JPRS L/10104

9 November 1981

USSR Report

CONSTRUCTION AND EQUIPMENT

(FOUO 5/81)

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000400070019-0

JPRS L/10104

9 November 1981

USSR REPORT

CONTRUCTION AND EQUIPMENT

(FOUO 5/81)

CONTENTS

METALWORKING EQUIPMENT

DEVELOPMENT OF MACHINE BUILDING INDUSTRY DISCUSSED

Moscow VOPROSY EKONOMIKI in Russian No 8, Aug 81 (signed to press 11 Aug 81) pp 24-34

[Article by S.Kheynman: "Problems of Machine Building Development"]

[Text] The 26th party congress, having stressed the exceptional importance of machine building in the development of the national economy, formulated the basic problems that are faced by this industrial sector in the eighties. The reequipment and systematic improvement of the production apparatus of all sectors of the national economy, including the production apparatus of machine building itself, imply the production on a sufficient scale of modern, constantly renewable (at rates corresponding to the rates of scientific-technological progress) means of labor and equipment for nonproductive purposes, including household and other equipment for personal use.

The higher technical level of the means of production is an important condition for the intensification of the latter -- an increase in the yield and a reduction in the cost of unit power, a reduction in the cost, use of material and man-hours per job for the product,and the reduction in the length of the production cycle. The role of machine building in completing the transfer of the economy to an intensive path of development also expresses itself by providing the following:

technological conditions for the output of high quality products, wide production of equipment for the preservation of the final and intermediate products and the minimization of their losses;

dynamic correspondence between the technological and dimensional parameters of the equipment to similar parameters of parts and processes which are processed and executed on it;

the possibilities at the design stage of its subsequent economic and flexible modernization and of switching over to making new products;

economic, trouble-free and efficient operation of the equipment, guaranteed servicing and repairs.

Among the basic problems of the economic and social development of the country in the eighties, the 26th party congress outlined broad transformations in the most

important sphere in the life of the people -- in labor: "...Improve and lighten working conditions, provide wide possibilities for highly productive and creative work, erase considerably essential differences between mental and physical labor, and transform agricultural labor into a form of industrial labor." This system is inseparably related to the radical problem of ecomomic development -- a stable growth in the productivity of social labor. Conditions, the content and nature of labor which are adequate for the demands and possibilities of modern man, are the basic premises for increasing the productivity of labor and becoming one of life's benefits which depend primarily upon the means of work and the role played by the social-economic criteria in the production of machines, their design and manufacture.

The demographic situation in the eighties and the problems of social-economic transformations in the sphere of labor pose several problems in machine building. First, it is necessary to provide a sufficient output of modern equipment (the means for large and small-scale mechanization) of high quality for the systematic reduction of the number of manual workers whose ratio is half of all the workers in a number of industrial sectors.

Also required is the accelerated development of production automation, including its highest forms: equipment with numerical programed control, automatic lines, automatic manipulators (industrial robots) etc. The 26th party congress outlined a broad program in this area. Wide introduction of automated means of production is one of the most important premises for automating material production in industrial sectors.

The equipment which, at the start of the eighties, is at the design stage on the drawing boards of the design bureaus, determine the nature of labor in the eighties and nineties. Therefore, their utilization and their associated technologies must create conditions that will meet the requirements of a worker at the end of the 20th century and the start of the 21st. Designers, technologists and workers of NII [Scientific Research Institute], KB [Design Bureau] and enterprises that embody technical and technological solutions in metal must provide the following in their developments: mechanization of heavy and unskilled manual labor; observe (in equipment and technology) all human engineering premises for the total safety and comfortable working conditions with systematic elimination of the monotonous elements of labor; the transformation of agricultural labor into a form of industrial labor.

The material basis for raising product quality is created primarily by machine building. The technical characteristics of the means of production and, of course, of technology must provide the production of high quality products by the given equipment. The 26th party congress posed the problem: "...Improve and strengthen the 'upper stories' of the respective industrial sectors: the so-called fourth conversion in metallurgy, the finishing work in construction and final production in light industry. They determine, to a great extent, the quality and sometimes also the quantity of the products." This applies equally to the production of drying and impregnating equipment for wood-working, to the creation of rolling mills that provide a high technical standard of surface and strength properties of manufactured rolling stock, especially in equipping machine building itself with finishing equipment and, generally, in the quality of machine building products.

Questions of social development and the raising of the people's welfare still pose a number of problems for machine building. In particular, it was noted at the 26th party congress that it is necessary to improve considerably equipment in food and light industries enterprises, develop sectors for the production of technically perfect products for long-term use such as household articles, strengthen the material equipment base of state and cooperative commerce, raise the industrialization standard of public nutrition, take measures to accelerate and introduce widely scientific-technological achievements in medicine, increase the provision of public health establishments with instruments, medical equipment, transport and communications facilities, with a wide introduction of modern equipment in schools and educational enterprises.

