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USSR Report

MACHINE TOOLS AND METALWORKING EQUIPMENT

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USSR REPORT

MACHINE TOOLS AND METALWORKING EQUIPMENT

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INDUSTRY PLANNING AND ECONOMICS

MOSCOW INDUSTRY LEADERS DISCUSS RECAPITALIZATION PLANS

Moscow MOSKOVSKAYA PRAVDA in Russian 27 Oct 85 p 2

[Unsigned article: "Intensification--Command of the Time: Foundation of Technological Progress"]

[Text] Moscow machine builders outline ways of fundamentally improving the technological level of production and of further developing this most important industrial branch.

As we already reported, a meeting of the party and economic aktiv of Moscow enterprises and machine building organizations was held, which discussed the question of the tasks of party organizations and economic leaders of machine building enterprises and organizations in fulfilling the CPSU Central Committee and USSR Council of Ministers decree, "On Measures to Improve Fundamentally the Technological Level and Quality of Machine Building Products and Develop Machine Building as the Basis for Scientific and Technological Progress in the 12th Five-Year Plan and in the Future to the Year 2000."

L.A. Broisov, secretary of the CPSU Moscow City Committee, delivered a report.

Z.P. Shcherbakov, general director of the association for production of automated assembly lines and special tools; P.K. Sinyavskiy, ATE-1 [Moscow automobile and tractor electrical equipment plant No 1] factory party committee secretary; A.A. Tarasov, general director of the Elektrozavod imeni V.Z. Kuybyshev Association; A.I. Ozornikov, general director of the Borets Association; N.M. Glukh, VNIIMetmash [All-Union Scientific Research, Planning and Design Institute of Metallurgical Machinery] party committee secretary; and P.T. Yevseyev, ENIMS [Experimental Scientific Research Institute of Machine Cutting Machine Tools] and Stankokonstruktsiya Factory Party Committee secretary spoke at the meeting of the aktiv.

The April and October CPSU Central Committee plenums set the task of giving priority to the development of machine building, and decided during the 12th

Five-Year Plan, to accelerate by 50 to 100 percent the growth rate of production volume in the branch. The CPSU Central Committee and USSR Council of Ministers decree of August 1985, "On Measures to Improve Fundamentally the Technological Level and Quality of Machine Building Products and to Develop Machine Building as the Basis of Scientific and Technological Progress in the 12th Five-Year Plan and in the Future to the Year 2000," is of greatest importance for machine builders.

For the purpose of creating a stable foundation for accelerating scientific and technological progress in the economy, it is planned to implement measures in machine building to improve reliability fundamentally; reduce the amount of metal and energy required by machinery, equipment and tools; and reduce the labor intensiveness of their manufacture and servicing. Newly developed types of equipment must exceed similar products now being manufactured by 50 to 100 percent in productiveness and reliability.

Significant work has been accomplished during the 11th Five-Year Plan in the capital's machine building factories and associations in redesigning and technologically re-equipping enterprises. The automobile factories imeni I.A. Likhachev and imeni Leninskiy Komsomol; the Krasnyy Proletariy and Stankolit machine building factories and many others are being modernized without any stoppage in production.

FROM THE REPORT OF THE V. SHCHERBAKOV

THE EQUIPMENT DEVELOPED BY MPO [INTER-GOVERNMENTAL ORGANIZATION FOR THE MANUFACTURE OF AUTOMATED ASSEMBLY LINES AND SPECIAL MACHINE TOOLS] AND BY OTHER MACHINE BUILDING ENTERPRISES IN THE CAPITAL IS, IN THE MAIN, AS GOOD AS, AND SOMETIMES EXCEEDS IN TECHNOLOGICAL LEVEL, THE PRODUCTIVITY AND ACCURACY OF SIMILAR FOREIGN EQUIPMENT. BUT IT DOES LAG BEHIND IN BEING EQUIPPED WITH COMPONENTS, IN PARTICULAR, PROGRAMMING CONTROLS, NUMERICALLY CONTROLLED SYSTEMS, COMPUTERS AND GEARS.

SOLVING THESE AND OTHER TECHNICAL QUESTIONS IS MOST DIRECTLY RELATED TO THE TECHNOLOGICAL LEVEL AND COMPETITIVENESS OF OUR EQUIPMENT. THESE URGENT PROBLEMS CAN BE SOLVED ONLY WITH THE MOST ACTIVE ASSISTANCE OF MINSTANKOPROM [MINISTRY OF THE MACHINE TOOL AND TOOL BUILDING INDUSTRY], MINPRIBOR [MINISTRY OF INSTRUMENT MAKING, AUTOMATION EQUIPMENT, AND CONTROL SYSTEMS] AND MINELEKTRONPROM [MINISTRY OF THE ELECTRICAL EQUIPMENT INDUSTRY].

FROM THE REPORT OF A. TARASOV

DURING THE PAST TWO YEARS MPO "ELEKTROZAVOD" IMENI V.V. KUYBYSHEV BECAME CONVINCED THAT THE NEW MANAGERIAL METHODS WERE HAVING A FAVORABLE INFLUENCE ON MAKING ECONOMIC WORK MORE ACTIVE, INTRODUCING UNUSED RESERVES, STRENGTHENING PLAN AND EXECUTION DISCIPLINE AND INTEREST IN ACCEPTING INTENSE PLAN TARGETS.

DEVELOPMENT OF ELECTRICAL EQUIPMENT WITH HIGH TECHNICAL AND ECONOMIC CHARACTERISTICS IS BEING HELD BACK BY A LACK OF NEW MATERIALS AND HIGHLY RELIABLE COMPONENTS. IT IS DIFFICULT TO BELIEVE THAT BEARINGS FOR PUMPS WITH A SERVICE LIFE ONE ORDER HIGHER CANNOT BE DEVELOPED. ELECTROTECHNICAL STEELS WITH SMALL AMOUNTS OF SPECIFIC LOSSES ARE REQUIRED. SMALL LOTS OF PRODUCTS AND LOW

TONNAGE PRODUCTION ARE DISADVANTAGEOUS TO THE ENTERPRISES OF USSR MINCHERMET [MINISTRY OF FERROUS METALLURGY], MINKHIMPROM [MINISTRY OF THE CHEMICAL INDUSTRY], USSR MINLESBUMPROM [MINISTRY OF THE TIMBER, PULP AND PAPER, AND WOOD PRESSING INDUSTRY] AND MINAVTOPROM [MINISTRY OF THE AUTOMOTIVE INDUSTRY].

The scale of introduction of new equipment has grown and the technical level of production has increased. At the present time approximately 800 classifications of technical machinery products with the mark of quality are being produced, which comprises approximately 50 percent of the overall volume of production.

Based on the introduction into production of advanced scientific and technological achievements in machine building during the five-year plan, approximately 1,500 new types of machinery, equipment and instruments have been developed.

At the initiative of the Moscow City Party Committee, USSR Gosplan and RSFSR Gosplan, along with the ministries and departments, have developed a goal-oriented comprehensive program of specialization and development of inter-branch production at enterprises located in Moscow and Moscow Oblast for the 12th Five-Year Plan and the period up to the year 2000, which provides for extensive measures to concentrate billet milling industries and repair enterprises; to eliminate small unprofitable shops and sections and their over-specialization; to introduce advanced technology; and to utilize modern methods of organization of labor and production.

Implementation of this program will make it possible to double labor productivity in inter-branch industries and free up approximately 20,000 people in Moscow industry.

The report and presentations noted that there are a number of unsolved problems, shortcomings and omissions in the activity of the collectives of industrial enterprises and scientific research organizations.

A lag has been permitted from the control figures of the Five-Year Plan in volume of production and labor productivity by Moscow factories and associations of Minstroydormash [Ministry of Construction, Road and Municipal Machine Building] and Minselkhozmash [Ministry of Agricultural Machinery]. A number of machine building enterprises of Minstankoprom [Ministry of the Machine Tool and Tool Building Industry], Minlegpishchemash [Ministry of Machine Building for Light and Food Industry and Household Appliances], Minpribor [Ministry of Instrument Making], Minkhimmash [Ministry of the Chemical Industry], Minavtoprom [Ministry of the Automotive Industry] and Minelektrotekhprom [Ministry of the Electrical Equipment Industry] are not coping with the five-year plan tasks for increase in product output.

Not everywhere is the necessary work being carried out to modernize machinery and equipment which is being produced and to improve their competitiveness. The required measures are not being taken to improve fundamentally productivity and reliability; reduce the metal and energy intensiveness of machinery; reduce the labor intensiveness of its maintenance; and improve these indices to the level corresponding to advanced scientific and technological achievements.

This refers, in particular, also to the Kalibr and Mosselmash diary equipment factories, Metallist and others.

Unsolved problems also exist in the activity of scientific research and planning and design organizations. The tremendous scientific capability of branch institutes is being utilized unsatisfactorily. In many scientific research institutes, especially technological institutes, entire subdivisions are working mainly to prepare various reports for ministries and departments.

FROM THE REPORT OF A. OZORNIKOV

THE "BORETS" COLLECTIVE CAME FORTH WITH A PROPOSAL TO ENSURE GROWTH RATES DURING THE 12TH FIVE-YEAR PLAN OF NO LESS THAN 25 PERCENT DUE SOLELY TO INCREASED LABOR PRODUCTIVITY WITH COMPLETE TRANSITION TO NEW PRODUCTS OF HIGH EFFECTIVENESS. THE MAJORITY OF NEW COMPRESSORS WILL BE OF MODULAR COMPONENT DESIGN. IN ADDITION TO THE PLAN FOR THE OIL FIELD WORKERS IN TYUMEN, DURING 1985-1986 THE ASSOCIATION WILL SHIP 600 EXTENDED SERVICE LIFE WELL PUMPS.

DELIVERY OF MODULAR DESIGNED COMPRESSORS FOR FUELING TRUCKS WITH COMPRESSED NATURAL GAS BEGAN IN APRIL OF THIS YEAR. THE OPENING UP IN OUR CITY OF THE FIRST FOUR AUTOMATIC GAS STATIONS EQUIPPED WITH THESE COMPRESSORS WILL SAVE 120,000 TONS OF PETROLEUM.

As was emphasized in the meeting of the aktiv, the party organizations and economic leaders in some scientific research institutes and design bureaus are not displaying persistence in improving the effectiveness of their work.

The meeting's participants unanimously adopted a resolution which emphasized that implementation of the decree adopted by the CPSU Central Committee and USSR Council of Ministers must become a most important direction in the activity of party organizations and economic leaders, enterprise labor collectives and machine building scientific institutions. Confidence was expressed that Communists and all workers in the machine building branches of the capital will cope successfully with their assigned tasks, mark the finish of the 11th Five-Year Plan with their intensive labor and greet the 27th CPSU Congress with new achievements.

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INDUSTRY PLANNING AND ECONOMICS

INTENSIFICATION, GROWTH OF MACHINE TOOL INDUSTRY VIEWED

Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 85 p 2

[Article: "Machine Building Complex"]

[Text] Soviet machine building possesses a powerful production and scientific-technical potential. It is playing a key role in the scientific-technical revolution and in materializing the latest accomplishments of science and technology. Accelerated development of this complex will make it possible to successfully complete the task posed by the party--doubling the country's production potential and raising the productivity of collective labor by a factor of 2.3-2.5 in the next 15 years.

Many kinds of modern equipment, industrial automatic systems and automated control systems are now being produced in increasing amounts by machine tool building, instrument making and electrical engineering industry.

Production of equipment for nuclear power plants is developing in the country, and equipment for nuclear heat supply plants is being erected for the first time in world practice. Highly effective equipment is being produced for mining and petroleum extraction industry and transportation, and complexes of intricate equipment for gas mains are being produced.

However, the rate of development of machine building has been inadequate in recent years. In a number of cases the existing production capacities fail to satisfy the immediate needs of the economy, and they cannot produce the volume of new equipment that would make it possible to reequip the national economy within a short period of time and hasten its conversion to intensive methods of development. As was noted at a CPSU Central Committee conference on scientific-technical progress, during the 11th Five-Year Plan the assets directed into heavy and transport machine building were 28 times lower than into the sectors for which it manufactures machinery, 23 times lower than into sectors producing machinery and equipment for light and food industry, and 47 times lower than into the chemical and petroleum machine building sector.

The technical base of machine building itself was revealed to be falling behind and growing obsolete, which has had an unfavorable effect on product renewal and product quality. The technical level, quality and reliability of a number of machines, equipment and instruments failed to satisfy the greater demands imposed on the national economy in terms of parameters such as unit output, precision, level of automation, and relative material and energy intensiveness. Thus machine tool building industry is making its transition to production of highly mechanized machine tools and machines too slowly. About 30 percent of the equipment produced by the Ministry of Tractor and Agricultural Machine Building has fallen behind the present level of scientific-technical progress.

Preferential Development

Developing its economic strategy for the forthcoming period, the party deemed it necessary to significantly accelerate development of machine building in the interest of fundamentally hastening scientific-technical progress, intensifying production and significantly raising production effectiveness. This is one of the most important directions of reorganizing investment policy. The need for priority, fundamental reconstruction and preferential development of the machine building complex in the 12th Five-Year Plan is noted in the "Machine Building Complex" subsection of the draft Basic Directions.

Machine building and metalworking production must increase by 40-45 percent in the 12th Five-Year Plan in conjunction with an increase of 21-24 percent in industrial production as a whole. Within the framework of machine building itself, preferential development is foreseen for machine tool building, for computer production, for instrument making and for electrical engineering and electronic industry. The rate of increase of production in these sectors must exceed the average for machine building as a whole by a factor of 1.3-1.6. This approach satisfies the objectives of fundamentally reequipping the national economy.

Preferential development of microelectronics, computer technology and instrument making has special significance. These sectors are having the decisive influence on the effectiveness of the resources of labor and on technological systems in all sectors of the national economy. These are true catalysts of scientific-technical progress, promoting revolutionary changes in production. As an example computer production will increase by a factor of 2-2.3 in the 12th Five-Year Plan.

Accelerated growth of machine building production must be achieved together with a simultaneous significant increase in product quality and a sharp decrease in the time it takes to develop and introduce new equipment. The task of creating and assimilating production of new generations of equipment making it possible to raise labor productivity by several orders of magnitude and significantly reduce material outlays was proposed. By as early as 1986 the proportion of products of the machine building ministries in the top quality category must reach 44.6 percent. The proportion of products assimilated for the first time and placed into production within 3 years must attain 31.3 percent. There are plans for removing 1,800 items of obsolete equipment from production.

