5, 1978 pp 9-11

[Article by N. N. Gerasimov, L. V. Potemkin, Yu. D. Amirov, P. V. Mudretsov, Yu. I. Stepanov, Sh. L. Zlotnik, VNIINMASH Institute, Izdatel'stvo Standartov]

[Text] The prospects for the development of machine building are connected with a number of urgent problems of standardization, in the solution of which it is necessary to begin with the following basic prerequisites:

It is impossible to expand the scales of operations with respect to standardization in machine building, not determining and scientifically not substantiating the total number and nomenclature of the systems and the sets of scientific and technical documents entering into them corresponding to all phases and stages of design, production, operation, maintenance and repair of machines;

The basic tool of standardization and machine building as in other branches of the national economy, must become the complex leading standardization encompassing not only the materials, the kit parts and assemblies but also all methods and means of planning, design, production, operation and maintenance. The most important procedural principle of standardization must remain unitization;

The times of development of the normative technical documents for the methods and means of planning and design, production, and operation and maintenance of the products must be reduced and oriented toward the application of automation means;

The correspondence of the standards and the scientific and technical documents to the modern level of development of engineering is possible only under the condition of comprehensive use in them of the achievements of basic and applied science;

The growing social significance of standardization requires the introduction of sections on labor safety and ecology into the standards for the machine building products.

Let us consider some of these problems in more detail.

Establishment of the Optimal Structure of Interrelated Systems and Complexes of Scientific and Technical Documentation for All Phases of Development, Production, Operation and Maintenance of Products

This structure must include both the existing and the developed systems (YeSKD [the united system of design documentation], the YeSTPP [the united system for technological preparation of production], the YeSPPP [the system for delivery of products to the production facilities], the YeSZK [united system], and so on) and the new systems and the programs for complex standardization with respect to the most important types of machine building products.

The analysis of experience in the development of the approved programs for all-around standardization indicates that it is necessary above all to determine the nomenclature of the required programs considering the products of interbranch application or manufacture. Here, above all, the complex standardization of the most important types of machines and equipment and also the products the manufacture and operation of which are connected with the greatest consumption of materials and fuels must be insured.

The development of programs based on target program planning requires coordination among them with respect to composition of operations times of execution and executive agents. It is also necessary to tie them to the prospects for the development of the corresponding branches of industry.

It is necessary to give a great deal of attention to improvement of the methodology of programmed planning of standardization. In particular, when performing the work, it is necessary to make broader use of modern mathematical methods and means of computer engineering. This is connected with the fact that the process of creating the programs is accompanied by the gathering and processing of enormous files of data. The procedures for the formation of them are a complex information process connected with the solution of many problems and making it necessary to call in a large number of organizations and enterprises of the various ministries and departments for work. It is possible to provide for the development and implementation of the programs only with the help of the man-machine decision-making procedures in the state standardization system.

The realization of target program planning in the man-machine procedures will permit combination of the advantages of the computer when performing formalized organizations with the creative capacities, intuition and experience of the specialists realizing operations not subject to formalization in the creation and implementation of the complex standardization programs.

## Expansion and Deepening of the Work on the Unitization of the Products of Machine Building and Instrument Making

As the results of three all-union competitions for the best work on standardization and unitization of machine building (1968, 1970 and 1973) and the three All-Union Scientific and Technical Conferences (Uzhgorod 1971, Yerevan 1975, Tbilisi 1977) demonstrate, unitization is becoming a multipurpose, effective method of improving the quality of products and efficiency of production.

At the same time a number of scientific-procedural and theoretical problems in the given field still require solution.

In the near future the VNIINMASH Institute will provide for the following:

Classification of the objects of unitization and development of united terminology in the given fields considering the possibility of the machine processing of the information;

The analysis of the mechanism of the effect of standardization on the efficiency of social production, the study of its possibilities and determination of the specific procedural goals;

Formalization of the unitization problems and determination of the calculation functions for developing the principles of decision making, the development of standard solutions and the creation of the mathematical service equipment, and so on.

## Standardization and Unitization of Methods and Means Used in Automated Systems

The experience of the creation and introduction in the branches of the Ministry of Automated Systems for Different Purposes (the Automated Control System, the Automated Technological Process Control System, the System for Automation of Design Work, and so on) has demonstrated that their effectiveness is reduced to a significant degree as a result of the low level of unitization of methods and means used in automated systems. This is explained by the fact that the methods of automated solution of engineering problems were developed for specific types of production. The extension (serial duplication) of such methods is in practice impossible.

The following work is being done on the given problem by the VNIINMASH Institute.

a. The analysis of the methods of constructing automated systems for different purposes has demonstrated that a number of the procedural problems of their construction are general systems problems.

The standardization of these methods excludes the duplication of work performed in individual classes of automated systems.

The development of standards oriented toward a defined class of automated systems or defined subject area and reflecting the specific nature of the given area. As an example it is possible to present the YeSTPP standards regulating the procedures for selecting the objects of automation, the rules for establishing the conditions of automation, the rules for statement of the problems for automated solution, and so on. The experience of creating these standards must be used in the work on standardization of the automated design systems (SAPR).

c. The creation of the automated search systems for standardized parts and components, standardized technological processes or finding previously created analogs.

At the present time the VNIINMASH has developed an automated information retrieval system for the parts and components of general machine building application (AIPSMASH) which solves the problems of storage, retrieval and output of information on request on the parts and components of machine building products standardized on the interbranch level.

d. The standardization of means of automation, algorithmic languages and program documents, that is, standardization of the means providing for the performance of work on automation.