The production of a new in principle class of technical facilities -- medical, instructive and other equipment -- so far has not been sufficiently assimilated by domestic machine building and it is supplemented by imports. As a result, the standard of equipment of all industrial sectors in this area do not fully meet modern requirements.

The development of a long-range program of machine building development and bringing its structure and organization into correspondence with the problems it faces, as well as the completion of the transfer of this complex to the road of intensive development assume an analysis of the present state of machine building and a determination of the most important directions of its further development.

USSR machine building (including metal working) is distinguished by a capacity of high resources: about 40% of all workers and half the engineers, technicians and employees in the industry, 23.3% of the fixed production capital and 27.9% of its gross output. Obviously, machine building is characterized by a higher man-hours per job standard and a relatively lower capital-labor ratio. This is attested to by the fact that intensified progress in machine building production itself is acutely needed and, at the same time, it represents an essential factor in transferring its entire industrial production to the road of intensive development.

We will consider the resources at the disposal of the domestic machine building industry as well as the special features and the demands for its products. In this case, in our opinion, a national economic approach is necessary to characterize social labor resources whose expenditures are related to the development of machine building, i.e., it is necessary to take into account the labor and material resources related to the production of the equipment, as well as to its maintenance at the users or, to put it differently, resources spent on "machine production" and "machine servicing."

The machine building complex and the areas associated with it absorb a considerable share of the national economic resources. At the same time, having at its disposal huge labor and material resources, and continuously increasing them, machine building is not able to solve many important national economic problems it faces at the present time. As a result, it frequently becomes a factor that limits the possibility of solving a number of radical production development problems.

In the eighties to nineties, it is planned to maintain accelerated rates of machine building development. Thus, in 1981-1985, for an increase in the national income

of 18 to 20% and industrial production of 26 to 28%, it is planned to increase machine building output by 1.4 times. Over 40% of the entire increase in industrial output will be provided by increasing the output of machine building products.

At present,there are actually three machine building complexes in the country. The first one -- the machine building plants of machine building industries, "real" machine building guided at all levels by machine builders, organically related to a system of machine building NII and KB. It contains less than half the machine building equipment pool.

The second complex is machine building plants of nonmachine building ministries and departments. They contain several million workers and have at their disposal a considerable equipment pool.

These enterprises are outside the sphere of influence of machine building NII. Ministries in which these enterprises are included are technical "staffs" of metallurgical, textile and other production customers and not equipment producers.

The quality and efficiency of any technological equipment are determined not only by the knowledge of technologies and the directions of the technical progress in industrial sectors -- users of the equipment, but, to a greater extent, depend on the technical standard and technology of the machine building production itself. It is precisely these properties that, by its very nature, the "second machine building complex" does not have. An analysis we carried out for 29 sectors of machine building indicated that at plants within the machine building industries, the level of labor productivity and the output-capital ratio are higher by 20 to 25% respectively than in plants within the sectors -- equipment users.

Proposals are frequently made in publications on transferring machine building plants and associations to ministries that use the given equipment. This position is substantiated by the insufficient orientation of equipment producing industries toward satisfying the demands of users and the frequent violation of the fulfillment of orders, and schedules of delivery of the corresponding equipment. However, the policy of orientation toward the user, outlined in the last party congresses, cannot be achieved by converting a user into a producer. This could also lead to the further expansion of the natural [in situ] facilities in machine building which was already decisively censured by the 25th party congress. The transfer of coal machine building to the USSR Ministry of the Coal Industry did not justify itself. Such a practice leads only to lowering the quality of the product and the efficiency of machine building.

Finally, the third system of machine building -- machine and machine repair shops and subdivisions, within nonmachine building enterprises. They contain 45% of the total pool of the metal working equipment in the country and, it is estimated, no less than 5 to 6 million workers. This may be called "in pure form" the natural sector of machine building. The pool of metal-cutting machine tools and forging-press equipment in the USSR is greater than in the United States, Japan and the FRG together.

The high resource capacity of the machine building complex is due primarily, in our opinion, to a trend (and, moreover, a strengthening one) of the development of the

facilities in machine building itself, as well as in "machine-using" industrial sectors. The effect of this trend has a dual nature. First, in machine building itself, there prevail historically formed comprehensive enterprises having, as a rule, casting, forging, tool (frequently also machine tools at plants that do not produce machine tools) and auxiliary shops up to sawmills and woodworking facilities at the largest machine tool plants (for the manufacture of packing for the machine tools). However, about a third of the machine tool pool of the machine building plants themselves is outside the basic production in their auxiliary shops. Loading these shops with the manufacture of single products unavoidably reduces the productivity of labor and the yield per unit of equipment. Auxiliary workers (in auxiliary and basic shops) make up about half of all the workers in machine building.

Secondly, machine building (this is also related to the nature and structure of its products) is forced to serve the natural facilities which are developing in other sectors of the economy. For example, it is necessary to manufacture and renovate wood frames in mini-sawmills, garage equipment in mini-garages etc. Repair and machine shops that captivated enterprises of all ministries and departments require universal machine tools and casting, forging-press and welding equipment of all types.