As foreseen by the draft Basic Directions, the productivity and reliability of all new equipment must surpass similar equipment presently in production by not less than 1.5-2 times. The experimental base and experimental production will enjoy significant development. The time it takes to develop and assimilate new equipment is to be reduced on this basis by a factor of 3-4.

The relative metal content of machinery and equipment must be reduced by 12-18 percent in the 12th Five-Year Plan, and its relative energy consumption must be decreased by 7-12 percent. There are plans for reducing consumption of rolled ferrous metal (per million rubles of commercial products) by an average of 26-28 percent, for reducing consumption of steel pipes by 18-20 percent, and for reducing consumption of rolled nonferrous metals by 21-23 percent.

Reconstruction--The Priority Task

If we are to complete the tasks concerned with quality, time of creation and broad introduction of new equipment, we must fundamentally reconstruct machine building itself. This task is being carried out on priority. Not less than 50 percent of productive capital investments into the development of machine building are being directed into reequipment and reconstruction of existing enterprises.

The 12th Five-Year Plan foresees quadrupling production of special industrial equipment for internal needs as a means of accelerating reequipment of the complex's sectors. This will promote renewal of 10-12 percent of active productive capital on a qualitatively new basis each year.

Development of automation is also promoting an increase in the technical level of machine building production. The rate of introduction of flexible production systems is to be increased by a factor of 1.8 and introduction of industrial robots is to be doubled during the 12th Five-Year Plan. Steps are being taken to widely introduce automatic and semiautomatic equipment furnished with digital programmed control, built-in microprocessors, rotary and rotary-conveyer lines and automated design and control systems.

Machine builders must introduce resource-conserving procedures and metal substitutes into production more actively. Use of progressive procedures such as economical pattern cutting, stamping blanks from sheet steel, and producing articles out of powdered metal with wear-resistant coatings must be increased significantly in the 12th Five-Year Plan.

Introduction of progressive production processes based on new forms of energy, laser technology and wasteless and low-waste production processes is foreseen in sectors of the machine building complex.

The scale of use of parts and articles with strengthened coatings and their restoration by flame spraying will widen significantly. This will make it possible to reduce the demand for spare parts for motor vehicles, tractors and agricultural machinery due to an increase in their operating life.

Production of welded structures is increasing. It has been estimated that replacement of uneconomical steel castings by welded structures will mean a metal savings of up to 25 percent. The proportion of welded metal structures has already exceeded 50 percent in the overall structure of intermediate product production. In the 12th Five-Year Plan this trend will enjoy further development.

The plan for 1986 provides the basis for initiating practical implementation of the course toward accelerated development of the machine building complex. Capital investments into machine building will increase by more than 30 percent over the 1985 level.

Highly effective reequipment programs have already been developed and are now being implemented in a number of enterprises of sectors within the machine building complex. For example full automation of production processes at the Moscow Electrical Engineering Plant imeni Vladimir Ilich will increase productive capacities by a factor of 3.3 in conjunction with a 12 percent decrease in the total number of workers; this figure includes a 40 percent decrease in the number of workers in the main production operation and a 46 percent decrease in the number of workers in transportation and in manual freight handling operations.

But the reequipment effort is not being carried on everywhere with the required energy and purposefulness. For example the Stakhanov Rail Car Building, the Yuzhno-Uralsk Machine Building and the Ivano-Frankovsk Reinforcement Metal plants and the Dnepropetrovsk Heavy Press Plant are not insuring prompt commissioning of reconstructed production capacities. Such an attitude toward this highly important area of the work is entirely impermissible today.

The Reequipment Base

Growth in the production of highly effective products of the machine building complex will become a dependable base for reconstruction of all sectors of the national economy. Transition from production of individual machines to creation of complexes of machines, equipment, instruments and systems characterized by a high degree of automation in the entire production process and subject to delivery as production units will insure attainment of a qualitatively new level in the implements of labor. Use of such systems will make it possible to fully mechanize and automate all stages of production and to optimize the parameters of the individual machines making up the integral units of the production process. The degree to which raw materials and other materials are processed is increasing, and all production parameters are becoming stabilized, which is having a favorable influence on product quality.

The proportion of new articles produced by machine building for different sectors of the national economy is increasing. The volume of products that have been in production for over 10 years will decrease significantly due to their extensive modification and their replacement by new, highly effective equipment. There are plans for organizing production of new generations of machinery, automatic lines and outfits of forging and pressing equipment and agricultural machinery and tractors with regard for the requirements of the client.

Further expansion and deepening of intersector specialization and cooperation--the main direction of creating output capacities and developing the mobility of production--is becoming a typical trait of the development of the machine building complex.

In accordance with the 1986 plan, production of computer complexes out of microprocessors and of personal computers will increase by a factor of 1.8, production of peripheral equipment will increase by 13.6 percent, and production of programmed control devices for all kinds of production equipment will increase by 15.7 percent.

Formation of the machine building office of the USSR Council of Ministers will promote successful solution of the problems facing machine building. Transition to a two-level system in the administrative structure of machine building ministries is to play an important role. After enterprises of the Ministry of Automotive Industry, the Ministry of Machine Building for Animal Husbandry and Fodder Production, the Ministry of Construction, Road and Municipal Machine Building and the Ministry of Machine Building for Light and Food Industry and Household Appliances convert to the new methods of management, all sectors of the machine building complex will be working on the basis of the new methods.

It is the duty of laborers of the machine building complex to do everything necessary for the fastest possible conversion of the economy to the intensive path of development, and to greet the 27th CPSU Congress with new accomplishments.

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BALMONT PRAISES LITHUANIAN MACHINE TOOL INDUSTRY, WORK FORCE

Vilnius SOVETSKAYA LITVA in Russian 17 Jan 86 pp 1, 3

[Interview with B. V. Balmont, USSR Minister of Machine Tool and Tool Building Industry, by SOVETSKAYA LITVA Moscow correspondent E. Levin, date and place not given: "Machine Tool Manufacturing At a Qualitatively New Level"]

[Text] [Question] Having adopted a policy of accelerating the development of our economy, the April (1985) CPSU Central Committee Plenum emphasized the exceptionally important role of machinebuilding in this, pointing out that top-priority attention must be paid to improving machine tool manufacturing. In this connection, what tasks now face machine tool builders, including those in Lithuania?

[Answer] Under present conditions, the primary task of machine tool manufacturers is to move more quickly into producing new generations of machine tools and machinery which will be capable of ensuring the introduction of progressive technology, of increasing labor productivity many-fold, of lowering materials-intensiveness and raising the return on capital. The branch has recently implemented a planned organizational and technical restructuring to produce primarily automated equipment which is widely used in automatic control systems, computer and diagnostic equipment, and the latest in electric drives.

At the same time, a number of tasks involving accelerating scientific-technical progress, including that in the area of raising the technical level and quality of the output, have not been fully carried out by the branch. The CPSU Central Committee decree "On the Work of the USSR Ministry of Machine Tool and Tool Building Industry Party Committee on Intensifying the Responsibility of Communists of the Ministry Apparatus for Improving the Technical Level and Quality of Output Being Produced in Light of the Demands of the April (1985) CPSU Central Committee Plenum" provided a principled, objective evaluation of the state of affairs in the branch in this area. The decree noted that the ministry leadership has been slow to eliminate shortcomings in improving the technical level and quality of the output being released. The CPSU Central Committee has demanded that the ministry collegium, party organizations, and association and enterprise leaders take immediate steps to accelerate the retooling of machine tool manufacturing industry, to increase the effectiveness with which the scientific and production potential which has been created in the branch is used. The conclusions and demands of the CPSU Central Committee are a concrete program of action for the ministry and for enterprise and organization collectives. Lithuanian enterprises, too, are faced with much work along this line.

The most important tasks are further improvement in the structure of the equipment being released and significant improvement in its technical level. To this end, all machine tool manufacturing plants, including the Lithuanian group, are faced with accelerating the creation of new-generation machine tools, improving their productivity 1.5- to 1.6-fold in the 12th Five-Year Plan. Particular attention must be paid to fundamentally improving the quality of the output being produced, to ensuring the release of machines and machine tools which will be competitive in the world market. For example, we face a significant increase in the annual production of machine tools with numerical programmed control (NC), including machining centers, automatic machine tool lines and automatic lines for logging and wood-processing industry.

[Question] As we know, the Lithuanian SSR operates 13 enterprises and organizations in the USSR Ministry of Machine Tool and Tool Making Industry system. Could you please describe the place and role of republic machinebuilding in the union branch.

[Answer] The Lithuanian SSR is one of the country's leading republics in the area of domestic machinebuilding. The Lithuanian group of plants accounts for 11 percent of all metal-cutting machine tools produced. Let me remind SOVETSKAYA LITVA readers that these enterprises produce high-precision machine tools: gear hobbing machines, cylindrical grinding machines, precision boring machines, jig-boring machines, electrical-discharge machines, ram-type milling machines, too-and-cutter grinding machines, coordinate-measuring machines. About 20 percent of the precision machine tools manufactured by branch enterprises are produced by Lithuanian machinebuilders. Lithuanian plants are noted for high production standards and have skilled personnel, enabling us to entrust to tehm the manufacture of particularly important and complex products.

[Question] What prospects has the USSR Ministry of Machine Tool and Tool Building Industry envisioned for accelerating the retooling of Lithuanian machine tool manufacturing enterprises?

[Answer] A significant place in the ministry program of continued development of production capacities is given to branch enterprises located in the Lithuanian SSR. When working out the draft capital construction plan for 1986-1990, the ministry proceeded from the necessity of concentrating capital investments on retooling and renovating existing enterprises which will provide the basic increment in the release of high-precision metalworking equipment. In the draft plan for the 12th Five-Year Plan, the ministry proposes that the Lithuanian SSR will account for upwards of 70 percent of the total capital investment in the construction of production facilities for these purposes, the amount to exceed 110 million rubles in 1986-1990, or 1.7 times more than the capital investment actually utilized in the 11th Five-Year Plan.

Plants will be updating the fleet of metalworking equipment, increasing the proportion of progressive highly automated and special equipment. We anticipate the organization of several flexible manufacturing systems at the Zhalgiris and Komunaras machine tool manufacturing plants and the Kaunas SPO and the extensive introduction of NC machine tools, including machining centers.

Along with retooling and renovation, the draft capital construction plan of the USSR Ministry of Machine Tool and Tool Building Industry for the 12th Five-Year Plan includes expansion of the Kaunas Machinebuilding Plant imeni F. E. Dzerzhinskiy and construction of an engineering-laboratory building to develop prototype machining centers at the Vilnius Branch of the ENIMS NPO ["Experimental Scientific Research Institute of Metal-Cutting Machine Tools" scientific-production association]. Moreover, with a view towards eliminating the shortage of cast blanks, hydraulic equipment subassemblies and automatic hydraulic equipment at republic machinebuilding enterprises and in adjacent regions in the 12th Five-Year Plan, we intend to expand the Kaunas "Tsentrolit" foundry and the "Gidroprivod" plant in Shilute.

In this connection, it must be noted that successful fulfillment of these plans will depend in decisive measure on the attention to and precision in organizing this work by the Lithuanian SSR Ministry of Construction. The volumes of contractor construction-installation work submitted by the USSR Ministry of Machine Tool and Tool Building Industry to construction organizations of this ministry for implementation in the 12th Five-Year Plan are quite significant, almost four-fold greater than the amounts actually done in the 11th Five-Year Plan. The USSR Ministry of Machine Tool and Tool Building Industry's proposals for the 12th Five-Year Plan anticipate continued improvement in the structure of the production capacities being put into operation in the republic. In particular, the enterprises being expanded in the five-year plan are expected to produce 100 coordinate-measuring machines for flexible manufacturing systems (Kaunas machine-tool plant imeni F. E. Dzerzhinskiy), 15,000 tons of cast iron ("Tsentrolit" foundry in Kaunas) and eight million rubles worth of hydraulic drives and automatic hydraulic equipment ("Gidroprivod" plant in Shilute).

[Question] What do you intend to do in the five-year plan just begun to further social development of the collectives of Lithuanian machine tool manufacturing enterprises?

[Answer] To raise the social and personal standards of living at Lithuanian enterprises in the 12th Five-Year Plan, the USSR Ministry of Machine Tool and Tool Building Industry intends to increase housing construction, the draft five-year plan anticipating state capital investments to build and put into operation a total of 45,500 m^2 of housing, which is 1.3-fold more than in the 11th Five-Year Plan. We also anticipate approval for branch enterprises to build a total of 18,000 m^2 of housing-construction cooperatives and kindergartens.

[Question] The pre-Congress documents note that accelerating socioeconomic development in the country requires constant improvement in leadership of the national economy and reliable, effective functioning of an economic mechanism which includes a variety of forms and methods which must correspond to the changing conditions of economic development and changing nature of the tasks to be resolved. Will there be changes in the management structure of those USSR Ministry of Machine Tool and Tool Building Industry enterprises located in our republic?

[Answer] The primary task of the current management restructuring is the creation of the Vilnius Machine Tool Production Association, to be comprised of: Vilnius Grinder Plant (lead enterprise), "Zhalgiris" machine tool manufacturing plant in Vilnius, Vilnius Machine Tool Manufacturing Plant imeni 40th Anniversary of October, "Komunaras" machine tool manufacturing plant in Vilnius, and Shyaulyay Machine Tool Manufacturing Plant. Creation of this association will permit increasing the efficiency of the enterprises comprising it and accelerating the rates of development of machine tool manufacturing in the republic and improving its quality.

People, the availability of skilled personnel, are, of course, the decisive factor in the successes achieved by republic machine tool manufacturers and the guarantee of future achievements. A large detachment of competent specialists and highly skilled workers is at work at republic machine tool manufacturing enterprises. They, as are all branch collectives, are faced with resolving important tasks involving production intensification based on accelerating scientific-technical progress and improving the quality of the items being produced.

