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USSR Report

ENERGY

(FOUO 6/81)

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ELECTRIC POWER

UDC 621.31.002.51

MAJOR TRENDS IN THE DEVELOPMENT OF POWER ENGINEERING CONSTRUCTION

Moscow ENERGETICHESKOYE STROITEL'STVO in Russian No 12, Dec 80 pp 7-13

[Article by Deputy Minister of Power Engineering and Electrification of the USSR, P. P. Falaleyev]

[Excerpt] However, for the successful resolution of the tasks confronting power system builders over the next decade, a qualitatively different approach to project planning, material and technical support, financing and the construction of power engineering facilities is required.

The structure of the power capacities being brought on line by the end of the future decade will be characterized by the following specific features:

--An increase in power capacities and consequently, in the electrical power output of nuclear electric power stations, heat and electric power stations as well as hydroelectric power stations, including GAES's [pumped storage electric power stations];

--The fraction of power capacities, and correspondingly, the electrical power output at condensation thermal electric power stations will decrease.

It is planned that power engineering construction in 1981-1990 will develop in line with the following major trends:

--The advanced construction of nuclear electric power stations with capacities of 4 to 6 million KW each having power generation sets with a unit capacity of 1 to 1.5 million KW in the European region of the nation and in the Urals;

--The construction of thermal electric power stations with a capacity of 4 to 6.4 million KW each in using fuels which are not in short supply; primarily the flow-line construction of pulverized coal GRES's [state regional electric power stations] with power sets having capacities of 500 and 800 MW each incorporated in the Ekibastuz and Konsko-Achinsk fuel and power generating complexes, as well as the Surgutsk GRES's with byproduct gas power sets having unit capacities of 800 and 1,200 MW;

--The construction of high power hydroelectric power stations and multiple function hydraulic developments in Siberia, Central Asia, in the Far East and in the Transcaucusus, as well as large GAES's in the nation's European area to cover the peak portion of the electric load schedule;

--The further expansion of the heat supply to cities and industrial enterprises;

--An increase in the volumes of electrical network construction, including the development of the 500 to 750 KV power transmission line network, the construction of 1,150 KV alternating current and 1,500 KV direct current transmission lines to transmit electrical power from Siberia and Kazakhstan to the European area of the nation.

In line with the directions indicated above, it is planned that the acceleration of technical progress which is the basis for the completion of the set tasks, be assured through the development and introduction of:

--New special structural designs for AES's, including standard protective casings and antiseismic structures for reactor rooms; highly reliable concrete boxes, which provide biological shielding; prefabricated structures and production process and structural assemblies fabricated in a plant;

--Efficient designs for the major structures of GRES's having power sets with capacities of 800 and 1,200 MW as well as GRES with small boilers, the integrated main structures of TES's, as well as the new structures of high facilities: smokestacks and cooling towers, including those erected with factory prefabricated components;

--Progressive structural designs for hydroelectric power stations, high concrete and earth dams, constructed under difficult climatic, geological and seismic conditions, as well as those for GAES's; thin-walled monolithic and composite tunnel linings;

--New structural design solutions for electrical power network construction using efficient steel sections, light reinforced concrete, as well as buildings which can be assembled rapidly and modular packaging devices;

--New construction technology for power engineering facilities based on the design and mastery of special installation, construction and transport mechanisms: concrete pumps, manipulators, inventory decking, including sliding decks; non-dismantlable armored sheathing panels and hollow blocks, filled with poured concrete; systems of machines for the comprehensive mechanization of electrical power network construction and special machinery for working in the extreme north and mountainous regions;

--Long term comprehensive and specialized flows in the consruction of TES's, AES's and electrical power network facilities;

--Measures directed towards the curtailing of the duration of the preparatory period in the construction of power engineering facilities, the utilization of

bases for construction projects which are winding down, the widescale introduction of inventory readily assembled and taken down buildings, as well as container and mobile buildings and installations, pneumatic installations and automated concrete mixing facilities built up from the structural production blocks which are fully factory prefabricated;

--Highly mechanized complexes (including those with a continuous production process) for the construction and earth dams; ways of hydraulically transporting soil, and a directional explosive method for the construction of rubble dams; the technology and equipment for driving large tunnels with a continuous long walled cross-section;

--A fast flow-line method for the construction of electrical power network facilities through the use of progressive labor performance methods, boosting the level of mechanization support for the builders as well as designing new, efficient mechanisms.

The following are planned in the area of improving the organization and control of power system construction;

--Create all-union construction and installation associations in accordance with the general management plan, in this case, elevating the level of technological specialization from 67 percent up to 75 percent by setting mobile organizations in these associations which are called upon to perform the entire cycle of construction work;

--Expand the scope of the application of electronic computer equipment, office equipment, communications gear and automated control systems for construction to increase planning and control efficiency of comprehensive targeted programs for the construction of nuclear electric power stations and large scale power engineering complexes;

--Provide for the introduction of a system of putting together complete component packages for power facilities under construction using the structural materials, products and structures, based on working drawings, technological complexes and delivery schedules, worked out for each facility using computers; a comprehensive product quality control system based on the development and introduction of more sophisticated standards, modern means and methods of operational monitoring, as well as boosting the level of plant readiness of the structures and products which are supplied.

The implementation of the indicated program is one of the major factors determining the possibility of curtailing the timeframes and boosting the quality of the construction of power engineering facilities.

Along with the question of the development of equipment, technology and the organization of construction in the USSR Ministry, a set of organizational measures have been developed, the implementation of which requires the participation of the planning organs and industrial enterprises of other sectors.

To implement the developmental program for power engineering construction, it is necessary to realize a number of large scale measures, which provide for the expansion and technical retrofitting of the construction industry enterprises, as well as increasing the output of progressive structures and materials.

The volumes of prefabricated steel reinforced concrete production and structural metal structures as well as nonmetallic materials will increase in the 11th Five-Year Plan. For this, it is planned that the utilization of the capacities of existing enterprises will be improved, they will be technically retrofitted, rebuilt and expanded, and a number of new ones will be built.

In order to improve the state of the art in construction, provide for industrialization of construction and the maximum transfer of work operations from the construction site to plant conditions, it is planned that new production capacities will be created for the fabrication of special structures for AES's, plastic pipes, fully prefabricated and quickly assemblable buildings for auxiliary power generating and electrical power network facilities, mobile container buildings, ventilation, sanitary engineering and electrical installation stocks and products, inventory decking, as well as facilities for galvanizing the metal structures of power transmission line supports, etc.

To implement the measures planned by the ministry for the development of the material and technical base in the 11th Five-Year Plan, capital investments are needed which significantly exceed capital investments employed in the 10th Five-Year Plan.