To supplement and partially renovate this pool of equipment, machine building capacities are loaded with the manufacture of a huge quantity of ordinary (and which therefore, do not require high technical characteristics, "convenient" for production) equipment. In this case, the ordinary manufactured equipment itself, in its turn is very little utilized by the user. It is not by chance that in the USSR, for a smaller volume of production and a generation of electric power, almost half that of the United States, that there are produced and operated several times more electric motors as drives for various equipment (with powers of 0.75 kw and greater).

Loading machine building with the production of ordinary equipment, including metalworking equipment, and saturating sectors of the national economy with it where it is utilized far from fully determines, to a considerable extent, the present state of machine building, the nature of the demand for its products, the trend of its development, its resource capacity and efficiency and, by the way, also to a great extent, the so-called "deficit" of machine tool operators.

In our opinion, the way out of this situation is to create new capacities and build enterprises oriented toward specialized production. At the same time, it is necessary to increase the specialization level of existing production facilities and capacities. For this purpose, it is necessary to make the cooperation mechanism more rigid, strengthen penalties for nonfulfillment of deliveries on cooperative contracts and change prices (and corresponding payments for funds and other resources) for the products of their "own" natural facilities. Such measures will make it possible to eliminate the artificially created high profitability of the latter. It is advisable to limit deliveries of new equipment to natural facilities, orienting them toward purchasing equipment freed by the basic machine building plants.

The status and prospects of developing the machine building production mechanism are inseparably related to the progress of machine tool building. While materialization of scientific-technical progress depends on machine building, the technical and economic possibilities of machine building itself depend on machine tool building.

In its turn, machine tool building depends on its complementing sectors -- the electrotechnical, electronic and instrument building industries. It must be stressed that the technical standard of the metal-working equipment produced and its efficient functioning depend, to a great degree, specifically on these sectors (electric drives and high torque motors, electronics, controlling, monitoring and recording devices etc.). All this equipment determines the standard and possibilities of the machine tools, presses etc., but are produced by domestic industry in insufficient quantities and are not always of high quality.

Specialized production of tools and technological fixtures lags noticeably behind the scales of machine tool building and the machine tool pool. Standardization and specialization in the production of intermediate products, functional units and parts of machine tools, and technological fixtures are insufficiently developed. An increase in the scale of such production facilities would make it possible to reduce the load on machine tool plants and provide for the production of special and specialized equipment for the needs of various production facilities and of the NII.

Attention should be given to the positive experience in this area accumulated, in particular, in machine tool building. Thus, several kinds of machine tools of the "processing center" type are being designed and made on the progressive basis of standardized units whose manufacture is assigned to specialized enterprises already at the stage of creating prototypes. For example, one of the machine building plants produces steel guides and a series of linear motion drives for actuators. Another -- devices for the automatic change of processed parts. A third plant -- mechanisms for the automatic change of tools etc. In this case, the time between overhauls was increased by 60% and for inactive tools of the same size, but different arrangements, it was increased by 90%. Similar possibilities also exist in other subsectors of machine tool building.

The complex of problems of repairs, modernization and the output of spare parts for the equipment is related to the renovation of the pool. Existing repair practices, as a rule, do not provide for the proper quality and life of the repaired equipment, thereby increasing the idle time of the equipment. Creators of many types of equipment do not produce the necessary set of replaceable and repair units and parts for it. Therefore, most of the units and parts for repairs are manufactured in their "own" machine repair shops.

We think that the time has come to include in the production standards for each given equipment the conditions for manufacturing (by the equipment maker) a sufficient set of replaceable and repair units and parts, as well as the order for guaranteed repairs and servicing of the equipment. These standards must be observed strictly and would require, on the one hand, a corresponding system of material incentives and, on the other hand, the introduction of penalties.

As noted previously, the available machine building capacities cannot provide the necessary rates of renovation and replacement of the equipment pool. At the same time, with the presence of a powerful production apparatus and with high rates of technical progress, the problem of pool renovation cannot be solved only by replacing it with new equipment. For countries that have such capacities as are at the disposal of the USSR and the United States, a full replacement of the pool of equipment would absorb not less than a 20-year output of machine tool building.

Therefore, the modernization of equipment becomes very urgent. At present, the modernization process is achieved, as a rule, by enterprises operating the equipment which, not being machine building enterprises, cannot modernize to a high technical standard. For modernization to be efficient in renovating the equipment, its technical bases must be provided by the efforts of machine building itself. Equipment producers already incorporate modernization possibilities at the design stage creating, so to speak, "genetic premises" for modernization in order that the main working parts can be replaced, continuing the operation of the basic units using the most metal. By manufacturing new, more productive models, the plants would provide the needed quantity of units for the modernization of the operated equipment thereby. It is advisable to accompany capital repairs of the equipment with modernization. Thus, production and continuous provision of the users with a set of replacement and repair units and parts sufficient for operation, repairs and modernization of the equipment, must become an integral characteristic of modern machine building.