11052
CSO: 1823/103

INDUSTRY PLANNING AND ECONOMICS

BRIEFS

CEMA TECHNICAL REPRESENTATIVES IN TASHKENT--(UzTAG)--The common task of the scientists, designers and machine builders of the countries of the Socialist community is to give to agriculture a system of qualitatively new machinery and equipment, which meets the needs of intensive technology. The ways of solving this task are being discussed at the first session of the CEMA committee branch buro for cooperation in the area of machine building, which opened on 14 October in Tashkent. Taking part in this meeting are representatives of Bulgaria, Hungary, Cuba, Poland, Romania, Czechoslovakia, the USSR and Yugoslavia. The meeting is examining a number of important questions of multilateral cooperation in accordance with the "Comprehensive Program of Socialist Economic Integration," stated V.M. Shabanov, deputy minister of USSR Tractor and Agricultural Machine Building. This concerns the main directions for the development of the sector in the partner countries, the ways of achieving further specialization and cooperation in production, as well as acceleration of scientific and technological progress. Considerable attention is being devoted to sharing accumulated experience. Our guests will become acquainted with the work of the Tashkent Tractor Factory, which has permanent links with the machine builders of the Socialist countries, and will visit other enterprises in the capital of Uzbekistan. [Text] [Tashkent PRAVDA VOSTOKA in Russian 15 Oct 85 p 2] 9069/12859

CSO: 1823/37

METAL CUTTING AND METAL-FORMING MACHINE TOOLS

NEW NC TURNING CENTER SLATED FOR SERIES PRODUCTION

Yerevan KOMMUNIST in Russian 13 August 85 p 1

[Article by M. Gasangalyan: "New Model Machine Tools"]

[Text] The Yerevan Machine Building Factory imeni F. Dzerzhinskiy, along with the Transcaucasus branch of the ENIMS [Experimental Scientific Research Institute of Metal Cutting Machine Tools] of the Armstanok Scientific Production Association, has developed an experimental model of a new numerically controlled lathe. It is designed for lathing the outer and inner surfaces of parts of the body of rotation type and for threading automatically.

The designers had the task of improving the standard machine tool, expanding its technological capabilities and achieving higher accuracy and reliability. The new model was developed by L. Gustinyy, Z. Bagdasaryan and A. Kondzhibroyan, specialists in the department of metal cutting machine tools of the scientific production association. It has higher productivity and the capability of automatically changing the spindle speed. Instead of an asynchronous motor, it is equipped with a direct current motor with variable speed drive. The possibility of including it in flexible manufacturing systems has also been studied.

The new machine tool has been accepted by the state commission and classified as a top quality product, corresponding to the level of contemporary domestic and foreign models. An experimental batch of machine tools will be manufactured by the end of the year, and series production of them will begin in 1986.

Based on the new machine tool it is planned to manufacture an experimental model of a flexible lathe module equipped with an industrial robot and a system for automatic stockpiling of parts. A centering and cutting machine tool with numerical controls and automatic tool replacement and a flexible production control system from a common computer are being developed for completely automated machining of parts of the body of revolution type. These efforts will be accomplished at the factory imeni F. Dzerzhinskiy.

The experimental factory at the Armstanok scientific production association has manufactured a new duplicating and milling machine tool designed for milling small and medium-sized intricate products such as electrodes from nonferrous metals and graphite materials for electrophysical and electrochemical methods of machining. The author-designers G. Nalyan, B. Aslanyan and Ye. Ponamarev equipped the machine tool with an exhaust device to remove dust when machining carbon graphite electrodes.

The introduction of the machine tools will ensure safe working conditions, high productivity and significant savings.

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CSO: 1823/0039

BRIEFS

NEW MACHINE TOOLS -- The product line of metal cutting machine tools produced by the Kirovakan machine builders has been supplemented by new, small table-top-model machine tools. According to designs of the Armstanok scientific production association, workers at the experimental factory of precision machine tools have manufactured the first experimental models of two table-top vertical drilling and vertical thread cutting machine tools of high accuracy. The extraordinary drive design, floating table, cycling automatic spindle delivery, the presence of a duplicating device for threat cutting and many other features make this product among the best domestic machine tools of its type. The new products will find wide application in small series, as well as series and mass production. If necessary, they can be manufactured in a variant for incorporation into an automated production line. The authors of these machine tools, Candidate of Engineering and chief of the Armstanok laboratory Z. Bagdasaryan; section chief A. Kodzhibroyan and engineer-designer O. Vartanyan, along with factory specialists from the department of the main designer and experimental production, quickly accomplished a great deal of work in implementing the concept. Work is in progress at the factory to set up the manufacture of a table lathe of especially high accuracy, also developed at Armstanok. Miniature parts can be machined on it with micron accuracy in the laboratories and shops of tool and experimental production in industrial enterprises, as well as in scientific research institutes and design bureaus. [By V. Adamyants] [Text] [Yerevan KOMMUNIST in Russian 25 Aug 85 p 1] 9069

ADJUSTMENT FREE MILLING ATTACHMENT PRODUCED--For machining parts, such as lathe carriers, the Minsk Machine Building Factory imeni S. M. Kirov has developed and introduced into production a fast, pneumatic milling attachment. It is being set up at longitudinal milling machine tools and makes it possible to machine parts in three planes sequentially or simultaneously, without readjustment. [Text] [Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 8, Aug 85 p 3] 9069

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ADVANCED METALWORKING MACHINES DEVELOPED AT KRAMATORSK

Kiev TEKHNOLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 3, Jul-Sep 85 pp 3-5

[Article by V.M. Panasenko and I.P. Beskorovannyy, engineers: "Technical Reequipping of Experimental Production"]

[Text] The experimental factory of NIIPTmash [Scientific Research, Planning and Technological Institute of Machinery Manufacture] (Kramatorsk) was established to manufacture experimental products and accomplish experimental laboratory projects according to the institute's scientific research plan. In connection with the decision by Mintyazhmash [Ministry of Heavy Machinery Manufacture] to cease producing non-specialized products, the need arose to technologically reequip the factory's shops, taking into account the increased output of specialized products. To accomplish this a technological reequipping plan and a task to develop a contractor design were developed and approved. The range and quantity of products to be manufactured were established.

The most advanced types of equipment planned for manufacture by NIIPTmash include: mechanized oxyacetylene cutting units; automated and comprehensively mechanized impulse molding assembly lines; machinery with servo-drives and manipulators for fettling castings; electroslag remelting assemblies; a wide range of universal assembly readjusting and special machining attachments; and complex non-standard equipment for branch factories being constructed and reconstructed.

The high level of equipment being manufactured and the growing demand for its operational reliability necessitated the application of advanced technological solutions. Thus, in reequipping intermediate production it will be possible to use advanced technological processes for manufacture of forms and rods; sand and core-sand preparation; fettling and cleaning of molds (impulse forming; sand-slinging packing of molds; electrohydraullic cleaning of molds; manufacture of forgings with minimal allowances by automating control of 800 ton-force presses, etc.), permitting a 10-20 percent reduction in the labor intensiveness of the work. Low-waste technology for production of steel and cast-iron molds will be applied (establishment of a section for production of molds by smelting models and in metal forms and for manufacture of parts by powder metallurgy, and a section for producing billets based on the use of two semi-continuous casting machines, etc.).

Improving the level of welding production is envisioned by mechanization and automation of welding (automated submerged arc welding; welding in a carbon dioxide medium; plasma cutting of large thickness sheets, etc.); use of quick-adjusting attachments of NIIPTmash design; elimination of small welding sections and creation of a single specialized shop. These and other measures are increasing the output of cast iron molds by 4.3 times; steel molds by 1.7 times; forgings from mill bars and slabs by 1.4 times and welded metalwork by 1.8 times.

The effectiveness of mechanical assembly production will be improved as a result of the creation of flexible automated machining of USP [universal assembly device] positioning pieces (45 named parts with an annual output of more than 3,500 units, as well as 6 specialized and comprehensively mechanized machining sections and three assembly sections containing more than 170 items of metal cutting equipment); expanding the use of machine tools with programmed controls of the "machine tool center" type (up to 20 percent); introducing gang manufacturing technology and advanced outfitting, including specialized accessories for lathes; substantially expanding the use of hydraullic, pneumatic, hydro-pneumatic and general purpose assembly attachments and standard mechanized tools.

It would be useful to double the size of assembly areas; specialize working areas for assemblers; introduce assembly and test units; create highly specialized sections for assembly of units of similar design and technology; and sharply reduce the amount of adjusting work by improving the accuracy and quality of mechanized machining.

The task also envisions expanding working areas and raising the technological level of the tool and repair shops, heat treatment section and electroplating department.

The most advanced solutions for auxiliary production include: creation of finished product manufacturing sections for machining parts and specialized sections for assembly and repair of units; introduction of new technological processes (tool hardening on Bulat and Kvant-18 machines; diffusion welding of up to 25 mm diameter point tools); use of gluing tools and attachments; introduction of electroerosion machine tools; etc.

The main technological solutions envisioned by the task for developing the technological reequipping project are based on the level of work achieved by institute scientists and Experimental Factory specialists and the leading experience of related manufacturers.

Accomplishing the technological and organizational solutions for technological reequipping of the experimental factory shops will provide increased output of commercial products and achievement of advanced specific indices of effectiveness of capital investments for growth in production output (0.96) and for ruble of capacity introduced (0.98).

The above indicated main technological solutions were reflected in the contractor design fulfilled by the Kramatorsk affiliate of Ukrgiprotyazhmash [Ukrainian State Planning and Design Institute of Heavy Machinery Manufacture]. It is planned that the technological reequipping will be accomplished by the Experimental Factory over a two year period.

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CSO: 1823/30

OTHER METALWORKING EQUIPMENT

PLASMA TORCH ON CONVENTIONAL MILL CUTS TOUGHEST METALS

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 85 pp 17-18

[Article by V. Mikhaylova, engineer: "Plasma Plus Cutter"]

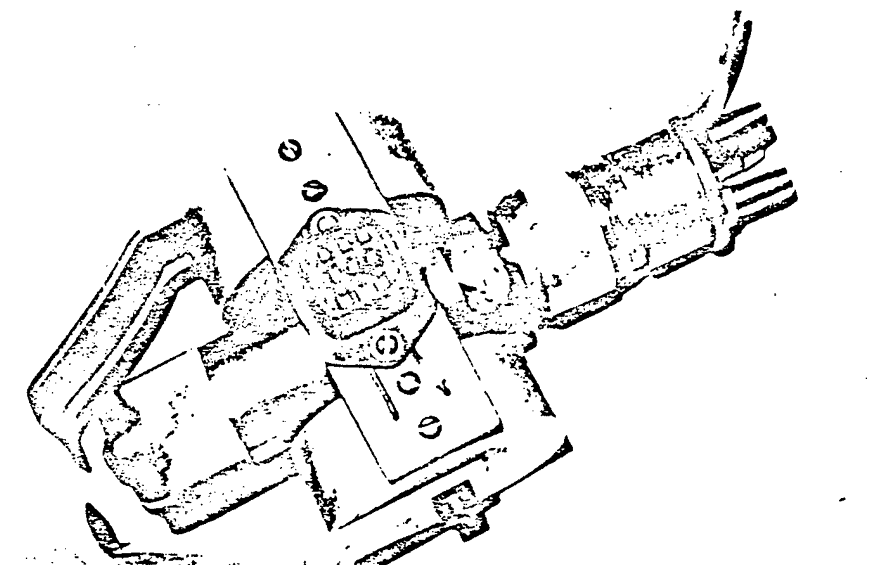
[Text] Industrial engineers strive to make it possible for the machine operator to strip off a cutting from a billet in the minimum number of passes and as rapidly as possible. The method of plasma-mechanical milling developed in the Leningrad Polytechnical Institute under the leadership of Professor V.G. Podporkin, honored scientist and technician of the RSFSR, and docent M.A. Shaterin fully meets this condition.

At the construction materials faculty, where research on new methods of cutting is being carried out, you will be shown a cutting which is a good three centimeters wide and the thickness of a matchbox. It looks more like a forged spring and it is hard to believe that it was cut from metal by a cutting tool. But this gigantic cutting--and there are some even larger in the faculty--was cut from a thick steel sheet. And it was cut not with a cutting torch, or even a planing tool, but with a rather blunt wedge. One gets the impression that in the cutting zone the metal was pliable, like modelling clay, and this assumption is not far from the truth.

In front of the spindle on which the cutter sits and turns, the Leningrade engineers set up a plasma torch, and on both sides of its nozzle they fastened alternately triggered magnets. Under the influence of the field the stream of red hot gas wavers like a pendulum and heats the strip of metal in front of the tool to the width of the cuttings which are being stripped off. The device was tested in machining edges of sheets of tough and difficult-to-work steel 30 mm thick. First the output was doubled over that envisioned for the equipment. Then it was increased to five times that output, and the ordinary medium power milling machine continued to work quietly. They added more output. The cutter ran smoothly and milled the surface quite cleanly. Only when the output was increased to 15 times the usual did the machine vibrate.

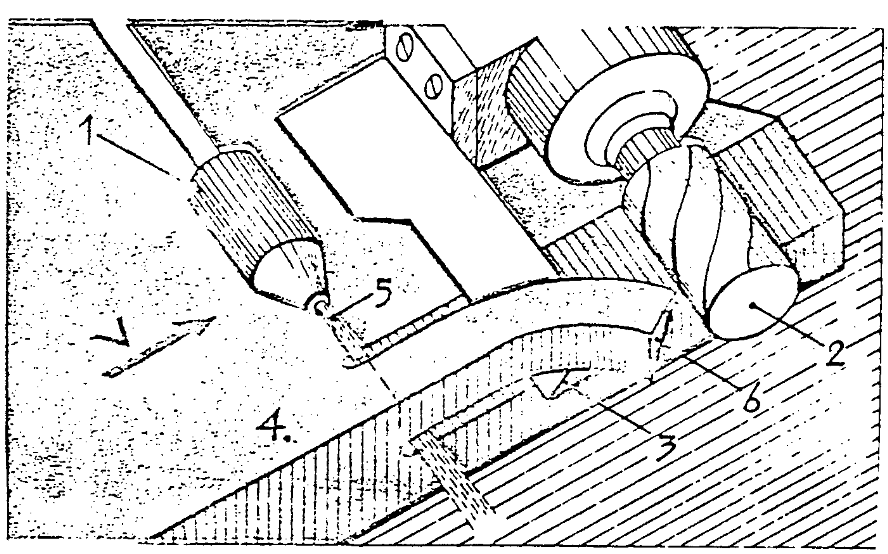
Here is yet another capability of the new technology. When welding metal structures from thick sheets, bevels are stripped off of their edges. Usually the bevels are made by cutting torches. This technology was established in a time when mainly low carbon steels not prone to hardening were used for the manufacture of welded metal structures. But now, when high-alloy steel structures are being welded in many of the country's major enterprises, the cutting torch does not suit the specialists. The cut is not clean and accurate enough and it requires subsequent mechanical machining. But with a cutting torch steel alloy is heated enough so that an ordinary cutting tool can no longer be used. In such cases gas cutting, even preliminary cutting, is completely rejected and all machining of edges is carried out on cutting or edge-planing machines, with much time spent in this process.