In line with the requirements for technical progress in capital construction, the construction and installation organizations should be re-equipped with high performance construction equipment and motor vehicle transportation, assuring that the requisite amount of single bucket excavators (including excavators with 2.5 m^3 capacity buckets and more) are allocated to them in 1981-1985, as well as powerful bulldozers, installation cranes (including pneumatic wheeled types and those on special chassis) with a load lifting capacity of 100 tons and more, ultrahigh power log skidders and large capacity trucks with a high degree of maneuverability. In order for the plants of the ministry to be able to fabricate the special construction machines, it is necessary to allocate the basic machines, tractors and automobiles, to them annually.

It is likewise necessary to improve material and technical supply. In particular, the following should be done for this:

--Provide for matching the allocated material and technical resources to the calculated demand for them based on substantiated standards, worked out taking into account the achievements of science and engineering progress and the proposed areas of construction.

--See that the enterprises execute the unionwide industrial plan for deliveries of material resources in accordance with the allocated funds, in this case

providing for advanced delivery of rolled metal in a volume of up to 90 percent of the annual demand by October 1st of the supply year;

--Resolve the question of increasing the production of efficient materials by union industry enterprises (alloy and tempered steels, light weight rolled sections, high grade cements, plastic pipes, an incombustible polymer hot top, effective shielding materials, etc.) in volumes necessary for the realization of measures directed towards the acceleration of scientific and engineering progress;

--Implement effective monitoring of the apportionment of the roling stock for shipments of construction structures, products and nonmetal materials to USSR Ministry of Energy facilities under construction in accordance with the computed demand for them.

In order to provide for bringing the increasing volume of power generation capacities and power transmission lines into service, it is necessary to improve the system of deliveries for the major and auxiliary production process equipment and electrical engineering products in a fundamental fashion, as well as to achieve balance, timeliness and completeness in the deliveries of equipment 6 to 12 months prior to its acceptance for service.

The quality of the supplied equipment and piping is to be fundamentally improved, providing for the defect free fabrication and a high level of plant readiness, bringing the level of modularity of the delivered products for thermal and nuclear electric power stations up to 90 percent.

Measures have been worked out in the USSR Ministry of Energy to improve the work with personnel. Most of important of them are the realization of the program for residential construction, social, cultural and everyday facilities as well as a workers' supply for builders and installers, an improvement in the organization of labor and its wage system, and also the improvement of the system of monetary and nonmonetary incentives for the purpose of strengthening the labor force.

The implementation of the measures enumerated above will make it possible to carry out the assignments for bringing capacities on line as well as other planned indicators for construction output, providing in this case for a reduction in the cost of construction and a curtailing of labor expenditures and consumption of material resources.

8225
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ELECTRIC POWER

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PROGRESS IN THE HYDROELECTRIC POWER INDUSTRY

Moscow ENERGETICHESKOYE STROITEL'STVO in Russian No 12, Dec 80 pp 34-38

[Excerpt from article by candidates of the engineering sciences V.L. Kuperman and L.P. Mikhaylov]

[Excerpt] Throughout the entire world in recent years, also including in our country, the construction of dams from local materials has expanded. Worldwide experience in dam construction shows that pratically any soils are suitable for the building of dams. It is only necessary to correctly choose the profile of the dam and the appropriate manner of arranging the soils with various properties within this profile, as well as employ an efficient technology for laying and sealing the soils.

To be included among the new scientific and engineering techniques used in the erection of earthen dams is the high productivity conveyor delivery of earth from remote pits, as well as the use of natural, crushed and fractional mixtures, the placement of the materials in the dams with a density which assures a reduction in their settling down to insignificant values, etc. Initial experience has already been gained in the use of synthetic film and asphalt concrete as an antifiltration material.

Rock and earth dams 150 m to 300 m high and more have been and are being constructed in the Soviet Union in regions of high seismicity in accordance with the project plans Gidroproyekt [All-Union Planning, Surveying and Scientific Research Institute imeni S.Ya. Zhuk]. They include the Charvak dam with a height of 168 m, the Nurek 300 m high and the Rogun at 335 m.

In speaking of the scientific and engineering progress in the design of dams using earthen materials, a number of questions should be indicated, which must be resolved for the purposes of radically improving the technical and economic indicators of such dams and expanding their applications areas. The most important of them are to be recognized as: sharply stepping up the pace and reducing the cost of driving tunnels, the construction of which is essential in the construction of dams of earth materials; the development of gate structures designed for a head of 150 to 250 m (the lack of which does not allow for the use of construction tunnels as operational ones without additional retrofitting); the design of reliable

structures for antifiltration diaphragms, readily producible when constructing dams in the nation's northern regions; the accumulation of experience with the construction of screens and diaphragms from asphalt-bitumen compositions, especially for the dykes of the water storage electric power stations operating where the daily fluctuations in the water level are 10 to 15 m, including during the winter.

Hydroelectric power stations have been and are being constructed in the North and Far East to supply power to isolated industrial regions. The advantage of GES's [hydroelectric power stations] that the labor expenditures for their operation is 6 to 10 times less than for the operation of TES's [thermal electric power stations] has had a particular impact here.

The accelerated construction of pumped storage electric power stations has been started recently in the industrially developed nations because of the trend towards the rise in demand for peak power. The overall capacity of the GAES's [pumped storage electric power stations] in service in the world amounts to about 40 million KW. The capacity of GAES's in the U.S. reached 14 million KW by 1980.

Only one GAES, the Kiev station, with a capacity of 225 MW has as yet been placed in service in the USSR. The construction of the Zagorskaya GAES with a capacity of 1,200 MW and the Kayshyadorskaya with a capacity of 1,600 MW has been started. The construction of a series of GAES's is also planned, including the Tsentral'naya, Leningradska, Yuzhno-Ukrainskaya, Kanevskaya, Dnestrovskaya and Srednevolzhskaya. It is planned that the first series of GAES's will be erected in accordance with a standardized project plan with standard series hydroelectric power equipment for a unit capacity of a hydroelectric generator set of 200 MW at a pressure head of 100 m. The GAES buildings will be standardized, as well as the piping, water receivers and a number of the structural designs for the dykes of the water reservoir. The creation of standardized project plans for GAES's requires scientific and project planning development work in depth, both as regards the equipment and the structural designs. The program for such work has been prepared and its implementation has begun.

Considerable attention has been devoted in recent years in the planning and construction of hydroelectric facilities to questions of increasing the labor productivity as well as reducing the labor expenditures and the number of workers. Thus, only through the introduction of comprehensive mechanization at a number of construction projects was a significant reduction in labor expenditures achieved. For example, in the construction of the Toktogul'skaya Dam, a method of layer by layer pouring of concrete in large blocks using a special technology was developed and successfully applied, where this technology made it possible to fully mechanize all of the processes and thereby boost labor productivity up to 12 m^3/man-day. Because of the utilization of 25-ton cable cranes for concrete delivery and the introduction of comprehensive mechanization, the same labor productivity was achieved in the construction of the Chirkeyskaya arched dam.