It should also be noted that the volume of installation and dismantling equipment is insufficient in the machine building output. Therefore, making repairs increases the number of manual workers considerably. According to the USSR TsSU [Central Statistical Administration], about one quarter (23%) of the manual workers (not less than 3.2 million people) are occupied with repairs.

Based on the above described problem of the further development of machine building, we will consider the basic directions of a comprehensive program for developing and improving its structure and organization over a long-range period. The program should, first of all, outline the structure of the equipment produced. In a consolidated plan there could be the following: technological equipment with a full set of finishing and auxiliary equipment, a required set of units and parts for repairing and modernizing the equipment in all sectors of the production of material; sufficiently flexible capacities for the production of scientific-experimental equipment and devices for equipping the nonproductive servicing sphere, including educational institutions, health safety, the leisure industry and rest and recreation; household equipment for personal use; environmental protection equipment.

In manufacturing all these types of equipment it is necessary to take into account their social-economic effectiveness, providing optimal working conditions, as well as observing all ecological criteria at the very bases of the equipment and technology.

In the area of structural materials, technology and material consumption in machine building, the required effect may be achieved by changing over to metal-saving designs, the reorientation of designs (wherever this is expedient) from castings to rolled stock, from merchant shapes to sheets, thin sheets, stampings and welded designs; a systematic reorientation of technological solutions toward plastic deformation, stamping and welding methods on the basis of prospects for increasing the share of sheets in using metal; change the production apparatus of machine building and machine tool building to correspond with above-cited metal-saving orientation in machine building as a whole.

Among the especially important problems of machine building development, it is necessary to consider the huge problems in organizing machine building production.

This concerns, first of all, the specialization level and its necessary bases -- standardization and normalization of equipment units and parts. During the last several five-year plan periods, in spite of a number of solutions by directive organs, the progress of specialization in machine building in all its directions was very little.

The level of product specialization is low. Thus, 22 plants of the Mintyazhmash [Ministry of Heavy and Transport Machine Building] manufactureonly 17% of the material handling equipment. The remainder (83%) is manufactured at 400 plants of 35 ministries and departments. A similar situation exists in road-building and municipal engineering equipment. A considerable share of metal-working equipment (especially metal-cutting machine tools) is manufactured outside the enterprises of the Ministry of the Tool and Machine Tool Industry. The Minkhimmash [Ministry of Chemical and Petroleum Machine Building] manufactures heat exchange apparatus at 14 plants. The manufacture of many types of household equipment is also very scattered.

Essential shortcomings are also found in the development of technological and parts specialization. The centralized specialized production of castings and forgings makes up 3% of the entire volume of these intermediate products and of castings, in particular, -- 4.5%. There are practically no specialized plants that manufacture forgings and stampings.*

We have no specialized sector for the production of metal coatings, fastenings, threaded parts etc. Specialized production of machine units and parts is not being sufficiently developed.**

The path of high specialization and cooperation for machine building on such a huge scale as it is in the USSR is the only efficient one. This course was laid out in the directives of the 26th party congress: "Continue the specialization of machine building production, create new enterprises and develop existing specialized ones, and large shops that make castings, forgings, parts, units and assemblies for industrial and interindustrial purposes."

Functional specialization is an important and promising direction for machine building. This direction becomes especially urgent in connection with the course taken to create a system of machines for the comprehensive mechanization and automation of entire industrial sectors and production facilities.

Functional specialization is one of the most important conditions for raising the flexibility of machine building, the flexibility of the produced equipment and the capacity for rapid adaptation to new situations. This orientation, whose time has come, poses an acute alternative. A machine system for any modern industrial

*In the United States interindustry enterprises satisfy 70% of the total requirements in forgings, 70% of ferrous metal forgings, and about 50% of their requirements in forgings and hot stampings. Since 1972, a census is taken in a special sector --the production of automobile stampings. In 1977, it counted 579 enterprises, 132,000 workers and product sales of 9.7 billion dollars.

**In 1976, in the United States, automobile plants had 274,000 workers with a conditional net output of 15.8 billion dollars, while in plants making automobile units and parts -- 340,000 workers and 13.7 billion dollars respectively.

sector, as a rule, consists of a wide spectrum of technical devices, different in functions and technology, as well as manufacturing methods. Therefore, a corresponding association or enterprise must either manufacture this entire spectrum itself or a "base" must be created consisting of enterprises, specializing in the production of functional units that may be used in manufacturing the most varied types of units. Precisely this path was used in the production of bearings. They were standardized. Only a bearing catalog containing their sizes and other technical parameters is needed in the design process, and the designer selects the required bearing from it.

A network of functionally specialized enterprises and associations will make it possible to assemble (on the modular principle) a considerable part of the machine system from finished functional units. This path of machine building development is determined by the high rates of scientific technological progress and the more and more frequent renovation of the equipment and the manufactured products. It was noted at the 26th party congress that in creating new machines, equipment, apparatus and devices, it is necessary to use the modular principle widely, utilizing standard units, producing multifunctional machines and equipment that can be readjusted when technological processes and types of produced products change. The introduction of such equipment will raise the efficiency of machine building production considerably. The realization of this direction should be specified in the plans of the ministries for the 11th Five-Year Plan period.