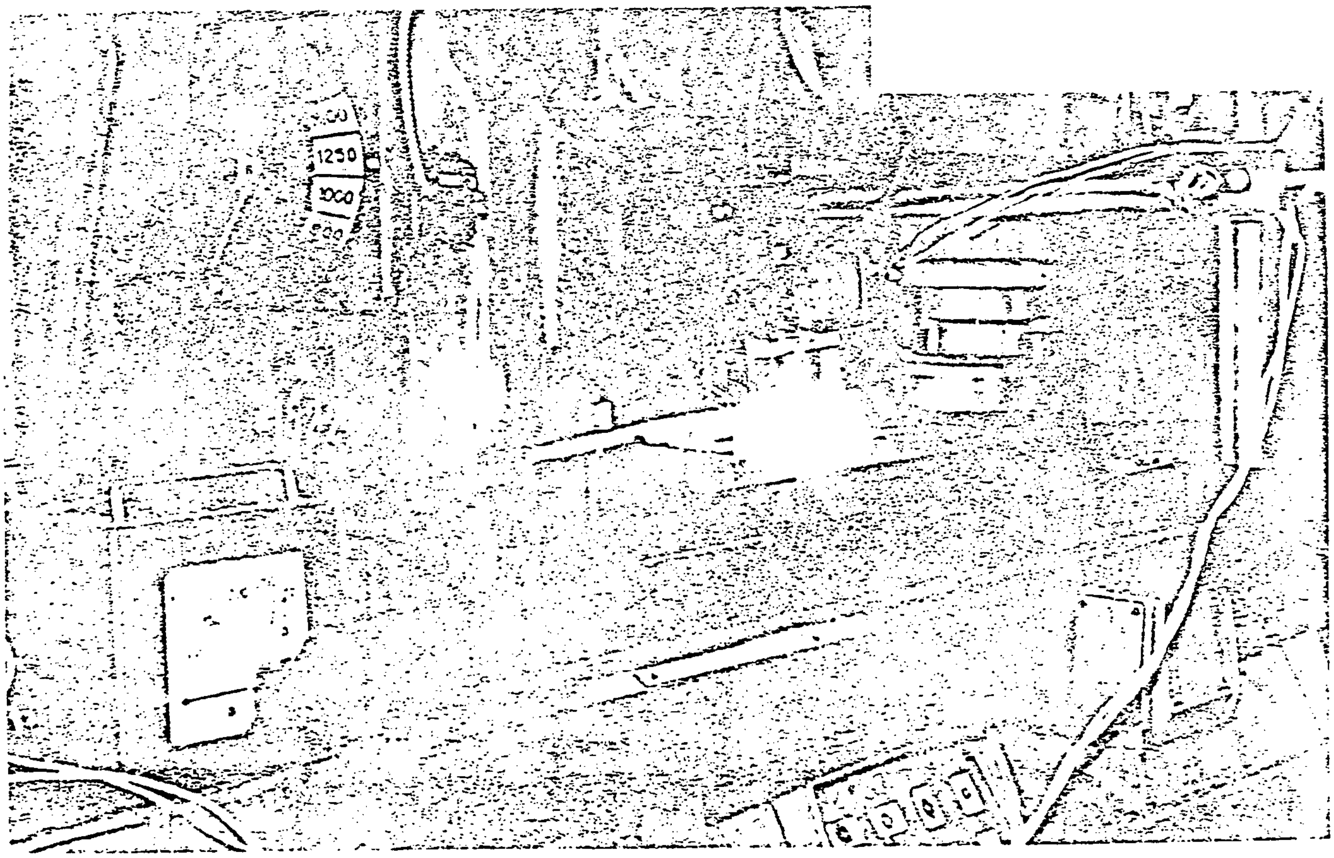
Plasma Torch With Beam Deflecting Magnet System



Плазменная горелка с отклоняющей магнитной системой.

On the Diagram: 1. plasma gun; 2. cutter; 3. wedge for bending cut metal and protecting cutter from damage; 4. metal sheet being machined; 5. plasma arc





Laboratory assemblage at which plasma-mechanical cutting operations were developed

An ordinary plasma torch was set in front of a cutter. Between them was fastened a massive wedge, made of high temperature steel which had not been hardened. On the table of a low capacity milling machine a sheet of hard to process alloy 50 mm in thickness was fastened (precisely this angle is required in beveling edges by welding). The torch was brought to the edge being milled. It moved along the sheet at a speed of 250 mm per minute. A plasma stream, like a string in a piece of modeling clay, cut a narrow slit into which a wedge was then placed, bending aside the metal, still red from heating, so that the cutter following behind the wedge did not strike it. The cutter easily stripped off a clean cutting. The system of tools demonstrated record productivity with high accuracy and cleanness of milling, stripping off a 12 cm square stream in one pass with a speed not achievable through mechanical machining, even on the most powerful milling machines. The Leningrad engineers are proposing this technology, illustrated by the stream itself, which looks like a spring, for large-scale introduction.

From the editors: Unfortunately, there is still a long way to go until large-scale introduction, although testing of the new method was conducted successfully several years ago. It seems to us that the reason for this is found in the stereotypical thinking of machine building engineers. Milling of metals by cutting and the technology of welding reside somehow seaprately in the consciousness of engineers. But how could it be otherwise, since the cold and hot metal machining faculties are separate in the machine building VUZes. This situation may remain for a long time, for in the "cold" faculties a meager course in welding technology is taught, and in the "hot" faculties only a very rough impression about the technology of metal cutting is given. Is not this the reason that, although they have existed side by side for more than a century, these two "giants" of modern machine building are making only their first joint steps.

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LACK OF COORDINATION STIFLES FURTHER DEVELOPMENT OF NEW LASER

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 85 pp 19-21

[Article by A. Velednitskiy: "A Laser Instead of a Cutting Tool"]

[Text] For several seconds we stand silently, waiting for the machine tool to begin to operate.

"That's it, let's go," says Kh. S. Bagdasarov. "Now watch what happens."

From under a sheet of stainless steel there runs a continuous stream of sparks. Cutting has begun. Several seconds pass and an accurately cut 6 mm plate with perfectly smooth edges falls on the table of the machine tool.

"In general the process hardly differs from traditional cutting and machining on an ordinary metal cutting machine?" I asked for clarification.

"It is true that it hardly differs," willingly agrees Bagdasarov. "The only difference is that there is no cutting tool; it was replaced by a laser beam. The width of this beam is measured in hundredths of a millimeter. Accordingly, there is no waste, there are no cuttings and there is also no cutting effort. And this means that no special attachments are required to fasten parts and it is not necessary to waste time on their assembly." "So that," Khachik Saakovich sums up, "even from a purely economic viewpoint, due to the sharp increase in labor productivity the use of the laser on machine tools fully justifies itself." But, you see, besides the economic aspect there is yet another aspect--technological. And, flexing his fingers, the chief of the high temperature crystallization laboratory of the USSR Academy of Sciences Institute of Crystalography, doctor of physical and mathematical sciences Kh. Bagdasarov, begins to list the advantages of the new method of cutting.

Skipping ahead, I say that this list would seem much more impressive if it were given by specialists in the field of metal working, the main users of the new apparatus. Nevertheless, even from the positions of basic science the applied importance of the metal cutting laser is very substantial.

With the help of a laser beam it is possible to "drill" a hole of any shape; circular, square, ellipsoidal. And if a light guide is used it is possible to penetrate inside the part and approach with the cutting instrument, the laser beam, from the opposite side or from below, in short, to cut metal in places which are completely inaccessible to an ordinary cutting tool.

True, here it is probably worthwhile to make one small clarification. The idea of cutting metal with the help of a laser beam is in general not new. Immediately after the first laser assemblies appeared the first experiments in cutting metal were also conducted. They demonstrated in principle the capability to cut metal with the use of a powerful source of radiation. Only it was not possible to find a practical way of using this capability. Powerful sources of radiation based on a CO_2 generator in the mechanical shop looked like dinosaurs which had gotten into a circus ring. They occupied more space than the machine tool itself to which they were attached and, naturally, found no practical application.

In the design which Bagdasarov demonstrated to me the laser assembly was not much larger than an ordinary cutting head. It fits freely within the dimensions of a milling or drilling machine and, at least in size, is fully competitive with milling and drilling machines.

"Our laser," explains Khachik Saakovich, "is based on a garnet refractory crystal grown in our laboratory."

He takes out of a box and places on the table a glass cylinder, garnet in color, and as though anticipating my doubts, explains:

"Yes, yes this is artificial garnet. And if we speak in the language of chemical formulas, it is $Y_3Al_5O_{12}$. Without impurities it is completely transparent. Such a transparent crystal is called yttrium-aluminiferous garnet. A small, one percent admixture of niodim [sic] [possibly niobium] turns it into a laser crystal. The main trait of such a crystal is the presence of a so-called metastable level at which electrons knocked out of their orbits under the impact of energy impulses are collected. They accumulate little by little and finally rotate simultaneously in their places, letting off a powerful quantum of energy which also forms the laser beam. The longer the crystal the more powerful the laser. However, the power of the beam falls sharply if there are impurities in the body of the crystal. They form a kind of break in the lattice where the electrons are collected. Naturally, all of the thinking of the scientists is directed at growing crystals which are longer and without any impurities. For this purpose new methods of growing crystals are constantly being developed and old methods which have long existed are being improved.

Scientists began to engage in synthesis of crystals long ago. Back at the beginning of the century, the Frenchman, O. Verneiul, found a method of obtaining artificial ruby. However, Verneiul's rubies had a very important shortcoming. They were nonuniform. This is not surprising. The process of crystallization occurs at temperatures of approximately 2000 degrees Centigrade. The slightest (half degree) deviation in temperature leads to a change in the crystal's structure. How can the temperature be held constant?

Until recently the most widespread method was that of vertically directed crystallization, which made it possible to grow crystals in the form of a rod. A substance is poured into a tubular container. On the side is a heater, a tungsten pipe. Due to ohmic resistance the pipe warms up and the container with the substance, passing through the pipe, gradually (part by part) warms and just as gradually cools. However, as the crystal grows, the level of melt in the container is reduced. And along with the level of melt the crystallization temperature and the structure of the crystal also change. Moreover, all the impurities inevitably collect in the upper portion of the crystal. The Americans solve this problem rather simply. They cut off the end of the crystal which is grown in different temperatures. In this way it is possible to avoid nonuniformities, but at the same time it is necessary to reduce the length of the crystal which, as we already said, determines the power of the laser assembly.

In the USSR Academy of Sciences Institute of Crystallography the crystal does not have to be shortened even by a millimeter. The technology of horizontally directed crystallization, which was developed in the institute, makes it possible to grow crystals which are virtually uniform and without any impurities. The initial substance (melting stock) is poured into a "boat," which passes through a heater. In the front of the "boat" a crystalline particle of the same substance is placed. As it reaches the heater the melting stock melts and then, as it leaves the zone of heating, it solidifies, forming a crystal, the dimensions of which are determined by the amount of melting stock.

The new method makes it possible to obtain crystals weighing up to 2 kg. They can be used for connecting artificial joints (a friction coupling made out of leuco-sapphire is characterized by the lowest friction coefficient); manufacturing of surgical scalpels; the power elements of reactors; UHF equipment accelerators; and super high resolution optics. So far it is difficult to determine with accuracy the entire sphere of possible use of the new method and of the crystals obtained thereby, but one thing is clear. In the next few years refractory crystals will find wide use in equipment, and most of all in machine building and in manufacturing assemblies for cutting. True, in order for it to find application it is necessary to find someone desiring to manufacture such assemblies.

"The machine builders who came to visit us," states Kh. Bagdasarov, "saw the operation of the laser and were delighted. They asked us to make them 20 such assemblies. But, after all, we are not a factory but an institute, and an academic institute. Large-scale production is not our task. Our business is to provide ideas. We not only had the idea but made an experimental assembly. And, just the same, we cannot find a factory which would undertake to produce laser cutting heads.

But perhaps Kh. Bagdasarov, like any inventor, is somewhat exaggerating the capabilities of his invention. Perhaps the Bagdasarov laser is not workable and does not promise any particular advantage. I phoned the chief institute of Minstankoprom, ENIMS [Experimental Scientific Research Institute of Metal Cutting Machine Tools], and asked their opinion about the Bagdasarov assembly.

"What is there to say. The assembly is impressive." Candidate of engineering B. Mechetner, chief of the department of electro-physical chemical methods of machining, answers my question unambigiously. "Even in its present form the Bagdasarov assembly is suitable for cutting parts."

The laser cuts a 10-millimeter stainless plate. But the Bagdasarov design is made for larger: then its capabilities will grow so that it can be used for heat treatment. It will be a very serious competitor of CO_2 lasers and, of course, will be significantly simpler to manufacture. We are dying to get a hold of these lasers but cannot obtain them. Make them ourselves? Of course, we could if we were supplied with crystals. But Minstankoprom is not able to grow crystals. This is a matter for Minkhimprom [Ministry of the Chemical Industry], and as far as I know they are not yet planning to organize the production of artificial crystals by the Bagdasarov method. Why? Ask them.

"Bagdasarov lasers? That's the first I have heard of them," stated M. Tikhomirov, chief of technical administration, Soyuzreaktiv, Ministry of Chemical Industry. "No, we grow crystals. We have the Institute of Monocrystals in Kharkov. But in order to make the crystals about which you speak, it is necessary to carry out research, and then developmental work, and for this first we must receive an order to accomplish this work. Thus far we have received no orders to grow crystals for the Bagdasarov assembly."

"Well, and if such an order reached you tomorrow, would you begin to manufacture crystals for the Bagdasarov lasers?" I asked.

"If they arrive, then we will discuss it," M. Tikhomirov diplomatically avoids a direct answer.