The use of heated scaffolding and tents, as well as the implementation of a number of other measures, made it possible to execute the concrete work in the construction of the Ust'-Ilimskaya and Zeyskaya Dams without reducing the rate of work during the winter. The development of new methods of constructing dams from local materials promoted the successful construction of hydraulic developments in the regions of the Far North to a considerable extent, something which made it possible to work year-round on the erection of the antifiltration elements of the Vilyuyskaya, Ust'-Khantayskaya and Serebryanskaya Dams.

Questions of increasing construction efficiency are of first order importance in hydroelectric power construction, which is characterized by large one-time capital investments, large scale and amounts of materials, technical and human resources which are drawn upon, as well as by long timeframes for the erection of the structures. Experience with the organization of work production at the Nurek Dam shows that the erection of earthen dams more than 200 m high by traditional methods using motor vehicle transportation is not profitable. The rate of fill for the rubble mound of the Nurek Dam achieved in 1976 (8.5 million m^3/year) is practically the ultimate with this production process scheme. At the same time, the placement of 62.5 million m^3 of earth is planned at the Rogunskaya Dam (the construction of which has already started), and in this case, it is planned that 10 to 11 million m^3 will be piled up annually. For this reason, belt conveyors are provided in the project plan for this dam to deliver the boulder-course gravel material for the support prisms (40 million m^3) and the rock for securing the slope (15 million m^3).

A special experimental industrial test facility was created for the purpose of working out the production process operation for the delivery of rock by belt conveyors in the construction of the Nurek Dam. Operational experience with this line will be used in the construction of the Rogunskaya and other dams made of local earth materials.

The technology of erecting dams from local earth materials by means of directed explosives is promising. The Alma-Atinsk flood protection dam and the Baypazinskaya Dam on the Vakhsha with heights of 150 and 50 m respectively and volumes of about 5.5 and 1 million m^3 have already been built by this method and are in successful operation in the Soviet Union. The cost of the profiled rubble pile of the Alma-Atinsk Dam was 2 ruble/m^3 and 1.3 ruble/m^3 for the Baypazinskaya Dam.

Searches and plan development work are underway at the present time for the construction of the Kambaratinskiy hydraulic development on the Naryn by means of directional explosives (the height of the dam is 250 m and the profile volume is about 100 million m^3). For the purpose of studying the nature of the explosion, the degree of crushing and the density of rock laying in the built-up pile as well as the settling of the dam, filtration and other characteristics, an experimental dam 40 m high was erected using the directional explosion technique beforehand under similar topological and geodesic conditions on the Burlykiya River. The experience with the construction, as well as more two years of observations of the condition of this dam attest to the rather good and

practically uniform crushing of the rock, the reliable packing of the rock in the built-up pile and the absence of undermining. The data from these studies were taken into account in developing the project plan for the Kambaratinskiy Dam. The erection of the Kambaratinskiy Dam using the directional explosion technique provides for a significant curtailment of the time required for the construction and a sharp reduction in the labor expenditures and also eleminates the necessity of acquiring scarce construction equipment (excavators with 8 m^3 capacity buckets, 40 ton dump trucks); the areas required for the construction base and the builders' settlement are also reduced, something which yields a substantial economic impact in the final analysis.

The further refinement of the production technology for concrete operation and the development of measures for their comprehensive mechanization will promote a significant increase in the construction efficiency of concrete dams. Thus, in the construction of the Sa no-Shushenskaya GES, where 10.5 million m^3 of concrete was poured for the first time in dam construction practice, a new erection technology is being introduced, which provides for the utilization of high performance KBGS-1000 tower cranes with a load lifting capacity of 25 tons, with a boom length of 40 m. These cranes are set up directly on the structure and are lifted in step with the rise in the dam. The use of such a configuration has made it possible to dispense with part of the subcrane and the concrete-delivery scaffolding, which would have to be arranged in several levels over the height of the structure. The use of high performance cranes and comprehensive mechanization of the work within a unit provides for fast paced concrete pouring: more than 1.5 million m^3/year.

A scheme for erecting concrete structures by means of the new KBGS-500 KhL power cranes has been developed for the Boguchanskaya GES, where these cranes were specially made for northern conditions. These cranes will be lifted up to different marker levels on the structure (in step with its erection) without reassembly, something which will make it possible to dispense with the construction of concrete delivery scaffolding. Such a scheme for the erection provides for a reduction in metal consumption of 10,000 tons (as compared to the consumption at the Ust'-Ilimskaya GES).

Even more promising is the application of continuous methods of mixing, delivering and pouring concrete in concrete structures. Widescale planning and scientific research work is underway at the present time on the introduction of continuous methods of pouring concrete (a project plan is being worked out for the erection of the large Bureyskaya dam in this fashion).

For the first time in hydroelectric engineering construction practice, the plans for the Zagorskaya and Kayshyadorskaya GAES called for making pressure head reinforced concrete pipes more than 500 m long with an internal diameter of 7.5 m, designed for a pressure head of up to 100 m. The water conduits will be constructed using full and comprehensive mechanization, which provides for the industrial fabrication of the steel reinforced concrete sections with lengths of 4.5 m each and their delivery to the installation site on special platforms which move on rails. Because of the use of industrial methods and year-round work operations, such a scheme (in contrast to others) will make it possible to complete the

laying of the pipes with the least labor expenditures and a reduction in the timeframe.

The volumes of the major work operations on the largest hydraulic installations are given in the table.

A considerable reduction in labor expenditures can be achieved in the erection of structures by means of improving the structural designs and work procedures, simplifying the design of the structures attaching to the foundation and the other componets of dams, GES buildings and locks.

At the same time, practice shows that the major structures in terms of the volume of labor expenditures are frequently not the dominating ones at the present time. The results of investigating a number of large construction projects attest to the fact that even in the peak years, a significant portion of the workers are engaged in the construction and operation of subsidary enterprises. Because of this, one of the ways of reducing labor expenditures is the improvement of the industrial construction bases. The erection of production buildings from prefabricated and dismantlable structures fabricated in a plant has made it possible to reduce labor expenditures for their construction. As experience with the construction and operation of these facilities shows, as a rule, they are also utilized after the completion of the construction work. For this reason, those bases which will also knowingly be operated after the completion of the construction work (these are primarily, mechanical, motor vehicle and warehousing facilities), with the appropriate economic substantiation, should be executed as structures designed for longer term operation, while the bases which will be dismantled after the completion of the construction work, should be made as prefabricated, dismantlable structures.