An urgent and, at the same time, an extremely complex problem is the change in the situation with regard to specialization. One of the weak links in the economic mechanism is the lack of reliable penalties for suppliers and almost a total absence of the possibility for users to select equipment. The formation of a means of production reserves, including reserves of production capacities, specified by the decree on improving the economic mechanism, creates premises for solving the given problems.

However, this will require a long time by virtue of objective reasons. It is our opinion that fairly important and realistic steps in the development of specialization may be, and must be, taken within the framework of ministries, as well as large machine building centers. An expedient specialization of intermediate product, tool and other plant shops, close in nature to the products, may have and does have a considerable effect. This is attested to by the practice of enterprises of a number of large machine building centers (in particular, by the Leninskiy and Rostovskiy), as well as enterprises of the Minsel'khozmash [Ministry of Agricultural Machinery] and the Minelektrotekhprom [Ministry of Electrical Equipment Industry].

In the Minelektrotekhprom, for example, each large enterprise had independent production facilities for such products of interindustrial use as castings, welded metal structures, forgings, hot stampings and fastenings. All plants had their plating shops or sections and manufactured for themselves technological equipment and tools, having accumulated considerable reserves of both. In accordance with the decision of the board of the ministry, industrial territorial councils of directors were formed. On the initiative of the northwestern council of directors, combined production facilities were created which could satisfy the demands of all electric equipment enterprises of this economic region for such products, which

made it possible to increase the output-capital ratio and the productivity of labor. The Minsel'khozmash experience also merits attention. The tool shops of its plants specialize in the production of one or another type of tool. It is expedient to form such production facilities within the ministries that accept and execute individual orders for special equipment.

Existing industrial machine building specialization, the presence of certain monopolistic elements in the production of equipment and the inability, to a considerable degree,of the user to select equipment,create trends that lead to a certain break between producer and user. The first does not study the special features of the requirements of the second sufficiently, frequently sacrificing the possibility of greater series production. As a result, according to available data, technical parameters of many machine tools greatly exceed the dimensional characteristics of the castings, forgings and parts they machine. In the dynamic process, machine tool parameters (as well as parameters of other types of equipment) increase frequently without taking into account changes in the dimensions of the parts machined on them.

Overestimated parameters of equipment as compared to actual requirements leads not only to the increased size and weight of the equipment, but also to greater manhours per job, uses greater amounts of metal and has a greater capital-output ratio. In its turn, this increases the load on metallurgy, increases capital costs and reduces the output-capital ratio of the given equipment at the user.

This situation is related to another larger general economic problem. The production of a required series of equipment sizes, making it possible for the user to select equipment with the parameters he needs must be accompanied by a sufficient level of quality of this equipment. Otherwise the user selects the most reliable machine tool although it may have greater capacity with respect to dimensional parameters. An example of this is the screw-cutting lathe. The product of the Moscow "Krasnyy Proletariy" Machine Tool Building Plant acquitted itself well over products of plants producing smaller size machine tools. Meanwhile, the ministry as well as local territorial organs, under existing planning practices, strive to maintain plants that produce poorer machine tools and help them to "come out" with better indicators and thus "not spoil" the indicators of the ministry.

Another still unsolved problem from the complex of organizational machine building problems is related to the production of special, nonstandard types of equipment, the requirements for which increases constantly with the development of production and the acceleration of scientific technological progress. At present, there are practically no machine building plants and associations that accept orders for such equipment from enterprises and NII, although it is needed widely -- from small fittings to complicated experimental installations. As a result, equipment users must make these nonstandard products themselves developing corresponding machine building capacities. Practically, handicraft production and repairs of the special equipment, and making replacement and repair units and parts for it -- are already characterized as being above the "third"machine building complex. It should be noted that according to estimated data, the level of equipment utilization in such a complex is considerably lower than one shift.

Orientation toward the final results as applied to machine building means that its functions cannot be completed by just producing equipment alone. Machine building

is called upon to play a leading role in the investment process. This also means a certain responsibility of machine building for the assimilation and efficient functioning of the equipment at the user, providing the optimally possible life, as well as the actual life of this equipment. These problems were raised in full at the 26th party congress. N. A. Tikhonov stressed that machine building is called upon not only to produce modern equipment, but also to cooperate actively with the user in its efficient operation. This requires the wide participation of machine building enterprises in the installation of complex equipment in the process of construction, as well as implementing measures on radical improvement in servicing equipment, and centralized plant repairs.