What he says is understandable. The production volume of crystals for the Bagdasarov assembly is clearly not great. Minkhimprom does not need such lasers, and to assimilate their production as, by the way, that of any new technology, is difficult. So is it worth seeking to commit oneself to a new adventure? Of course, Mikhail Mikhaylovich did not tell me all this. Patiently, like a teacher to an uncomprehending student, he explained to me that there is a procedure for sending orders for scientific research work and experimental design work set down in GOST [all-union state standard], and that there are regulations for sending orders and many other various regulations which, for all their validity, at the same time make it possible not to do (or not to do immediately) work which is disadvantageous to do. No, no, he has nothing against the GOST. And it goes without saying that there must be procedures in relationships between different departments. On the other hand, if there is a good development, which can have a colossal effect on the economy, create a revolution in metalworking, and it is not introduced, then this is not order, but the most real form of disorder.

One might say that the situation is paradoxical. An academic institute developed a practical industrial assembly which needed only to be taken and introduced. But there was no one to introduce it. The machine builders would like to, but cannot, and the chemists can, but, "...in connection with the fact that in accordance with GOST..." and so forth, about which we already spoke. So what should be done? Of course, it would be good if the Moscow Experimental Scientific Research Institute of Metal Cutting Machine Tools and the Kharkov Institute of Monocrystals concluded an agreement about creative cooperation, established a creative brigade of representatives from various departments and jointly took up the matter. And if the leaders of these departments, understanding that creative problems must be solved in creative cooperation, immediately took up the matter, this would also be good. But it would be still better if the USSR State Committee for Science and Technology, jointly with VSNTO

[All-union Council of Scientific, Engineering and Technical Societies], convinced that the "high contracting parties" were unable to overcome the interdepartmental barrier, discussed the work of Bagdasarov and took measures within their control to direct the attention of USSR Gosplan and the Council of Ministers to this problem.

And in the meantime dozens of people come to the USSR Academy of Sciences Institute of Crystalography and admire the assembly at which Bagdasarov, just like a coping saw, cuts and saws stainless steel models, demonstrating the unlimited possibilities of the new cutting tool.

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UDC 621.73.046-62-229.72.002.237

MODEL MKP 2.5M UPDATED FORGING MANIPULATOR

Moscow KUZNECHNO-SHTAMPOVOCHNOYE PROIZVODSTVO in Russian No 10, Oct 85, p 6

[Article by V. D. Shramko, V. A. Naumov, B. A. Chelishchev, V. F. Gulin]

[Text] Ten years' experience operating manipulators with 2.5-ton lifting capacity as part of model AKP 500/2.5 and AKPI 250/2.5 forging complexes at the country's enterprises have demonstrated their serviceability and, at the same time, have revealed certain structural deficiencies.

Obsolescent hydraulic and electrical equipment was replaced when the manipulator was updated. An experimental prototype of the model MKP-2.5M forging manipulator with a capacity of 2.5 tons has been produced, tested, and released for operation (cf. first cover page).

Carriage travel speed and holder elevation speed have been increased by a factor of 1.5 in the updated manipulator.

In contrast to the MKP 2.5, the MKP 2.5M has a hydraulic battery-powered mechanisms to lift, tilt, and shift the holder laterally, and the holder roll-back and return drive is greatly simplified.

A hydraulic holder "collapse" system has been introduced to automatically place a forging on the press head at every pressing cycle.

Manipulator carriage travel and holder rotation drives use VKU610M crane reducing gears and 2PF180 DC electric motors.

To expand the MKP 2.5M's process capabilities, parallel holder elevation height was increased and hydraulic tilt cylinders were introduced to tilt the holder 6° up and 3° down, respectively, along the vertical.

The carriage travel drive engagement pin's reliability was raised by installing two gears which mesh with pin racks on both sides of the manipulator. Interlocks were provided to ensure placement of the holder in middle and horizontal positions when appropriate buttons on the control console are pushed. Sensors were installed to monitor carriage movement, and holder rollback, elevation, and return. PDF-3 transducers were used as sensors.

The manipulator is remotely controlled in manual, semi-automatic, and automatic operating modes using controls on a separate console or on the forging complex control console.

Incorporated into forging complexes, the updated MKP 2.5M manipulator increases their productivity by a factor of 1.4 by raising carriage travel speed and yoke elevation speed, as well as by increasing operating reliability and reducing downtown for repairs.

Specifications for the Updated MKP-2.5M Manipulator

Lifting capacity, t	2.5
Load moment, kN per m	50
Maximum diameter of tongs turning circle	1,180
Maximum tongs separation relative to inscribed circle diameter	500
Minimum yoke axis height from rack head, mm	700
Maximum parallel yoke elevation, mm	550
Lateral tongs movement, mm	±160
Holder tilt, degree	
Downward	6
Upward	3
Adjustable manipulator travel speed, m per min^{-1}	1-60
Adjustable tongs rotation speed, min^{-1}	1-20
Vertical yoke travel speed, m per min^{-1}	6.3
Installed power, kW	46.5
Dimensions, mm;	
Left to right	2,700
Front to back	7,140
Height	2,100
Weight, kg	22,500

12809/13167
CSO: 1823/083

OTHER METALWORKING EQUIPMENT

INSTALLATION OF ADVANCED ROLLING MILL TECHNOLOGY AT KRAMATORSK

Moscow IZVESTIYA in Russian 8 Dec 85 p 1

[Article by A. Blokhnin and N. Lisovenko, special IZVESTIYA correspondents: "On-the-Spot Reporting: The Giants Go North"]

[Text] About 50 railway wagons are needed to ship one kvarto [not further identified] stand (the chief part of a rolling mill) built at the Novokramatorsk Machine-Building Plant imeni V.I. Lenin for the Krasnoyarsk Metallurgical Works. The stand weighs more than 2000 tons.

It is hard to believe that such a machine can find room within the production hall. The impression of its massive size is made even stronger by the sight of miniscule human figures at work along the various "stories" of this manmade steel "iceberg". V. Kolomiyets, director of machine-assembly shop 8, said:

"Our shop is the largest in the country. Number 8 turns out a full quarter of the planned production at the Novokramatorsk plant. While finishing the kvarto, we have already begun construction of a 45,000-ton press. A press of this sort is a unique device but we are also producing walking excavators. Most of them are made on orders received from the northern part of the country."

You are reminded of one when you come into the next section of Shop 8. Some of the steel foundations of the future walking excavators stuck out a good hundred meters into the shop floor. This is where they put together the ESh 6.5/45's with a bucket capacity of 6.5 cubic meters and a boom length of 45 meters. Metalworker A. Timchenko who has worked 23 years at this plant knows the workings of the excavator like it were nothing more than a bicycle. His partner I. Golovchenko is 23 years old but he has also occasionally worked without needing a blueprint. The foreman, Viktor Nikiforovich Nemirich, received the Lenin, Red Banner of Labor and Rebirth of Poland medals for his excellent work assembling a 3600 stand in the Polish People's Republic.

The next section is another assembly line for giants. Excavators of capacities of 10 and more cubic meters sit on the assembly jigs. Since it began the construction of such machinery, the Novokramatorsk plant has already produced 650 of these walking excavators and all of them are still in operation! Even the ESh 4/40 which were first produced in 1948 are still working.

Technological progress and the appearance of high-grade steels have made it possible to create excavators that can be provided with a 6.5 cubic meter bucket and a longer boom while still remaining in the weight category of a four cubic-meter excavator. The Novokramatorsk excavators being produced today contain 10-18 percent less metal than the American Marion models.

Now the task is to adapt electronic systems to such big machinery, namely to control the excavator turning mechanism with its planetary reduction gear and wave transmission for smooth travel and precision movement of the working organs. The plant's designers are working on a new model of he ESh 15/80 which will fill the gap between the supergiants made by Uralmash and current models made by NKMZ [not further identified]. The design has already been finished and the new excavator will appear during the 12th Five-Year Plan.

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CSO: 1823/077

OTHER METALWORKING EQUIPMENT

BRIEFS

NEW PLASMA GENERATOR—A new plasma generator mounted on an NC metalcutting machine has recently been developed at the Sibelektroterm Association. It was created by the association's own specialists and scientists from the Thermal Physics Institutes, Siberian Division of the USSR Academy of Sciences. Their new creation is considerably more productive and technically sophisticated than similar devices already in use today. The RPT-2, as the new generator is known, has undergone and passed plant testing and it will now go into the arsenal of equipment used in many branches of industry. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Nov 85 p 2] 12261

PLASMA-GENERATING MACHINE TOOL—The Kramatorsk Machine-Building Association has built a plasma-generating machine tool. The combination of plasma and cutter has made it possible to machine blanks with high-strength surfaces. For example, metal ingots smelted by electrical slagging or vacuum arc methods have an extremely hard cast core which under ordinary conditions will ruin any cutter. Within seconds, a plasma jet can melt the metal in the cutting zone and then the cutter can work it quite easily. Productivity is increased 800 percent. The lathe is equipped with two carriages. One contains the plasma generator while the other is used for normal machining operations. The unit also has an industrial television camera that allows the operator to view the cutting zone and tool condition. The lathe can work parts up to 12 meters long, two meters in diameter and 100 tons in mass. The first finished unit was sent to the Leningrad Izhorsky Zavod Production Association. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Dec 85 p 2] 12261

IMPROVED CUTTING SURFACES—The chief use of the Bulat [sword] plasma generator made by the Kramatorsk Machine-Building Plant is to increase the hardness of sheet metal used to coat cutting surfaces. These surfaces are almost twice as hard after they are sprayed with titanium nitrate. However, the plant directors decided to teach the Bulat a new trade. This generator is now used to strengthen high-speed cutting mills by hardening them in a medium of liquid nitrogen. Tools made at this plant go from the frying pan into the fire, as the saying goes. Plasma spraying to cold steel hardening is the range of operations of the tools whose name was born nearly a century ago when swords were forged at this plant. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Nov 85 p 2] 12261

CSO: 1823/77

AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

PRODUCTIVITY, COMPONENTS OF AUTOMATED PRODUCTION SYSTEMS VIEWED

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 10, Oct 85 pp 40-41

[Article by candidate of engineering V. I. Letsik: "The Experience of Introducing Industrial Robots and Flexible Production Modules in the Krasnodar Measuring Instruments Plant Production Association"]

[Text] The acceleration of the production growth rates of electric measuring instruments is based on the introduction of highly effective means of mechanization and automation of primary and secondary technological processes, interoperational transport and warehousing efforts, and the use of such powerful levers of technological progress as SAPR [automatic industrial robot systems], ASU TP [automated control systems by technological process], computer equipment, etc. The use of robotics is receiving particular development: industrial robots (PR), manipulators (M), and the development on their basis of flexible production systems (GPS).

The intensive development and expanded use of robotics stems first of all from the desire to increase labor productivity, ensure stable high quality instruments and necessary safety equipment, reduce the cost of products, as well as to free the worker from exhausting, monotonous and unhealthy work.

Starting in 1982 in the Krasnodar Measuring Instruments Plant Production Association, robotics was introduced in such technological elements as cold stamping, machining, loading and unloading, transport and warehousing, etc. Approximately 200 robots have been introduced in the association, which conditionally freed 50 people and had an economic savings of more than 35,000 rubles.

The creation of a demonstration stamping section is envisioned. Its first line has already gone into operation and the capacity of the next is increasing. Thus, a type 55721 flexible production module, which includes a type 2K02 crank press with an operating force of 70 KHz, a type PR4-2 robot and a vibro-hopper loading device and stamp, fitted with a pneumatic lifter with an ASAMS (aggregate modular system of means of automating assembly) module. The purpose of the system is to punch two notches in a nut of a type M309 instrument.

A flexible production line which accomplishes two operations has been introduced in the section. It edges billets along the contour and punches a center hole, and it flanges the edges of the hole in the handle. The line consists of two crank presses (types K116G with a force of 600 KHz and KD2128 with a force of 1,000 KHz) and three model MP9-S industrial robots, and can produce 600 items per hour. The line is loaded manually by setting up the billets after they are cleaned of oil, dirt and solid particles on a six position turntable with a pneumatic accuator. The first type MP9-S robot takes the next billet from the table with one arm and places it on the stamp for edging the contour, and the other picks up the billet cut in the previous cycle and transfers it over to be flanged. The second robot accomplishes the transporting functions between the presses in this operation. The third type MP9-S robot, like the first, has two arms, one of which passes the billet for the second operation, and the other of which puts the prepared part in a container. The arms of the robot are equipped with vacuum grips.

Indicator instruments are the largest volume product of the association's chief factory. The output of just one of them--an electric measuring instrument based on the M-381 indicator, which is designed to measure current and voltage in direct current circuits (ampmeters, voltmeters, milliampmeters, millivoltmeters)--will more than double in the next few years, and there will be 176 modifications in components of changed design.

To support this increase in the quantity of multi-nomenclature products it is planned to create a flexible automated assembler. For this purpose, flexible production modules are being set up in blanking shops for the manufacture of the individual parts of this instrument; for example, a flexible production module for forming the body of the frame. It includes a D-10 bench press with stamp, two type PR5-2 robots and two manipulators, manufactured based on the ASAMS modules.

Making instrument parts on metal cutting machines has a significant place in billet production (approximately 12 percent). For this reason, the introduction of industrial robots and manipulators there is also given a great deal of attention. Thus, four flexible production modules for countersinking holes in flat parts and bodies of revolution have already been developed and manufactured. All complexes are being serviced by type PR5-2 robots and have vibro-hopper loaders.

Model A-20 automatic turret lathes work with type 111119 manipulators of our own design. They are set on an upper support and lift parts at the moment they are cut from the bar and drop them into the container.

Work has been completed on equipping model 1V10, 1A10P single spindle automatic longitudinal turning devices and other manipulators for loading individual billets from holders and vibro hoppers. In instrument building, loading and unloading and transport and warehousing work (PRTSR) are among the most difficult and exhausting jobs. The main direction in their mechanization and automation is the introduction of balanced manipulators, automatic stacking container warehouses (STAS), etc. One of them, STAS-50LT (Model 02), which is intended for automatic loading and unloading of single items in a special pan conveyor, has been set up in the consumer goods material warehouse shop.