This principle was taken as the basis for the development of the project plan of the Boguchanskaya GES construction base, where modular production enterprises were developed for the purpose of reducing the occupied territory, the length of the engineering mains and underground services, as well as the roads within the construction site. This has made it possible to place the major construction facilities, with the exception of the concrete mixing and gravel sorting plans, in five combined triple span buildings (the buildings were made from prefabricated reinforced concrete with keramzit filled prefabricated concrete panels covered with corrugated sheeting and with efficient thermal insulation). The dimensions adopted for the buildings and the layout have made it possible to use them upon the completion of the construction work for the construction industry enterprises of the Boguchansk territorial production complex.

One of the specific featuresof the organization of hydraulic installation construction in the USSR is the series handling of the hydroelectric resources of the rivers. At the present time, the fully finished series of hydroelectric power stations on the Dnepr are numbered among the existing ones in service. The construction of the Volzhsko-Kamskiy and the Chirchik series of hydroelectric power stations is being completed and the construction of a series of large hydraulic installations is underway on the Angara, the Yenisey, the Vakhsha and the Naryn. Series construction makes it possible to most fully utilize the experience which has been acquired, efficiently distribute human and material resources, reduce

Table

Hydroelectric Power Station	Capacity MW	Work Volumes	
		Rock/Earth-works, -millions m^3	Concrete, thousands m^3
Dneprovskaya imeni V.I. Lenin:			
First stage Second state	540 650	5.4	1.100
Volzhskaya imeni V.I. Lenin	2,310	165.7	7,000
Volzhskaya imeni 22nd CPSU Congress	2,563	149.1	5,474
Saratovskaya imeni Leninskiy Komsomol	1,360	110.4	3,090
Bratskaya imeni 50th Anniversary of Great October	4,500	16.4	4,858
Ust'-Ilimskaya	4,320	10.4	4,220
Krasnoyarskaya imeni 50th Anniversary of the USSR	6,000	20.5	5,714
Sayano-Shushenskaya	6,400	11.6	9,720
Zeyskaya	1,290	7.8	2,370
Ingurskaya (with the Perepadnyye)	1,640	14.5	5,246
Chirkeyskaya	1,000	2.9	1,760
Nurekskaya	2,700	65.6	1.613
Toktogul'skaya	1,200	5.2	3,971

expenditures for the construction of bases and settlements, as well as shorten the preparatory period and the duration of hydraulic installation construction as a whole. For example, the base created for the construction of the Toktogul'skiy hydraulic development was fully utilized in the construction of the Kurpsayskiy hydraulic development, something which made it possible to construct the large GES in one five-year plan.

In the construction of large hydraulic developments with a high pressure head, the introduction of hydroelectric power units in stages (inlcluding the first units at an intermediate pressure head) is to be acknowledged as an extremely efficient solution, since in this case, the efficiency of the hydroelectric power construction is signficantly increased. At the present time, the minimum necessary volumes of construction and installation work is done in the hydraulic development complexes going on line. The operational start of the Bratsk, Krasnoyarsk, Charvak, Toktogul'skaya, Zeyskaya, Nurek, and Ingurskaya GES's was accomplished in this way. The first unit of the Sayano-Shushenskaya GES was started up after only 3.8 million m^3 of concrete in all was poured (of an overall volume of 9.7 million m^3). The first units in the construction of Kolymskaya GES will be brought on line after less than half of all capital investments have been used.

The experience with the operational start of GES's using a temporary configuration with the installation of changeable turbine rotors capable of operating at low pressure heads (the Nurek and Sayano-Shushenskaya GES's), as well as the utilization of diagonal turbines (the Zeyskaya and Kolymskaya GES's).

Because of such a start-up procedure, the expenditures for the construction of the hydraulic development are fully recovered by the time the construction is completed (the Bratsk, Krasnoyarsk, Nurek GES's, etc.).

Ways of further developing hydroelectric power engineering are rather clearly defined by the presence of hydroelectric power resources and the requirements of power systems. The construction of pumped storage electric power stations will be expanded in the European territory of the USSR, primarily those which will be incorporated in the Northwest, Center and South power systems, which are characterized by the greatest degree of nonuniformity in the daily electrical power consumption graph and a deep drop in the loads at night. The continuation of the mastery of the hydroelectric power resources of the Caucasus is still ahead, predominantly in Georgia and in part, in Dagestan. The possibilities of the further mastery of the hydroelectric power resources of the Yenisey Basin are enormous. The colossal hydroelectric power resources of the Lena Basin are also attracting attention. Hydroelectric power system construction will probably also continue in isolated power systems of the remote industrial northern and transpolar regions.

8225
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ELECTRIC POWER

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CENTRAL ASIAN, SOUTHERN KAZAKHSTAN REPUBLICS ELECTRICAL POWER GRID CONSTRUCTION

Moscow ENERGETICHESKOYE STROITEL'STVO in Russian No 12, Dec 80 pp 51-53

[Article by Engineer S. Z. Kalanov]

[Text] Open wire electrical power transmission lines are the most widely used means of electrical power transmission at the present time. Questions of establishing the nation's energy balance, determining the prospects for the development of individual regions and the utilization of raw materials recources, the selection of the capacity and location of electric power stations as well as the layout for large energy intensive enterprises and the integration of power systems cannot be resolved without taking into account the development of electrical power networks.

The generating capacities brought on line in the 9th and 10the Five-Year Plans at the largest thermal and hydroelectric power stations of central asia (the Nurekskaya and Toktogul'skaya GES's, the Tashkent, Syrdar'inskaya and Maryyskaya GRES's) also governed the direction of power grid construction development in the republics of Central Asia and southern Kazakhstan.

Right up to 1963, power transmission lines were constructed in this region of the nation by various nonspecialized construction and operational organizations, included in the complement of the USSR Ministry of Energy, USSR Ministry of Construction, USSR Ministry of Equipment Installation and Special Construction as well as other ministries and departments.

Taking into account the fact that a rapid build-up in power system capacities and the efficient transmission of electrical power to consumers are the governing factors in the successful resolution of national economic problems as a whole, the specialized Sredazelektroset'stroy [Central Asian Electrical Power Grid Construction Trust] was created in 1963 as a part of the Glavvostokelektroset'stroy [Main Eastern Electrical Power Grid Construction Administration] of the USSR Ministry of Energy at the base of the equipment installation administration of the Sredazgidroenergostroy [Central Asian Hydroelectric Power Construction Trust].

Table

Substation and Power Transmission Line Voltage, KV	Power Transmission Line Length, km	Substation Capacity, Substation Capacity, 10^3 KVA
500	576/607	1,002/2,067
220	1,585/981	1,904/1,398
110	1,545/2,337	867/389
35	1,313/284	365/28

Note: The data for the Ninth Five-Year Plan are given in the numerator and the data over the 4.5 years of the 10th Five-Year Plan are given in the denominator.