Apparently, the time has now come for a gradual changeover everywhere to a system of guaranteed servicing and repairs of the equipment, and developing a machine servicing department. Equipment producers who create the equipment and a scientifically substantiated mode of its operation must participate in the development of technological equipment and, where necessary, (for example, machine tools with numerical programed control) in the programs, conditions, principles, order and technology of repairs. In our opinion, the life of the equipment must be one of guaranteed parameters but, of course, only when the user follows the specifications for using the equipment. This will provide a feedback from the user and will facilitate raising the quality of the produced equipment.

We are not touching upon the important complex of problems on improving the organization of production at the machine building enterprises themselves. There are many urgent and unsolved problems in this area whose importance grows with the progress of the automation of production. It is important for the wide development of automation not only to organize the mass production of the means for automation, but also to improve systematically the organization of production by using automatic machines and devices.

In planning long-range machine building, extensive trends prevail to a certain extent -- to increase unit capacities and the volume of production, expand the product list and increase the output of new, more modern equipment. As shown by report data, the situation does not change essentially inasmuch as the scarcity of equipment remains; the demands of equipment users are far from being fully satisfied; its export does not increase, while its import is increasing. Machine building, as before, does not play a sufficiently active role in introducing new equipment, in its assimilation and utilization, limiting itself to the basic production of equipment, not creating even material, not even to speak of organizational premises for its effective utilization, such as the level of standardization, output of spare parts, plant repairs, machine service etc.

It follows from this that to continue to maintain accelerated rates in the growth of machine building, preserve its priority in the distribution of capital investments, it is advisable to change over to planning improvement in machine building, devote more attention to its organization, as well as to the all-around satisfaction of the demands of the equipment users. For this, the following is necessary:

step-by-step expansion of specialization -- product, part, technological and, especially, functional; the development of the theory and practice of functional-cost analysis;

expansion of the dimensional range of the produced equipment -- power, technological, transport (for an equal level of equipment quality) that would make it possible to reduce excessive technical parameters sharply and improve equipment utilization;

an increase in all sectors of machine building of the share of finishing equipment which is the technical basis for a sharp increase in quality and life of the equipment;

an increase in the orientation of the produced equipment toward the realization of the social-economic criteria of its effectiveness;

an increase in the flexibility of the produced equipment and the technology and organization of machine building production itself;

wide development of standardized and specialized production of highly progressive functional equipment units.

Many demands are made on machine building and justified complaints are made about the lagging behind the growing demands of social production. However, it is also necessary to evaluate those requirements that machine building can and must present to other industrial sectors and, first of all, to the equipment users. Besides the investments needed for accelerated development in machine building, careful preservation and operation of the equipment is also required. For example, on the average, about 80% of the tractors, combines and trucks supplied to agriculture is used to cover the replacement of written-off equipment without increasing the pool of equipment.

Machine building progress is unthinkable without a considerable increase in the volume of production and an increase in supplies of electrical equipment and electronic components to all sectors of machine building and, primarily, to machine tool building.

The decree of the Central Committee of the CPSU and the USSR Council of Ministers on strengthening the work of saving material resources and utilizing them efficiently outlined how to improve radically all the work on saving, and the efficient utilization of raw materials, materials, fuel and power in all links of the national economy. The comprehensive utilization of raw materials, fuel-power, construction and other materials; the introduction of low-waste and no-waste technologies; a sharp reduction in losses in areas of production, distribution and consumption; step-by-step reduction in the material used in machines and equipment -- all these are complex and important problems and may be solved only on the basis of proper equipment and progressive machine systems.

2291
CSO: 1821/007

METALWORKING EQUIPMENT

ABSTRACTS FROM 'VESTNIK MASHINOSTROYENIYE MAGAZINE'

Moscow VESTNIK MASHINOSTROYENIYA in Russian No 8, Aug 81 (signed to press 31 Jul 81) pp 76-77

UDC 621:658.516.007.52

PROBLEMS OF UNIFICATION AND STANDARDIZATION IN INDUSTRIAL ROBOT TECHNOLOGY

[Abstract of article by Yurevich, Ye. I.]

[Text] One of the pressing problems in robot technology is examined--working out and totally implementing the unification and standardization of industrial robots, manipulators and their components and also typical robotized technological complexes. The primary advantages that the use of standardized robot modules give are formulated. An exemplary list of standardized robot modules and manipulators is given. Two illustrations. Two bibliography references.

UDC 62-82./83.007.52

PROBLEMS IN DESIGNING INDUSTRIAL ROBOTS WITH TELESCOPING COMPONENTS

[Abstract of article by Ageykov, L. G., Petrosyan, A. O. and Chelyshev, V. A.]

[Text] Problems in reducing the mass of the operating device, lowering the power consumption and increasing the resources of industrial robots are examined. A scheme for arranging the telescoping component and a scheme for adapting the industrial robot to a mass of structures is given. Three illustrations. Two bibliography references.

UDC 62-82./83.007.52

METHODS OF IMPROVING THE DYNAMIC AND STATIC CHARACTERISTICS OF ELECTROHYDRAULIC DRIVE GEARS IN INDUSTRIAL ROBOTS

[Abstract of article by Alekseyev, A. P., Zhitkov, V. B. and Chelyshev, V.A.]