BASIC TECHNICAL SPECIFICATIONS OF THE STAS-50 LT

Lift capacity of the stacker, N	500
Dimensions:	
Compartments (mm)	530 x 395 x 315
Warehouse (meters	17 x 1.7 x 3.3
Number of compartments	434
ASU Element Base	Integrated Microcircuits
Weight (t)	6.5

In the first stage of robotization, industrial robots and manipulators were introduced in cold stamping operations, machining and in electroplating shops. Now the main attention is being paid to such technological elements as assembly production, welding of parts from light alloys and thermoplasts, piston metallurgy, electrophysical methods of machining, manufacture and assembly of printed circuit boards and control and verification operations.

Thus, the model 34162 semi-automatic machine with built-in manipulators for assembling the electric bridge of the type E365 indicators, consisting of five parts, has been placed in operation. The time of the working cycle is 4.5 seconds.

The type 55716 flexible production module for pinion unit assembly, consisting of a straight tooth pinion and two clamps, manufactured by welding under pressure from a copolymer of STD-A polyformaldehyde, has been developed for the purpose of automating manual labor and improving its productivity. Until now this operation was accomplished manually, and due to the small dimensions and rather elastic characteristics of the material in the parts it was unproductive and caused the assembler to become tired. The introduction into production of this flexible production module made it possible to increase labor productivity by 1.6 times and obtain a conditional annual economic savings of 3,300 rubles.

Moreover, the model 4531 machine tool with manual controls for electroerosion cutting of a 12 x 18 H9T0.4 x 0.1 bundle of pipes has been modernized: at each of them a type PR5-2 robot and two manipulators based on the ASAMS module have been set up. Control of the complex is stable, and included in the PR4-2 robot assembly.

The introduction of two flexible production modules made it possible to free one person and has a conditional annual savings of more than 2,000 rubles.

In the next few years the general direction of the introduction of robotics in the association will be the creation of comprehensively robotized technological elements, sections and shops. This is based on a fundamentally new approach to the technological structure and organizational-technical means of automation, orientation on flexible production systems, a comprehensive solution to the questions of increasing labor productivity, improving the quality of instruments and reducing the labor intensity of their manufacture, and maximally reducing manual labor, especially that which is heavy, monotonous and accomplished under harmful conditions.

9069/12795
CSO: 1823/046

AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

UDC 621.9.06-529:658.527

FLEXIBLE PRODUCTION SYSTEMS

Moscow AVTOMOBILNAYA PROMYSHLENNOST in Russian No 11, Nov 85 pp 4-7

[Article by A.D. Chudakov and D.D. Shchetinin of the Automotive Industry Technology Scientific Research Institute, under the "Economics and Organization of Production" rubric: "Flexible Production Systems"]

[Excerpts] Flexible production systems are a new technological tool designed to automate multiple product line manufacturing. Traditionally in this type of production, and especially in the case of small- and medium-size components, there is an unfavorable relationship between machining time and the total time involved in preparing, waiting, setting-up and transporting components (according to foreign data this ratio is 6% to 94%). Flexible production systems allow a sharp change in this ratio, provide an efficient means of organizing combined equipment operations and bring the production organization nearer to an "unmanned" arrangement or one requiring a limited number of workers. All this is achieved by intensifying and automating manufacturing processes; coordinating the automated processes involved in warehousing and materials transport in order to maintain a tight production path; and using computers to automate production preparation and production control so as to assure the best possible process organization and its continuous operation.

The prerequisites for a change to these new production structures include numerical control [NC] tools and machining centers, power connection points for robots, automated conveying and warehousing systems controlled by highly reliable microelectronic devices and highly reliable control computer complexes consisting primarily of microprocessor-based units capable of controlling equipment via a direct connection and on a real-time basis.

The types of flexible production systems now known to be in operation can be divided into three groups: flexible automated lines (GAL), flexible production modules (GPM) and flexible production complexes (GPK).

The flexible automated line is usually used for mass production of components. Here the product flow is moved via consecutively arranged machine stations at a given rate by means of a conveying system set up between the various work stations. When program-controlled machines are used the retooling process is reduced to a matter of changing tools, arbor heads, control programs and conveying devices. This requires a coordination of cycle times at each machine and a number of operations in the production process which approaches an unchangeable value, all of which is only possible for a narrow range of components -- the "closed-family" components.

A flexible production module is a manufacturing cell designed to fully machine a component at a single workstation. These cells are used in one-off and small-scale production. The individual production modules need not be interconnected by a conveying system but a capability is provided for this. All auxiliary functions (storage of incoming components, component input, output and intermediate storage, tool search and replace functions and measurement operations) are automated within the module.

The flexible production complex is between the flexible automated line and flexible production module in terms of flexibility and productivity. Depending on their equipment and structure, these complexes can be used in one-off or large-scale production. Addressable intermachine conveying facilities are a characteristic of the flexible production complex. Differences in the machining times at various stations can be compensated by means of centralized or decentralized intermediate storage facilities. The complexes contain NC machines and machining centers and the production process is controlled by computers.

GOST [All-Union State Standard] 26228-84 governs the terms and definitions employed in the field of flexible production systems.

Flexible production systems first appeared in the second half of the 1960s (Fig. 1), but their numbers have been extremely low and have begun to rise only in the years since 1980. For example, five such systems have been introduced per year in the USA.

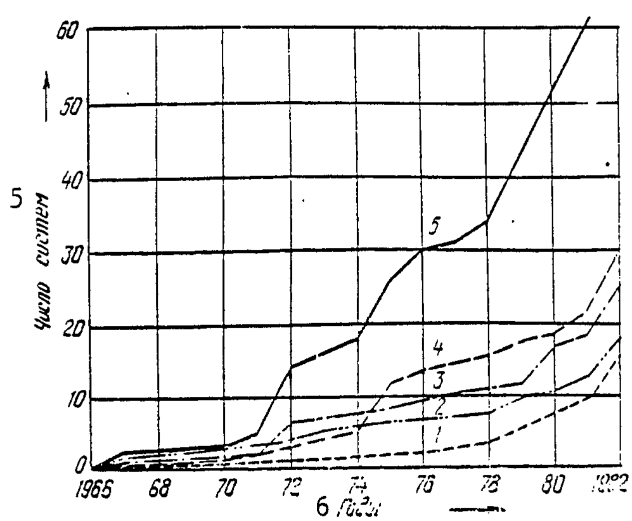

Figure 1. Increase in the number of flexible systems abroad.

1. FRG
2. USA
3. Western Europe (except FRG)
4. Japan
5. Number of systems
6. Years

The majority (about 75 percent) of the systems implemented by the beginning of the 1980s in the capitalist countries were intended for machining structural components. This specialization has deepened in recent years: according to foreign press reports about 87 percent of flexible production systems are used for structural components while only 13 percent are used to machine rotating components.

From 2 to 15 (basically up to 10) machines are used in 85 percent of the systems introduced, but in the USA and FRG there are systems with 28 and 34 machines.

Work on the development of flexible production systems is also underway in all CEMA member nations.

Four complex automation sections were operational in the GDR in 1976: the ROTA-F125NC, ROTA-FZ200, PRIZMA MA250/01DNC and PRIZMA-2. Other flexible production systems have now been introduced. These are characterized by a tendency to incorporate universal machine tools and non-machine stations in addition to NC machines and by a increasing number of machine tools per complex (from 5-7 to 20 and more).

Work in Czechoslovakia on the development and introduction of NC machine tool sections and various levels of automation began in 1970. The latest section designs provide for use of the modular construction concept in which the machining module contains a "machining center"-type multipurpose machine tool, a system for conveying accessories and tools and a device to interface the center to the conveying/warehousing system. The IVU-320 and IVU-500R sections for machining rotating components and the IVU-400, IVU-800/1250 and IVU-1200N sections for structural and smooth components are representative examples of the so-called integrated production section. The section control systems are based on the Soviet M6000 computer or the "Tselatron-C-8205-ZP" produced in the GDR.

A flexible production system designed to machine 40 different structural components has been introduced at one of the Czech machine-tool construction plants. It is set up for three-shift operations and consists of two zones: one for manual servicing and the other for "unmanned" operations.

In this country the Ministry of Machine Tool Construction is the chief agency responsible for the creation of flexible production systems. A range of standard flexible production complexes for processing rotating parts (ASV-series complexes) and structural parts (ASK-series complexes) has been developed in its enterprises.

Judging from comments made by manufacturers, the highest level of automation has been achieved in the ASK-20 complex developed and introduced at the Ivanovsk Machine Tool Construction Production Association (1981). This complex consists of four Modul-500 units with automatic tool and table/accessory changeover devices, 8-place table/accessory storage units, one IR-800MF4 machining center and a TS-500 rail-type conveyor system arranged alongside the Modul-500 unit storage facilities. The conveyor trolley is equipped with a table/accessory handling unit. Along the conveyor rail line there are four loading stations and four unloading stations for tables and accessories and two loading/unloading stations for tools. Complex control is achieved by a two-level system with an upper level consisting of a special SM-2-based computer system and a lower level made up of CNC machine tool devices, programmable controllers for the conveyor system and other local control devices.

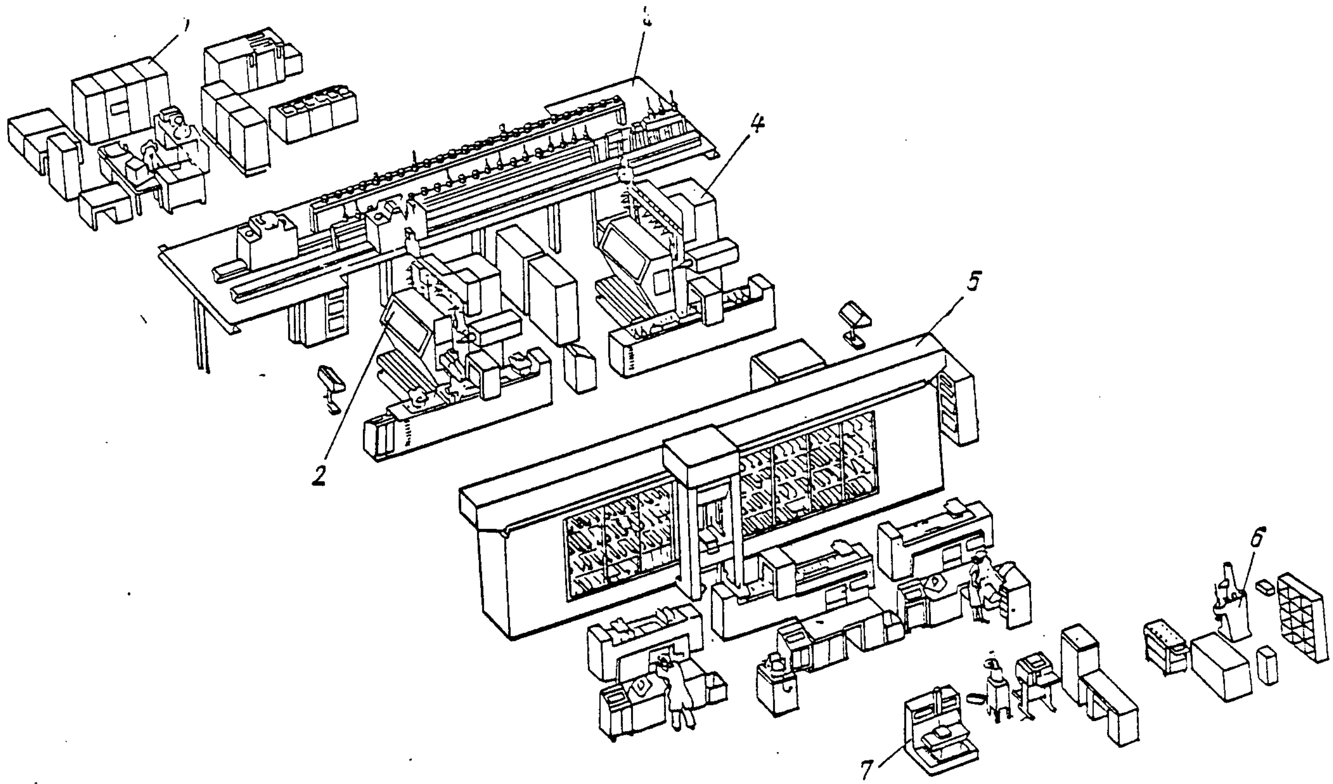

Figure 4. Type ALP-3-1 flexible production complex

1. Control section with M 6000 computer
2. Multi-item APRS-1M machine tool
3. SIO-1 tool conveying/storage system
4. Multi-operation SM400F45 machine tool
5. ATS-1 automated component and blank conveying/storage system
6. Off-machine setup section
7. Component monitoring section with 3-coordinate measurement unit

The ALP-3-1 (Figure 4) and ALP-3-2 flexible production complexes are of great interest.

The ALP-3-1 consists of two specialized multi-operation six-coordinate machine tools (models APRS-1M and SM400F45) with chained bins capable of holding 60 tools each, the ATS-1 automated conveying/storage system, the SIO-1 automated tool conveying/storage system, a section for off-machine setup work (with a setup unit), a finished-component monitoring section (with a three-coordinate measuring device) and a control section equipped with an M6000 computer to control the complex's conveying/storage systems and machine tools.

The ALP-3-2 complex is similar in design to the ALP-3-1 but consists of seven specialized multi-operation, NC machine tools, appropriately modified conveying/storage systems and tool conveying/storage systems, and a section for making up blank lots (with an automated shelf), an automated elevator-equipped tool bin system and an automated shavings removal system, as well as a section for final hand-processing and automated component washing, etc. Both complexes are designed to machine aluminum structural components with dimensions of 250x250x250 mm and are equipped with automatic systems for making up tool sets from individual tools drawn from central storage.

When evaluating the prospects for developing and introducing flexible production systems one must consider the fact that they are extremely expensive.

For example, according to information from an American firm, the cost of a fully flexible system averages 1 million dollars per workstation. The costs contained here are: machine tools (50 percent), conveying/storage system (10 percent), control and programming systems (8 percent), tools and attachment devices (25 percent) and engineering and special equipment (7 percent). It must be noted that this does not result in an "unmanned" environment: according to this same firm a typical eight-station flexible production system requires a foreman (brigade leader), electrician, hydraulic system mechanic, three machine tool operators, a computer operator, a tool maker and a team to service the electronic devices and computer equipment.