The creation of a specialized trust for the construction of electrical power transmission lines and substations at voltages of 35 to 500 KV made it possible to significantly step up the pace of construction, sharply reduce the volume of construction work while simultaneously curtailing the production cost of construction and installation operations as well as the labor expenditures for their performance.

While the length of 35 KV and higher open wire power lines in the republics of Central Asia and Southern Kazakhstan amounted to 600 km in 1962, and the overall capacity of transformer substations was 160,000 KVA, during the 9th and 10th Five-Year Plans, more than 1,100 km of 35 to 500 KV power transmission lines and up to 800,000 KVA of transformer capacities at substations were brought on line annually through the efforts of the Sredazelektroset'stroy Trust (see the Table).

The volume of construction and installation work also rose sharply: from 6.7 million in 1962 up to 28 million rubles in 1979.

Starting in 1971, the Sredazelektroset'stroy trust set about the construction of 500 KV electrical power transmission lines. The first such power line between the Tashkent GRES and Chimkent with a length of 111 km was placed in service in 1972 (temporarily at a voltage of 220 KV). The first 500 KV power line in Uzbekistan from the Tashkent GRES to the Syrdar'inskaya GRES with a length of 178 km went in service in 1973, which joined together the two largest electric power stations in Uzbekistan: the Tashkent and the Syrdar'inskaya GRES's.

The 500 KV power line between the Syrdar'inskaya GRES and the Leninsk substation in Andizhan with an overall length of 312 km was placed in service in 1975. The Sredazelektroset'stroy trust completed the construction of the first 500 KV substation in Central Asia a year earlier: the Leninsk substation in Andizhan with a transformer group of 501,000 KVA.

The construction of electrical power transmission lines joining power systems made it possible in 1975, the year of the greatest capacity shortfall for the Uzbek power system, to use the free capacities of adjacent power systems.

During 1974-1976, the Sredazelektroset'stroy trust constructed the 500 KV Nurekskaya GES--Regar power line (single circuit) with a length of 113 km, which fed power from the Nurekskaya GES and provided power to such power intensive consumers as the Tadzhik aluminum plant.

The Regar to Guzar 500 KV power line 250 km line was placed in service in 1976; the volume of construction and installation work in the erection of this facility was 12 million rubles. The second 500 KV substation, the Guzar, with a transformer group of 501,000 KVA in the Uzbek SSR was placed in service in 1977. It must be noted that the construction of the 500 KV Regar to Guzar power line and the Guzar substation made it possible to tie the Dushanbe-Vakhshskaya system and the southern regions of Uzbekistan into the integrated power system of Central Asia.

In 1977, the trust started the construction of the500 KV Syrdar'inskaya GRES to Guzar power line, intended to feed the Nurek GES power to the Uzbek power system and feed the Dushanbe-Vakhshskaya system from the Syrdar'inskaya GRES. The length of this power line is 342 km, where 44 km of the route passed through difficult mountain terrain at markers of about 2,000 m above sea level and cross two passes (the Dzhiakskiy and Takhtakoracha) with sections exposed to unusual ice build-up. This complex and large scale power facility was placed in service in 1979. More than 7,000 m^3 of prefabricated steel reinforced concrete structures were installed during its construction, 10,000 tons of metal supports were fabricated and set up, 6,000 tons of high strength aluminum wire of different brands and cross-sections were strung as well as 630 tons of lightening protection cable and construction and installation work totaling 17 million rubles was accomplished.

With the completion of the construction of the 500 KV Syrdar'inskaya GRES to Guzar power line, all of the major large electric power stations of the integrated power system (Tashkentskaya and Syrdar'inskaya GRES's, the Nurekskaya and Toktogul'skaya GES's) were interconnected at a voltage of 500 KV. The creation of such a power engineering "bridge" has made it possible to consideralby improve the reliability of the electrical power supply to the consumers in the republics of Central Asia and Kazakhstan, and has provided the possibility of flexibility in power transmission from power centers with excess capacity to regions where there is a capactiy short fall by means of large power overcurrents. For example, up to 1.5 million KW of electrical power (the overall capacity of five Syrdar'inskaya GES units) was transmitted in a year from the Nurekskaya GES to the Uzbek power system. A unified Central Asian ring at a voltage of 500 KV will be formed after the Frunze--Lugovaya--Dzhambul--Chimket 500 KV power line is placed in service.

At the present time, the Sredazelektroset'stroy trust in conjunction with the Spetsset'stroy trust is constructing a 500 KV power line between the Maryyskaya GRES and Karakul with an overall length of 368 km, which when placed in service in 1980 will also provide for feeding electrical power from the Maryyskaya GRES which operates on local natural gas to the Uzbek power system.

In the not too distant future, the 500 KV Guzar--Karakul' power line will tie the Maryyskaya GRES into the integrated power system of Central Asia and southern Kazakhstan at a voltage of 500 KV.

In 1980, the trust is erecting a 35--110 KV electrical power transmission line for the construction of the Novoangrenskaya GRES, which will operate in Uzbekistan using inexpensive local hydrogeneous coals of the Agrensk deposits.

Over a number of years, the Sredazelektroset'stroy trust has done a great deal of work in the construction of 35--220 KV power lines in the Dzhambulskaya oblast of the Kazakh SSR.

The successes which have been achieved by the trusts collective are primarily the result of the self-sacrificing and heroic labor of the power system builders. The construction of electrical power grid facilities in the Central Asian and southern Kazakhstan region is accomplished under the most difficult natural conditions: the roots of the power lines pass through high mountain areas with precipitate rock walls, deserts with roving barkhan forming sands, where even all terrain vehicles do not always get through, as well as water saturated quicksands, in which a great deal of complicated work must be done to lower the water. Moreover, the work must be done during all seasons of the year, far from cultural centers and inhabited areas. And despite the great difficulties, the electrical power transmission line builders work, giving it all they have.

The honored power system workers of the Uzbek SSR are working conscientiously under difficult power network construction conditions: brigade leader of the electrical power lineman of mechanized column No. 71, R.A. Boltachev, brigade leader of the electrical lineman of mechanized column No. 48, R. Ablyazizov, driver of mechanized column No. 48, S. Amanov, honored builder of the Uzbek SSR, KPP fitter, A. Yakubov, honored transportation worker of the Uzbek SSR, mechanic of mechanized column No. 49, V.F. Zubanin, honored motor vehicle transportation worker of the Uzbek SSR, driver of mechanized column No. 49, O. Akhmedov, partner of the "Emblem of Honor" order, power lineman of mechanized column No 47, Kh. Mallabayev, partner of the Order of the Red Banner of Labor, power lineman of mechanized column No. 50, A.N. Barkov, partners of the Order of Labor Glory, Grade III, driver of mechanized column No. 50, A.D. Filimonov, electrical power lineman of mechanized column No. 71, Kh. Yerbayev, crane machinist of the Special Construction and Installation Administration, A. Abkelyamov, and many others.