The standardization of the means of computer engineering and peripheral equipment jointly with the creation of the united system of program documentation (YeSPD) provides for the technical and program compatibility of various means of gathering, processing, representation and transmission of data, the establishment of optimal nomenclature for it. The possibility arises here for the exchange of program documents between the enterprises and the creation of branch and interbranch libraries of algorithms and programs.

e. The creation of an automated complex quality control system for the work of the institute (AKS UKR). This system will promote improved quality of work as a result of optimal planning, optimal distribution of labor and material resources with respect to the various scientific areas, operative control of the course of execution of the operations, timely provision of all of the elements of the institute with sufficient, reliable information on the investigated problem. The introduction of it into operation will permit establishment of a new form of organization of operations with respect to standardization, the basis for which is the close interaction of the developers, machine programs and technical automation means.

#### Use of the Results of Basic and Applied Work in Scientific and Technical Documentation

The planning, design and construction of modern machines are impossible without various calculations. The complication of the machines themselves and the conditions of their operation and maintenance leads to complication of the calculations, an increased volume of calculations, the necessity for

broader use of the known laws and finding new physical, mechanical and other laws and, consequently, the development of new mathematical methods and means.

At the present time the methods of performing the calculations are varied both with respect to nomenclature and with respect to efficiency. On the one hand it is possible to expect greater and greater detailing and refinement of them, and on the other, it is possible to isolate a finite number of standard problems of the mechanics of a deformable solid state, thermophysics, agrohydrodynamics, physicochemistry, the solution of which encompasses in practice all of the calculations encountered in planning, design and construction. Therefore the standardization of these problems, the optimization of the methods of solving them and the introduction of such methods into practice through the normative technical documents (procedures, recommendations and programs) is an important problem of standardization in the planning, design and instruction area.

The VNIINMASH has begun the development of methods of strength and reliability calculation. A characteristic feature of this work is orientation toward the broadest possible use of numerical methods and computers and also their clearly expressed interbranch nature.

As is known, the process of creating machines includes the performance of tests which are in practice realized in all phases and amount to a significant proportion of all expenditures on their development. The tests are the first check of correctness of the calculations.

Now there is no one who doubts the necessity for the standardization of test methods. The basic problems which must be solved in the given area are the following:

The clear, successive regulation of the procedure and methods of organizing the tests in various phases of development, operation and maintenance of machines;

Standardization of the operating conditions and external effects required for reproduction of them during tests;

The development and optimization of methods of test planning and methods of accelerated equivalent reproduction of operation and maintenance conditions;

The creation, optimization and standardization of technical methods and means of testing to determine various characteristics of materials and machines as a whole (strength, seal, wear resistance, corrosion resistance, and so on) as applied to the standard operating conditions and types of effects;

The development of standard methods and means of metrologic support of the tests;

The standardization of the latest methods of investigating the properties of materials and the characteristics of machines providing the basis for technical diagnosis -- optical, acoustic, magnetic, radiation, and so on; the development and optimization of the methods of monitoring the fitness of products during operation -- technical diagnostics.

It is necessary to include the performance of calculations in the enumerated problems in the test and monitoring area. For example, the remaining reserve of the machine will be calculated by the results of monitoring its parameters in a defined operation and maintenance stage.

Therefore the optimization of the methods of monitoring and test calculations must be carried out simultaneously in the areas connected with the establishment of individual properties of the machine -- reliability, strength, chemical resistance, seal, and so on.

Therefore the optimization of the work must become a qualitatively new phase in standardization in the field of planning, design and construction -- the phase of broad utilization of scientific results in the normative-technical documents. It also requires new forms of organization of the work with respect to standardization connected with broader involvement of scientific workers in the performance of this work.

#### Introduction of the Labor Safety Requirements into the Machine Building Production Standards

The developed program for social-economic development adopted by the 25th Congress of the CPSU attaches the most important significance to the further improvement of the conditions of labor, the conversion of all the production facilities to safe, convenient facilities for man. In the set of measures in the given area, one of the basic roles is played by the system of labor safety standards (SSBT).

At the present time more than 100 SSBT standards have been put into effect, the satisfaction of the requirements of which will promote the production of safe machines, the creation of safe technological processes guaranteeing reliable protection of workers in various branches of the national economy.

The basic areas of further development of this work on standardization in the field of labor safety are the following:

Completion of the creation of a united system of scientific and technical documentation on labor safety for the entire national economy of the country on the state, branch and production levels and its introduction into the national economy;

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The development and introduction of sets of state and branch standards directed at reducing the effects of dangerous and harmful production factors, provision for the output of safe production equipment and production processes, and the creation of effective means of protecting workers;

The creation of enterprise standards for labor safety on the basis of the SSBT;

The development and introduction of the metrologic support program in the area of labor safety;

The realization of a united state inspection system (with the participation of all of the state inspection agencies and trade union agencies) for the introduction and observation of safety requirements contained in the standards and other normative-technical documents;

Introduction of mandatory phase by phase review of the planning-design, technological, repair, operation and maintenance documents for completeness of reflection of the safety requirements, and so on.

The ministries, departments, the central committees of the trade unions jointly with the USSR Gosstandart and its territorial agencies are to evaluate all production equipment and all technological processes to discover their correspondence to the requirements of the SSBT standards. In addition, the plan calls for studying the condition of the entire stock of measurement means providing for labor safety and, wherever necessary, to take measures with respect to improvement of it and development of new methods and means.

Representatives of the trade union agencies (technical labor inspection agencies) are to be included in the certification commissions, complex tests are to be run on correspondence of the produced products to the safety requirements, a systematic analysis is to be made of the scientific and technical documentation in the field of labor safety with respect to branches of industry for further development and improvement of the SSBT on the basis of the data obtained.

These are some of the basic problems of standardization in machine building, the solution of which is being worked on and will be worked on by the VNIINMASH Institute collective in cooperation with the scientific research institutes of the Academy of Sciences, ministries and departments.

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