According to information from this firm ("Kerni and Treker"), 50 operational systems in a number of countries studied over a period of 18 months and 7 systems examined in the USA revealed an increase in labor productivity, a 40-percent reduction in preparation time and a 30-percent increase in machine utilization factors while per-unit component costs and labor wages dropped by 12 percent and 30 percent respectively. Nevertheless, these systems only handled 4 percent of the components passing through the factory.

Unsatisfactory operational results were found in the case of 33 other American systems. The crux of the matter is that the flexible system is not yet a unit which can be purchased as a whole and expected to demonstrate all its advantages immediately after installation and startup. It changes the nature of production, first of all its organization, and its performance improves as the overall level of plant automation increases. Moreover, in the opinion of experts from "Kerni and Treker", experience in the creation and introduction of flexible production systems indicates the need to change traditional relationships between system users and system suppliers. The system's manufacturer cannot bear all the responsibility for its final result. The user must provide guidance at all stages of its construction, beginning with the planning and development of production tasking and carrying on through system startup and the initiation of full-scale operations.

12746
CSO: 1823/090

AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

UDC D62-229.7.061

ADVANCED MACHINE TOOLS, LOADING SYSTEMS VIEWED

Moscow MEKHANIZATSIYA I AVTOMATIZATSIYA PROIZVODSTVA in Russian No 11, Nov 85 pp 5-9

[Article by V.I. Kharkov, engineer: "Scientific and Technical Progress (From Materials of the Exhibit of Economic Achievements of the USSR)"]

[Text] The machine-tooling complex (figure 1) built from a revolving lathe and a two-armed robot is designed to machine short revolving bodies including parts with curvilinear and threaded surfaces from piece blanks in either small-series or series multi-item production.

The complex consists of:

A model 1V340F30 revolving lathe with a vertical axis of rotation, 8-position revolving head on a cross carriage and an Elektronika NTs-31 on-line control system;

A gantry-style two-armed M20-Ts robot with a 20-kilogram (20 x 2) load capacity;

An 8-position indexable blank table, one of whose positions is for initial unloading of finished parts. Subsequently, machined parts are set onto the positions into which all of the blanks are unloaded;

Complex enclosure allowing adjustment and process correction during maintenance and convenient observation of the machining process.

Technical Characteristics

Maximum part dimensions, mm:
  diameter..200
  length..100

Robot load capacity, per arm, kg..10

Number of:
arms..2
grips...2
technological units served..1

Maximum movement, mm:
carriage...3500
arms..630

Turning angle of robot grips..90

Drive..................................pneumatic, electrical motor (carriage)

Type of robot control system...UTsM663

Carriage positioning precision, mm.......................plus or minus 1

Dimensions of transported blanks, mm:
diameter...40-200
length...20-100

Dimensions, mm:
complex...5800 x 3600 x 3000
lathe...2900 x 1740 x 1780
robot...5000 x 800 x 3000

Weight, kg:
complex..5850
lathe without attachments..2600
robot without electrical box and control system......................1100

Approximate price of complex, rubles..................................69,000

Manufacturer: the Berdichev Komsomolets Machine-Building Factory

The automated lathe (figure 2) with built-in robot and transport system is designed to automatically machine cylinder sleeves for various types of motors. It is automated line module consisting of several parallel automated units, each of which performs a specific operation in the machine-tooling of cylinder sleeves.

The automatic lathe is a programmable vertical, two-spindle hydraulically-fed model.

The transport system consists of the following components: an accumulator; an automatic loader and unloader which feeds sleeves from a distribution conveyor line and lowers processed sleeves 500 mm onto the removal conveyor; and a hoist that lifts processed sleeves 500 mm from the removal conveyor to the distributor conveyor to be passed onto the next operation.

The conveyor is a roller conveyor driven by the torque generated by the sleeve weight. The sleeves are fed into the feeding mechanism in lots of 4-6 units and the processed sleeves enter the removal conveyor where they are simultaneously monitored.

After processing, each sleeve is automatically checked by a measuring device built into the conveyor.

For setting up automated lines, there are modules consisting of an automatic lathe and a diverse set of transport devices.

Automated lines of this type are joined together to form systems that can perform various operations.

The automated lathe can increase labor productivity 335 percent.

Technical Characteristics

Dimensions of machined sleeves, mm:
internal diameter..100-150
maximum outer diameter...130-180
height...200-300

Adjustment precision, mm..0.005-0.2

Precision of unadjusted tool replacement, mm................0.05 per diameter

Technical use coefficient..0.8

Accumulator capacity, number of sleeves...........................160-200

Sleeve movement, m/min...5

Number of automated modules in an automated line....................2-10

The annual savings achieved through the use of this lathe is 13,940 rubles.

The lathe was developed by the Moscow Special Design Bureau for Automated Lines and Special Machine Tools.

The model 16K20F3R232 robotic lathing complex (figure 3) is designed to machine revolving bodies in an automated cycle and to process parts from piece blanks by clamping them between a mechanical chuck and if necessary a tailstock.

The complex consists of a center-chuck turning lathe with a numerical control device, a built-in M10P.62.01 robot and M20P.40.01 robot with a Kontur-1 NC device and an indexable table.

The technical capabilities of the robot are determined by the type of turning units used which are distinguished by their turning angle and number of fixed positioning points. Depending of the turning unit forming the complex, a part can be machined by two lathes without being turned over.

The robot grips are distinguished by their load capacity, range of action and arrangement. The range of action of the grip divided into two overlapping intervals. A small amount of adjustment is required for transition from one interval to the other and this must be considered in selecting the list of parts to be machined at one complex. In selecting the parts by weight, it is remembered that the load capacity of the grip is affected by the position of center of gravity of the handled part relative to the jaws of the grip.

The indexable table is designed to transport parts into the zone of the robot grip. The blank can be set directly onto the plate of the table along with any of the satellites attached to the plates.

Technical Characteristics

	16K20F3R132		16K20F3R232
Diameter of installed items, mm	20-150		50-250
Maximum item length, by type, mm:			
shaft		500	
flange		150	
Total load capacity per arm, kg	10/5		20/10
Number of arms and grips per arms		1/2	
Number of programmable coordinates (without grip)	5		4
Method of programming		teaching	
Memory capacity of robot system, points		300	
Positioning error, mm	$\pm$ 0.5		$\pm$ 1.0
Dimensions, mm	6100 x 3800 x 1900		6500 x 5800 x 2400
Mass, kg	4110		4570

The developer and manufacturer is the Red Proletariat Machine-Building Association.

The AT-220 RTK robotic technological complex (figure 4) is designed for automatic chuck lathing of cylindrical, conical and shaped surfaces of wheels, disks and drums made of any grade of steel or alloy. It includes an automatic manipulator that loads blanks and unloads finished parts.

Technical Characteristics

Maximum diameter of item handled by manipulator, mm......................300

Maximum length of handled item, mm.......................................150

Number of tools in magazine...13

Manipulator load capacity, kg...............................80 (40 x 2)

Number of controllable manipulator coordinates.............................3

Numerical control...2U32-61

Complex dimensions, mm....................................6100 x 3200 x 3600

Weight, kg..9000

The introduction of the complex can save 12,000 rubles per year.

The RRTK-3D31 robotic technological complex (figure 5) is designed to automatically lathe chuck parts (disks, flanges and bearings) of graduated or curvilinear profile and automatically load and unload them.

The complex consists of a semiautomatic chuck lathe with numerical control, an aggregate-design MA 80Ts12509 industrial robot and an Elektronika NTs180-31 control system.

Technical Characteristics

Diameter of machined parts, mm...160-500

Maximum blank weight, kg...40

Electrical motor power, kW...51.1

Dimensions, mm...6300 x 3750 x 3450

Weight, kg..12,310

Introduction of the complex can save 331,000 rubles per year

The robotic complex was developed by the Ryazan Special Machine Tool Design Bureau and is manufactured by the Ryazan Machine-Building Association.

The MP-15T transport robot (figure 6) with a digital control system is designed for use in flexible automated production systems to transport, load and unload items in assembly and welding operations carried out on a moving conveyor line. The robot is battery-powered.

The robot is set on a mobile platform and is equipped with a set of video sensors for highly-accurate positioning of items.

Technical Characteristics

Platform load capacity, kg..........650

Work time on one power charge..........16

Power source..........4 batteries, each 124 x 132 A/h

Dimensions, mm..........2100 x 1000 x 1700

Robot load capacity, kg..........30

Weight, kg..........650

The annual savings from the introduction of this robot was 80,000 rubles.

It was developed by Central Science Research Institute of Robotics and Technical Cybernetics of the Leningrad Polytechnical Institute imeni M.I. Kalinin.

The modular RPM-25 industrial robot (figure 7) is designed for automation of basic and auxiliary technological processes of the entire production process (hot die forging and sheet stamping, heat treatment, machine-working, etc.).

The robot's cinematic structure can be adapted to its specific working conditions by assembling the manipulator from autonomous structural modules. The system has a total of 15 structural modules which makes possible 100 different arrangements of the manipulator (stationary and mobile, floor and suspended designs). The robot has a maximum of 7 drive speeds. At the present time, 11 modules have been developed. It is possible to develop and gradually modernize module system.

Technical Characteristics

Load capacity, kg..........25

Number of degrees of mobility..........6

Type of drive..........D.C. electrical

Control system..........UPM-22 positional numerical control

Maximum positioning error, mm..........$\pm$ 1

Maximum radius of action, m..........2.1

Work zone area, m^3..........16

Angular displacement, degrees:

arms:
vertical turning..300
motion along the lower axis..90
motion along the upper axis..75

brushes:
rotation..300
bending..180
grip turning..300

Manipulator dimensions, mm.................................1700 x 1000 x 1610

Manipulator mass, kg..1510

A group of 3-5 robots to two-shift operation can replace 4-6 workers.

The savings achieved by the introduction of one robot amounts to 5000-7000 rubles.

This robot can be incorporated into flexible production systems through a nonstandard line of communications with the technological equipment.

The PTU2KD2124E.01 robotic technological section (figure 8) is designed for two-pass cold sheet stamping of flange covers from flat piece blanks.

The section includes two KD2124E presses, a KM1.25Ts4216 industrial robot, vale feeder and container.

Technical Characteristics

Output, units/minute..16

Blank weight, kg..up to 0.63

Positioning precision, mm..± 0.1

Dimensions, mm.................................3000 x 3000 x 2300

Weight, kg..4345

The annual savings from operation of this section is 21,300 rubles.

The section was designed by PKTIkuzrobot [not further identified] in Taganrog and manufactured by the Salsk Forge and Press Equipment Factory.

The automatic transport manipulator (figure 9) is designed and used in automated production to transport items over distances of up to 100 meters between shops and operations.

It can be used in all types of industry to provide transportation between technological lines and supply dumps as well as between individual work places. It is very adaptable to production planning and can transport loads over walkways and equipment without disturbing floor transportation and can operate in automatic mode.

The robot is an electrical freight car that can be programmed with addresses for receiving and removing loads.

Technical Characteristics

Load capacity, kg....................10

Positioning margin of error, mm....................$\pm$ 5

Maximum movement, m:
- horizontal....................100
- vertical....................1.5

Speed, m/s:
- horizontal....................0.5
- vertical....................0.2

Dimensions of transport car, mm....................400 x 300 x 250

Required power, kW....................0.12

The features of the transport system include a covered bus duct built into a monorail track to fully protect personnel against accidental exposure to the electrical contacts and simple and convenient assembly using standard components provided by the manufacturer for specific production planning.

The annual savings created by the use of this system is 8000 rubles.

The developer and manufacturer is the Elektronika Central Science and Research Institute.

The MT-294-006 transport manipulator (figure 10) is designed to mechanize heavy physical loading, unloading and transport work.

The advantages of this manipulator are its wide zone of service and the simplified design of its lever system.

Technical Characteristics

Load capacity, kg....................25

Area of work zone, m^3....................65

Carriage speed, m/s....................0.2

Vertical turning angle, degrees....................360

Dimensions, mm....................1600 x 500 x 3200

Weight, kg....................110

The annual savings achieved through introduction of this manipulator amounted to 5000 rubles.

The manipulator was designed by the Elektronika Central Science Research Institute.

The PR601/60 welding robot (figure 11) is designed to automatically weld the body of the VAZ-2108 light automobile.

The welding station consists of a robot with welding gear and platforms for mounting and attachment of the robot and the automobile body.

Technical Characteristics

Load capacity, kg:
  at full speed....................60
  at reduced speed....................100

Positioning margin of error, mm....................± 1.2

Dimensions, mm....................6000 x 4200 x 3400

Weight, kg....................5500

The robot is equipped with special welding tongs and due to its considerable radius of action and high mobility, can weld in hard-to-reach points.

The welding robot is designed and manufactured by AvtoVAZ.

The Universal 60.02 robot is designed to automate contact point welding along curvilinear spatial trajectories in series and mass production.

Technical Characteristics

Manipulator:

Number of speeds....................7

Positioning margin of error. mm....................± 1

Output (at a welding cycle of 0.8 seconds and a weld pitch of 40 mm)........40

Thickness of welded material, mm....................from 0.5+0.5 to 1.4+1.4

Required power, kW....................16

Method of teaching...first-cycle

Dimensions of manipulator base, mm..............................120 x 1440

Maximum work-zone dimensions, mm:
  horizontally...2105
  vertically...1958

Weight, kg...2300

The use of this robot made it possible to replace 8 hand welders and save 8000 rubles per year.

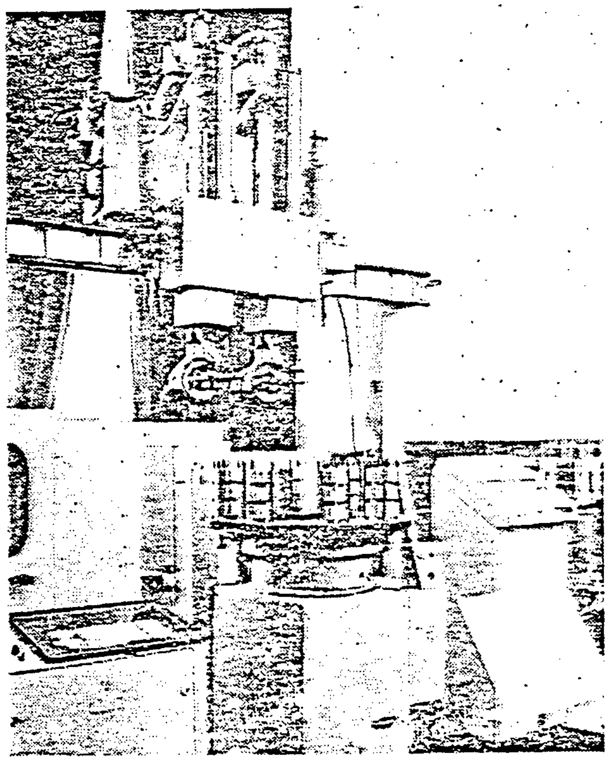

Figure 1. The Komsomolets robotic complex.