[Text] Problems are examined in improving the static and dynamic characteristics of high-speed electrohydraulic drive gears in industrial robots with the aid of

non-linear adjusting devices: a three channel pseudolinear and a relay device. Use of the suggested adjusting devices makes it possible to expand the transmission band for the drive gear by more than a factor of two and ensures static accuracy to one minute of an angle. One table. Five illustrations. Five bibliography references.

UDC 621.007.52

PROBLEMS WITH REMOTE CONTROLLED INDUSTRIAL DEVICES

[Abstract of article by Lakota, N. A.]

[Text] The special features of using remote controlled industrial robots in technological processes are examined. Their sphere of use, the primary problems that arise during the design of such robots and also possible efficient ways of solving them are analyzed. Three illustrations. Six bibliography references.

UDC 621.007.52

THE ENERGETICS OF GAS (PNEUMATIC) BOOSTERS IN INDUSTRIAL ROBOTS

[Abstract of article by Ivanov, V. I.]

[Text] The energetic characteristics of pneumatic distributors that are operating under relay (ShIM) [pulse-width modulation] and continuous control conditions are examined. Analytical graph relations are derived by which the power loss can be determined for the distributor under various operating conditions. It is shown that the relay control condition is more advantageous from the point of view of power loss in comparison with continuous control conditions. Three illustrations. Three bibliography references.

UDC 62-531.9.007.52

SEVERAL PROBLEMS IN OPTIMIZING THE POWER OF THE OPERATING MEMBER OF A ROBOT-MANIPULATOR

[Abstract of article by Petrov, L. N.]

[Text] A method is examined for improving the energetic characteristics of the operating members of robot-manipulators on the basis of introducing overcompensation for the weight of the moving components into the system for balancing the static loads. A method is suggested for selecting the optimum coefficient of overcompensation by calculating to obtain the minimum amount of electrical rigging for the operating member of the robot manipulator.

UDC 621.98:007.52:658.382.2

PROBLEMS OF ENSURING THAT THE EQUIPMENT OF ROBOTIZED TECHNOLOGICAL COMPLEXES FOR COLD SHEET PUNCHING OPERATE SAFELY

[Abstract of article by Kryuchkov, M. A. and Mal'tsevskiy, V. V.]

[Text] The experience in developing a system for controlling the design of a technological process and for interlocking the primary and auxiliary equipment of a technical robot complex for a sheet puncher is examined. One illustration.

UDC 621.192.001.4

CONCERNING THE ACCURACY OF FORECASTING THE PERFORMANCE RESOURCE OF STRUCTURES BASED ON THE RESULTS OF ACCELERATED TESTS

[Abstract of article by Pankratov, N. M.]

[Text] The results of research on the accuracy of forecasting the performance resource are reported. Recommendations are given for forecasting typical situations that arise during accelerated tests. One table. Two illustrations. Four bibliography references.

UDC 621.822.5

CALCULATING THE SLIPPING OF PLASTIC BUSHINGS ACCORDING TO THE SPECIFIC PRESSURE

[Abstract of article by Istomin, S. N.]

[Text] In formulating the problem of being flush in the theory of elasticity the problems of calculating the specific pressures in the slipping of plastic bushings by considering the setting clearances and the real arc of contact of the shaft's pin with the bushing's sleeve under a varying radial load are examined in the article. Three illustrations. Five bibliography references.

UDC 621.822.004

PERFECTING THE METHODS OF CONTROLLING THE POSITION OF ROLLING BEARINGS DURING OPERATION

[Abstract of article by Zakharov, S. A., Abramov, I. V., Sychev, A. A., and Martynov, V. M.]

[Text] A context is suggested for accepting decisions when researching the process of the vibrational control of the position of rolling bearings that are operating under conditions of limited external vibrational and sound influences and a new method is suggested for controlling the position of rolling bushings during operation. Three illustrations. Five bibliography references.

UDC 621.855

THE SYNTHESIS OF A REGULATING MECHANISM FROM NON-CIRCULAR COGGED WHEELS FOR CHAIN DRIVE GEARS

[Abstract of article by Ututov, N. L.]

[Text] A method is described for regulating the speed of the chain with the aid of specially synthesized non-circular cogged wheels. A method is described for determining the primary geometric parameters of non-circular regulating cogged wheels depending on the parameters of the chain drive gear. Two illustrations. Two bibliography references.

UDC 629.11.012.52

THE RADIAL RIGIDITY OF ELASTIC METAL WHEELS WITH THE JOINTS OF THE ELASTIC ELEMENTS STRENGTHENED

[Abstract of article by Samarin, A. I.]

[Text] Results are given of experimental and theoretical research into the radial rigidity of a model of an elastic metal wheel that is intended for use in special means of transportation under super low temperature conditions and in a vacuum; the calculated relations for determining the radial rigidity of elastic metal wheels are obtained with the hypothesis that the displacements are small and give results that are sufficiently close to the experimental ones for the deformations that occur in practice. Three illustrations. Two bibliography references.