Engineering progress and increasing the efficiency of construction and installation work are the prerequisites for the successful development of any construction sector, including electrical power grid construction. Considerable attention is being devoted in the Sredazelktroset'stroy trust to the introduction of new methods of labor, progressive engineering solutions and modern technological structural designs.

Thus, the method of press joining (connecting) wires using the energy of an explosion was universally used for the first time in our nation in 1976 on the 500 KV Regar--Guzar power line and the 220 KV Guzar--Karshi power line in the

installation of the lines in the loops of anchored corner support poles. More than 600 connections in all are made using this method on the indicated electrical power transmission line, something which made it possible to cut in half the time for the connection of the wires and most importantly, improve connection quality. The method of joining wires using the energy of an explosion was also successfully used in the installation of the line for the 500 KV Sydar'inskaya GRES--Guzar power line. The introduction of this technique will make it possible to dispense with the use of pressing sets and increase the labor productivity in the connection of wires in guy wire and connection terminals.

The progressive press joining method was given a high rating and the approval of the scientific and engineering council of the USSR Ministry of Energy. Samples of connections made by this technique were successfully exhibited in the construction pavilion at the USSR Exhibition of National Economic Achievements.

Bored out and packed foundations were successfully used for the first time in substation construction practice by the trust in the construction of the Leninskaya and Guzar 500 KV substations, and subsequently, on the 500 KV power line section between the Syrdar'inskaya GRES and Guzar.

Economical corner anchored supports using UBM [not further defined] type guys were installed on the 500 KV Regar--Guzar, Nurekskaya GES--Regar (single circuit) and Syrdar'inskaya GRES--Guzar power lines for the first time in the Soviet Union.

The efficiency experts of the trust have made a major contribution to the matter of improving labor productivity, reducing labor expenditures and the percentage of manual labor. They have designed, fabricated and put in production self-unloading support pole transport vehicles, intended for the transportation of reinforced concrete poles with a length of 22.2 m, as well as a modernized drilling rig for working rock, a bicycle trolley for installing the struts separating the line phases, and also small mechanization devices: an attachment for cutting the threads in the anchor bolts of foundations, electrical nut wrenches, and much more. During the years of the 9th and 10th Five-Year Plans, the economic impact of the introduction of the efficiency expert proposals by the workers of the trust amounted to about 8 million rubles. At the present time, a new high efficiency technique for securing sand by means of a KMTs [carboxymethylcellulose] preparate is being used on the 500 KV Maryyskaya GRES--Karakul' power line and the 110 KV Naip--Kirpchili power line, which are under construction.

Incorporated in the Sredazelektroset'stroy trust are six mechanized columns, which are based in the cities of Tashkent, Dushanbe, Chimkent, Fergan and Samarkand, as well as a combine of auxiliary enterprises (KPP), located in Chirchik. The KPP fabricates metal structures for electrical power transmission lines and substations. While the KPP produced a total of 6,000 tons of metal structures annually in the first years after the creation of the trust, in subsequent years, its capacity has grown to 14,000 - 16,000 tons.

At the present time, production bases have been created in mechanized columns No. 47 (Fergan), No. 49 (Chimkent), No. 50 (Dushanbe) and No. 71 (Tashkent).

The reconstruction of the KPP is planned, with an increase in its capacity up to 22,000 tons of metal structures annually and the construction of a new production base has been started in mechanized column No. 48 (the settlement of Khishrau, Samarkand).

The collective of the Sredazelektroset'stroy trust is meeting the 60th Anniversary of the GOELRO plan with the successful execution of the assumed socialist obligations to meet the 26th CPSU Congress and the 20th Uzbekistan Communist Party Congress in a worthy manner.

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ELECTRIC POWER

HIGH QUALITY POWER MACHINE BUILDING EQUIPMENT

Moscow ENERGOMASHINOSTROYENIYE in Russian No 10, Oct 80 pp 2-4

/Article by V. P. Plastov, member of the board of the Ministry of Power Machine Building, chief of the Atomic Machine Building Administration: "Power Machine Building Production--Outstanding Quality"/

/Text/ Workers in the power machine building industry, along with the entire Soviet nation, have taken part in the socialist competition for a fitting welcome to the 26th Party Congress.

The essence of the party's economic policy in the 10th five-year plan is the steady build-up of the economic might of the country, the broadening and basic replacement of productive capital, and the provision of a stable balanced growth to all sectors of industry. An important place was alloted to the development of the power machine building industry in the plans and tasks set by the 25th Party Congress.

During the 10th five-year plan, the power machine building enterprises had to produce, in the necessary quantities, power blocks with a capacity of 500, 800, and 1,000-1,200 megawatts, large hydraulic turbines, fuel-efficient steam and gas installations with a capacity up to 250 megawatts, gas-turbine units with a capacity up to 100 megawatts to cover peak loads, and other improved power equipment. In addition to the series production of thermal breeder reactors and turbine units for them with a unit capacity of not less than 1,000 megawatts, the atomic machine building industry must develop complete sets of atomic power block equipment with a capacity up to 1,500 megawatts.

In carrying out the decision of the 25th CPSU Congress, the enterprises and organizations of Minenergomash/Ministry of Power Machine Building/ have done much work during the 10th five-year plan to ensure the output of the most progressive equipment, increase unit capacities, raise the proportion of products of the highest quality category, and increase the effectiveness of new technology.

In steam-turbine building, the unit capacity of a machine reached 1,200 megawatts. The capacity usage of K-800-240-3 type steam turbines is 0.993; for the K-500-240-2 it is 0.963; for the K-220-44 for AES's it is 0.997; and it is even higher for the K-500-65/3000 type turbines(during a 3-4 year period between capital repairs).

On the whole the technical level of domestic steam-turbine building corresponds to world achievements in all of the main indicators: unit capacity, degree of savings, metallic content, and reliability.

In accordance with state certification results, turbines of the types K-200-130-6, K-300-240 LMZ/Leningrad Metal Plant/, K-500-240-2, R-100/107-130-15 UTMZ/Ural Turbomotor Plant/, T-250/300-240, K-220-44, and K-500-65/3000 have been awarded the state emblem of quality.

In hydraulic turbine building the unit capacity reached 650 megawatts(Sayano-Shushenskaya GES). The operational readiness for a majority of hydroturbines is 0.97--0.98 with a 3-4 year time period between capital repairs which, on the whole, also corresponds to the world level. In the 10th five-year plan the GZK/state emblem of quality/ was awarded to the hydroturbines for the following GES's: Sayano-Shushenskaya-1, Sobradin'o(PO/production association/ Leningrad Metal Plant), Purnari, Vartsikhi, Sal'to-Grande(PO Khar'kov Turbine Plant).