UDC 678.072:539.4

THE LONG TERM STABILITY OF REACTIVE LAYERS WITH FIBROUS FILLERS HAVING VARYING CHARACTERISTICS

[Abstract of article by Yartsev, V. P.]

[Text] The effect of unoriented fibrous fillers that have varying characteristics and dimensions on the physical constants of the reactive layers that define their resistance to mechanical destruction is investigated from the kinetic concept position. It was established that the introduction of fiberglass leads to a substantial increase in the maximum energy needed for activating the destruction of the composition. One table. Three illustrations. Eight bibliography references.

UDC 621.867.42.001.24

THE TECHNICAL REAMING OF SCREW SURFACES

[Abstract of article by Molchanov, V. I.]

[Text] Calculations for reaming straight and skewed screw surfaces when manufacturing augers are set forth. Six illustrations.

UDC 621.774-462:621.941.004.18

DETERMINING THE SIZES OF PIPES USED AS BLANKS WHEN MANUFACTURING CYLINDRICAL ARTICLES BY MACHINING

[Abstract of article by Sokurenko, V. P., Gorovenka, G. A., Tertyshnik, I. M., and Gubar', E. I.]

[Text] Recommendations are worked out on the basis of a probability approach for determining the sizes of pipes used as blanks when manufacturing cylindrical articles by machining. A well-founded selection of pipe sizes for blanks ensures, with a given reliability, a minimum amount of waste metal when machining pipes.

UDC 621.941.1

OPTIMIZING THE TECHNOLOGICAL PARAMETERS OF MACHINING PIECES ON A LATHE WITH UNFIXED CUTTING

[Abstract of article by Kytin, A. A.]

[Text] A method of optimizing parameters is worked out on the basis of research into the irregularity of changes in the indicators for the process of machining parts under unfixed cutting conditions. Use of the suggested method and optimizing program is expedient mainly for lathe machine tools with ChPU [Computer programmed control]. Calculations have shown that in this case the technological cost of machining is reduced by 20 percent in comparison with the norm. Two tables. Three illustrations. Five bibliography references.

UDC 621.9.01:621.9.025.7

RESEARCH INTO THE BREAKDOWN OF THE CUTTING PORTION OF THE HARD ALLOY TOOL DURING MILLING

[Abstract of article by Kabaldin, Yu. G.]

[Text] A method is set forth for investigating the thermal condition of the cutting tool under milling conditions. It was established that the formation of longitudinal cracks in the cutting portion of the hard alloy tool is due to fatigue and the chipping of the edge is due to its brittle nature.

Ways are suggested of reducing the tendency of the hard alloys to form cracks under milling conditions. Five illustrations. Five bibliography references.

UDC 621-923:669.14.018.25

THE EFFECTIVENESS OF SOZh [lubricating-cooling liquid] WHEN BURNISHING STEEL FOR TOOLS

[Abstract of article by Fedoseyev, O. B. and Kravchenko, Yu. G.]

[Text] The results of experiments of burnishing using water emulsions, mineral oils and without SOZh under conditions that limit the quality and precision of machining are given.

Recommendations are given for designating burnishing methods. Three tables. Two bibliography references.

UDC 621.73.043:519.47

SELECTING THE OPTIMUM VARIATION FOR THE TECHNOLOGICAL PROCESS OF VOLUME DIE STAMPING

[Abstract of article by Aksenov, L. B. and Aksenova, O. A.]

[Text] A multicriteria approach to evaluating the technological processes of volume die stamping is set forth. It is suggested that the selection of the optimum process be done according to overall criteria for the technical level of the forged pieces,

the technical level of the technological process and also the amount of expenditures by using multipurpose optimization methods. One table. Three illustrations. Seven bibliography references.

UDC 621.833.15:621.979.134

CONCERNING SEVERAL FEATURES OF COGGED REDUCING GEARS IN THE DRIVE GEAR OF CRANK MACHINES

[Abstract of article by Tytyanov, V. N.]

[Text] Diagrams are examined of cogged reducing gears used in the drive gear of various types of crank machines for machining by compression; several features in arranging and loading reducing gears are shown, their classification formulas are given and the possibility of making a comparative evaluation of the reducing gears with the aid of these formulas when selecting a specific crank machine is noted. Three tables. Five bibliography references.

UDC 621.002.5.003.13.001.24

CONCERNING THE ACCURACY OF CALCULATIONS FOR THE ECONOMIC EFFECTIVENESS OF NEW TECHNOLOGY

[Abstract of article by Gilula, M. D. and Gilula, M. M.]

[Text] A method is examined for evaluating the accuracy of calculations for the economic effectiveness of new technology. It makes it possible to establish the allowable error in determining the current individual component expenditures and capital investments based on the accuracy and reliability required for the calculations of the economic effect. Two specific examples for construction machines are given. One table. Four bibliography references.

9495
CSO: 1821/132

END