Modern boiler units manufactured by boiler building plants for power blocks of 150, 200, 300, 500, and 800 megawatts, and also for TETs, measure up to the world technical standard. According to information from electric power stations, the average cycles-between-failures of our boiler units for 300-megawatt power blocks in the period 1976-78 was 3,200 hours, and it was 2,600 hours for boiler units for 800-megawatt blocks. In recent years the average time period between capital repairs for boiler units working 7,000 hours per year at established capacity was 3.5 years. The main indicators of the technical level of domestic large-capacity boiler units are at the level of American boiler units.

The state emblem of quality was awarded to all new gasproof-design boiler units manufactured since 1975(boilers with 200, 300, and 800-megawatt blocks, and also TETs boilers of the type TGMP-464, BKZ-420-140-MGM, and others).

In accordance with the decisions of the 25th CPSU Congress, special attention is being paid in the 10th five-year plan to domestic atomic machine building. The production of steam turbines for AES's has more than doubled during the first three years of the current five-year plan in comparison with the corresponding period of the 9th five-year plan. Minenergomash enterprises have manufactured several high-speed turbines with a unit capacity of 500 megawatts for energy blocks with 1,000-megawatt channel-type reactors. They are manufacturing low-speed turbines, each with a capacity of 1,000 megawatts. Work is continuing on the creation of high-efficiency AES equipment for future 800-megawatt blocks with fast breeder reactors, and a high-speed 1,000-megawatt turbine is being developed. New capacities are being created in the PO's Izhorskiy Plant imeni A. A. Zhdanov and Atommash/Atomic Machine Building Association/. Atommash is making the first 1,000-megawatt reactor.

The operational experience of equipment supplied by the Minenergomash plants which has been in lengthy operation at AES's in the USSR, Finland, and the CEMA countries testifies to the sufficiently high technical level of all types of basic equipment. The comparatively high values for established power capacity usage in 1978 were 74.5 percent for the VVER-440 block, and 68.8 percent for the RMBK-1000 block. The operational readiness of VVER-440 blocks in 1978 was 97.6 percent (on the average this coefficient is estimated to be 85 percent for similar foreign blocks.) Forced VVER-440 downtimes did not exceed 3 percent of calendar time in 1978; these downtimes are 12 percent for foreign blocks with water-cooled reactors having a capacity up to 600 megawatts.

The high technical level of new designs for all types of power equipment is due to the development of technical resolutions corresponding to those achieved at the world level, an ideal method for estimating work operation processes in equipment parts, and the more complete technology of equipment manufacture and installation. The growth in the number of articles with the state emblem of quality within the total volume of commodity production by the production associations and enterprises of Minenergomash, and the increase in the portion of products supplied for export, serves to confirm this.

As is generally known, the 10th five-year plan is the five-year plan of efficiency and quality. A high level of production quality forms during the development stage, is ensured during production, and must be maintained(kept up and reconditioned) in operation for efficient utilization. These requirements can only be met when based on a clearly developed quality control system which includes a large number of technical, organizational, economic, ideological, and other points.

In fulfilling the CC CPSU decree "The Work Experience of Party Organizations and Collectives of the Leading Industrial Enterprises of the L'vovskaya Oblast on Developing and Introducing a Total System of Production Quality Control" and the 30 September 1975 decree of the collegium of Minenergomash and the presidium of the CC of the trade union of heavy machine building workers "The Development of Production Quality Control," the production associations, enterprises, and organizations of the industry have done a large amount of work on creating and introducing KSUKP/total system for the quality control of production/ and KSUKR /total system for the quality control of plan development/ based on enterprise standards.

KSUKP(KSUKR) have been developed and introduced under the scientific and methodological direction of the Technical Administration of Minenergomash and NPO /scientific production association/ TsKTI/Central Scientific Research, Planning and Design Boiler and Turbine Institute imeni I. I. Polzunov/--the lead organization for production quality control in the industry. The aim of KSUKP(KSUKR) is to improve the activities of associations, enterprises and organizations in providing a continuing quality conformity for the products developed and manufactured for the requirements of the national economy.

The development and introduction of a complete set of enterprise standards, regulating the activity of the staff and subunits of the associations, enterprises and organizations of the industry on controlling production quality(and plan development) has assisted in achieving the established goal. Quality control functions have been most fully reflected in the standards of the PO Leningrad Metal Plant, PO Nevskiy Plant, PO Khar'kov Turbine Plant, PO Sibenergomash/Siberian Power Machine Building Plant/, the Chekhovskiy and Belgorod Power Machine Building Plants, the BiKZ/Biysk Boiler Plant/, VPTIenergomash/All-Union Planning and Technological Institute of Power Machine Building/, and NPO TsKTI.

During the development and introduction of KSUKP(KSUKR), the main attention has been focused on measures providing for the fulfillment of planned tasks for the manufacture of products with the state emblem of quality and a decrease in losses from defective output and claims(as, for example, the construction of new and renovation of existing shops and sections, the modernization and replacement of equipment, the introduction of universal assembly devices and mechanized

equipment, the introduction of ESTPP/unified system for technological production training/, and state and plant certification of production quality and the technological processes.) An evaluation of the activities of the production associations and enterprises on increasing the quality of labor and production in accordance with RTM/guiding technical materials/ 108.002.110-78 is conducted quarterly.

A total set of work requirements has been completed for acceptance of KSUKP(KSUKR) according to schedules confirmed by the Technical Administration(a defect-free work system has been introduced, technical tasks and operating KSUKP plans have been developed, training in quality control of production and labor questions according to categories of workers has been organized, visual KSUKP propaganda aids have been drawn up, the certification of laborers, ITR/engineering and technical personnel/, and white collar workers on knowledge of BIP/defect-free manufacture of products/, SBT/defect-free work system/, KSUKP, etc. is being continuously conducted.) Socialist competition has been organized for obtaining the honorary title "Outstanding Quality Worker," "Master--Golden Hands," "High Quality Collective," etc.

The creation in the associations and at the enterprises of offices of quality--centers for the propaganda and dissemination of advanced KSUKP(KSUKR) experience--has also played a large role. Such offices are functioning successfully in the PO Khar'kov Turbine Plant, PO Sibenergomash, at ChZEM/unidentified machine building plant/, BZEM/unidentified machine building plant/, and ZiO/Plant imeni Ordzhonikidze/. The results of the measures conducted by the production associations, enterprises and organizations to improve production quality, based on the development, introduction and operation of KSUKP(KSUKR), are an improvement in the basic technical and economic indicators of the activities of enterprises, the regulation of their organizational and functional structure, and the interrelationships between the enterprise subunits for the output of high-quality power equipment.

In comparison with 1976 when the associations and enterprises of the industry began to create KSUKP, the relative share of articles with the GZK/state emblem of quality/ in the total output volume doubled and is 27.7 percent.* At a number of the industry's enterprises, the relative share of products with the GZK is significantly higher than the average for the ministry(MMZ/unidentified machine building plant/--63.9 percent, Plant Il'marine--61.1 percent, PO Khar'kov Turbine Plant--59.0 percent, PO Turbine Motor Plant--44.8 percent. The output of production with the GZK at such enterprises as the PO Nevskiy Plant(from 8.1 in 1976 to 35.7 percent), PO Krasnyy Kotel'shchik(from 7.9 to 33.3 percent), POSibenergomash(from 6.3 to 30.6 percent), SiLZ(from 3.4 to 29.8 percent), LMZ(from 1.6 to 31.9 percent), etc., has increased significantly.

The number of articles with the GZK grew from 211 in 1976 to 379(at the ChZEM the GZK was awarded to 87 types of articles, at the PO Sibenergomash--40, at the PO Krasnyy Kotel'shchik--28, at the PO Nevskiy Plant--26, at the PO Turbine Motor Plant--23, etc.). The release of OTK/technical control section/ products on first submission on the average for Minenergomash exceeds 95.0 percent(MMZ--99.5 percent, STZ--99.3 percent, Plant Il'marine--98.8 percent, ZiO--98.4 percent, etc.).

*All data presented is as of 1 January 1980.

As a result of the work conducted, the acceptance of production quality control systems by the ministry's commissions and their registration in the State Standards Committee organs was provided for all production associations and enterprises of the industry. The most purposefully and methodically organized system acceptance work was carried out at the PO Turbine Motor Plant, PO Nevskiy Plant, PO Leningrad Metal Plant, PO Sibenergomash, at the Il'marine plants, MMZ, LMZ, ChZEM, ZiO, etc. Work has been successfully carried out on creating and introducing a quality control system at Atommash.

Things are not going as successfully with the introduction of a plan development quality control system in the scientific production associations and organizations of the industry. The system has been introduced and registered at the VPTIenergomash, the NPO Atomkotlomash/Atomic Boiler Machine Building Association/, NPO TsNTI and it is being prepared for introduction at the PO Energomashproyekt/All-Union Design and Engineering Institute of Power Machine Building/. At the same time the acceptance of KSUKP(PSUKK) should be considered only one stage in the continual and systematic work of ensuring the functioning and improvement of these systems, and in strengthening their influence on increasing the efficiency of the production operations of the enterprises and organizations.

Where the managers of the enterprises and organizations do not give the proper attention to the introduction and functioning of a system, the system, as a rule, is only considered to be formally introduced, since it has not been worked out in all of its parts--from the development of technical documentation to the output of power equipment. The system at present does not adequately influence the quality of the manufactured articles, the lowering of losses from defective output and claims, and the decrease in the number of claims.

The ministry has adopted measures which, if carried out, will permit the associations and enterprises of the industry to eliminate, in the shortest period of time, the causes responsible for the manufacture of non-quality products, to liquidate the shortcomings observed, and to strengthen production and industrial discipline. It is first of all necessary to provide effectiveness and efficiency to the functioning of total production(plan development) quality control systems in the associations, enterprises, and organizations. The main thing in this case is not to approach the introduction of KSUKP in a formalistic manner, to equate them, to the maximum extent possible, to production activities, to provide a strict control over the constant increase in quality of the manufactured production and all results of the activities of the association(enterprise), and to increase the responsibility of each person for the quality of the work fulfilled. In this connection the role of the OTK services, which require in turn the strengthening of control over the functioning of these very services, grows significantly.

One must consider the absence of specialized production quality control services to be a serious shortcoming in providing efficiency to the functioning of the system.

NPO TsNTI has been commissioned this year to develop an industry standard OS U.P EM (production quality control services department for power machine building) which must clearly define the role of these services in a production control system.

The technical administration of Minenergomash and the NPO TsNTI must thoroughly analyze the results of the work on the adoption of a quality control system, work up an order which notes the achievements and existing shortcomings, and draw appropriate conclusions which must be considered during the development of a technical task for the improvement of the production quality control system in power machine building in the years 1981-1985.

The basic organizations, primarily NPO TsNIITmash/Central Scientific Research Institute of Machine Building Technology/, VPTIenergomash, NPO Atomkotlomash, must more effectively assist the enterprises in strengthening the OS UKP EN trends in these organizations, specifically for technological standardization, a system of defect-free work, etc.

The strengthening of control by the ministry and the head and basic organizations for the functioning of ASUKP(ASUR) in the associations, enterprises, and organizations of the industry through the use of systematic inspections locally, and an analysis and generalization of the results of these inspections is also a major task.

In order to accomplish the 20 July 1978 decree of the CC CPSU and USSR Council of Ministers "The Further Development of Machine Building in the Years 1978-1980," it is necessary to complete work, in a timely fashion, on increasing the technical level and quality of power equipment by introducing into the standards and specifications for this equipment of increased indicators for resources, metal-content, and the economic expenditure of power and fuel, to strengthen control over the introduction of standardized technical documentation, and also to provide a strict observance of industrial and design documentation under the personal control of the enterprise administrators and chief specialists.

In 1980 and the following years the industry must bring about a complete set of measures to accomplish the 12 July 1979 decree of the CC CPSU and the USSR Council of Ministers "Improving the Planning and Strengthening the Influence of the Economic Mechanism for Increasing Production Efficiency and Work Quality," to effectively utilize those economic levers which have been provided in it, and to achieve the fulfillment of the tasks of the state economic and social development plan, first of all of the scheduled plan, of the contract commitments, and the plans for increasing quality.

It should be noted that a part of the measures envisioned by this decree has already been introduced into the industry. Specifically, the transition has been made to the planning and evaluation of the association and enterprise activities according to the standard net production indicator which replaced the gross production indicator and began to more objectively show the labor expenditure of each collective during production activities. This indicator helps in determining production volume, the labor productivity growth rate, the proportion of articles in the highest quality category, monetary bonus funds, and other statistics. A standardized method for planning wages has been introduced into the industry, and a system for the planning, financing, and economic stimulation of work in accordance with new technology is in operation.

The question of creating high-quality articles and, consequently, providing them with high operational reliability, is the most important and crucial question of all the activities of the scientific industrial and production associations, enterprises, and organizations of the industry.

Having assumed labor duties in honor of the 26th CPSU Congress, the power machine builders are solving the problems of increasing the quality of products manufactured by the industry at the level of the requirements of modern tasks facing power engineering and are working under the motto "Equipment created by the power machine builders is outstanding!"

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