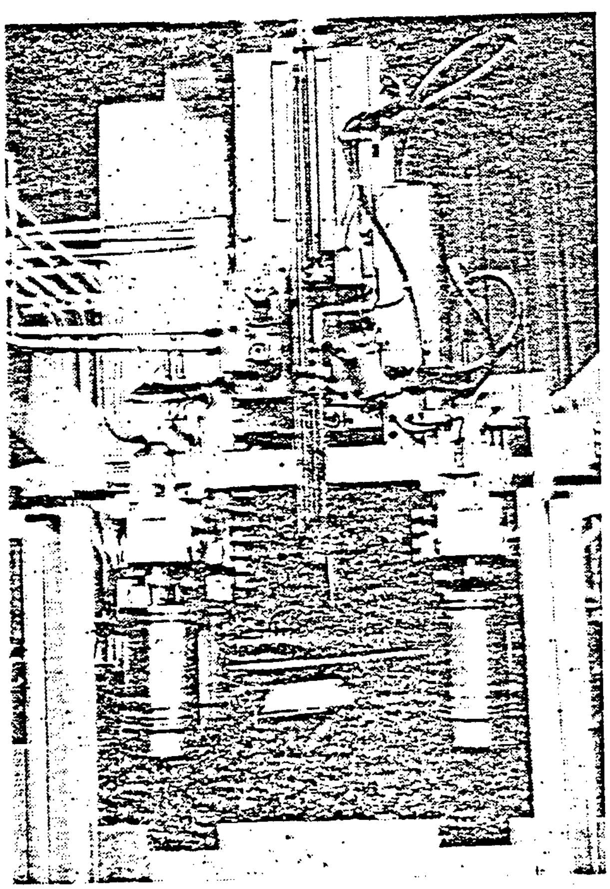

Figure 2. The automated lathe with built-in robot.

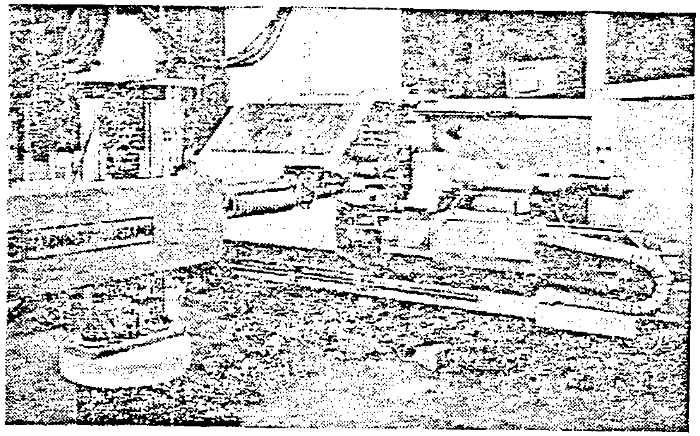

Figure 3. The Red Proletariat robotic lathe complex.

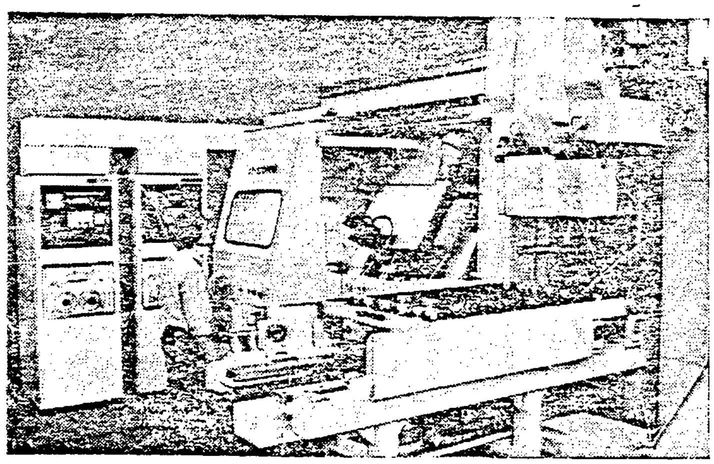

Figure 4. The AT-220 robotic technological complex.

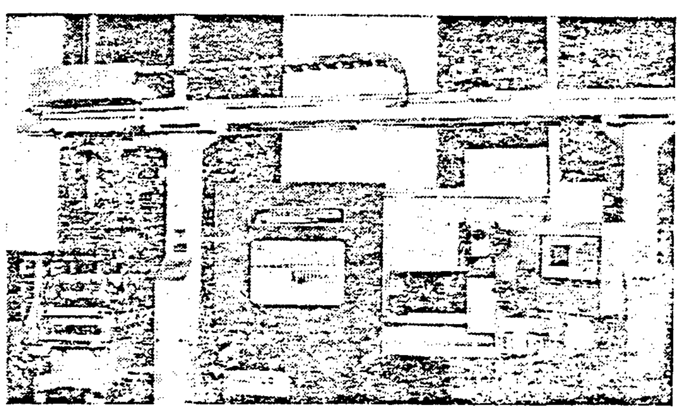

Figure 5. The Ryazan Machine-Building Association's robotic technological complex.

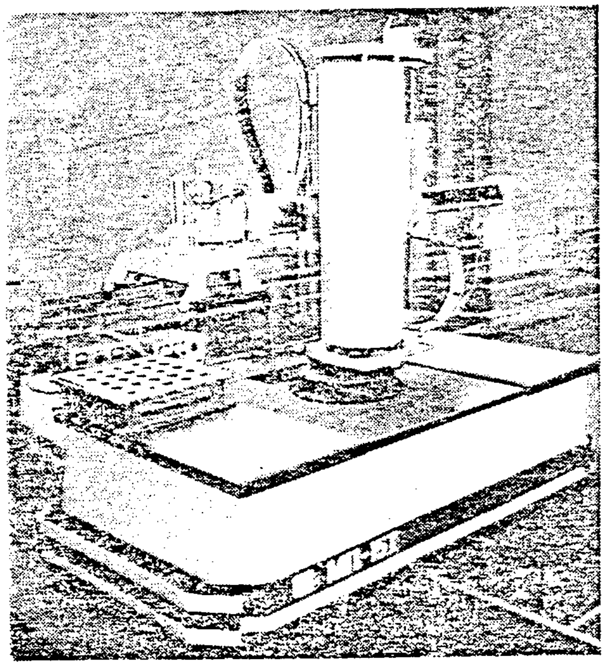

Figure 6. Transport robot.

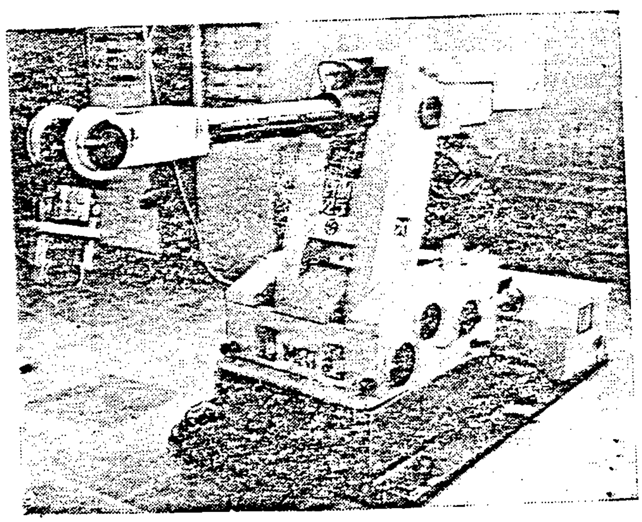

Figure 7. The RPM-25 robot.

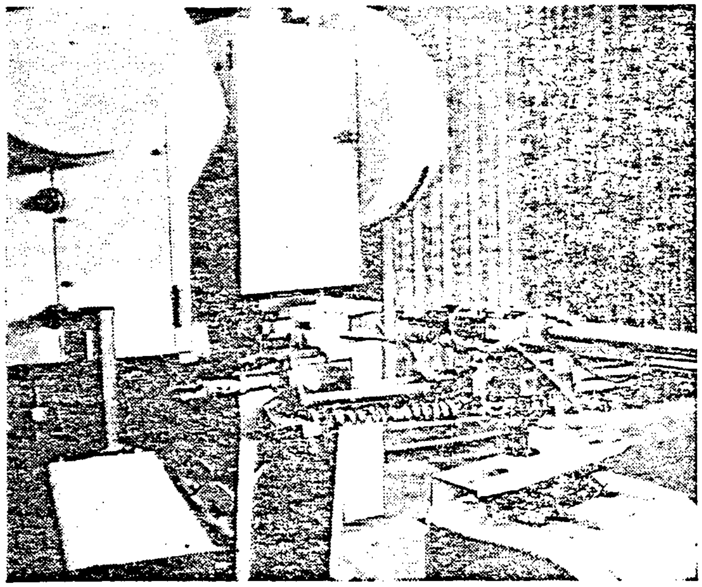

Figure 8. The Salsk Forge and Press Equipment Factory's robotic technological complex.

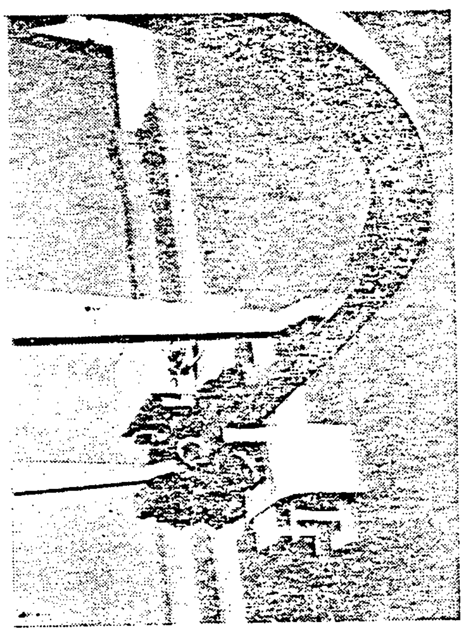

Figure 9. The automatic transport manipulator.

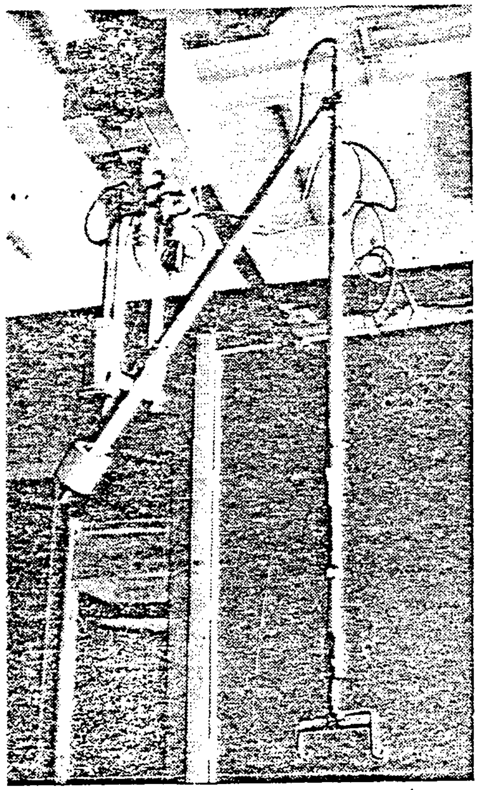

Figure 10. The MT-294-006 transport manipulator.

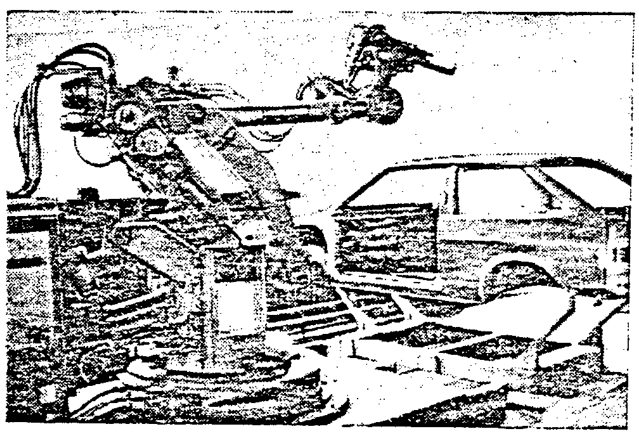

Figure 11. The AvtoVAZ welding robot.

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ROBOTICS

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TRANSPORT MANIPULATOR REVIEWED

Moscow MEKHANIZATSIYA I AVTOMATIZATSIYA PROIZVODSTVA in Russian No 11, Nov 85 pp 13-14

[Article by engineers V. Dzyuba, A. S. Mironenko, L. N. Timoshenko, V. Ye. Kovtunenko: "Transport Manipulator"]

[Text] Floor type transportation facilities for operational servicing of work positions, located on the line with intermediate products, fixtures and tools, make the most frequent use of cart-robots (transmanipulators). Since the transport manipulator and the warehouse stacker move the same loads in flexible production complexes, it is advisable to have the manipulator grip in the shape of a lifting telescopic bracket moving to both sides, similar to the stacker.

The transport manipulator (Fig. 1) consists of frame 1, two wheel pairs 2, transmission mechanism with a two-speed reducer 3, brakes 4, telescopic load grip with two-sided feed 5, two place П-shaped rack 6, motion blocking unit 7, as well as four electrical drives for moving load grip 9, load grip 10 as well as moving rack 11 and manipulator 8.

Transported packing 12 with intermediate products, tools, fixtures or finished products is placed in cells of the two-place rack. Power is fed to the manipulator over suspended cable 13. The manipulator is moved over a 25x40 mm steel rail. On one side two manipulator wheels are made with flanges and the other wheels are made without flanges in order to make it more convenient for switching. Catches 14 are mounted along the rail. The manipulator does the following operations: carries packing to the work position, returns packing to the warehouse and exchanges it. In the "exchange packing" mode the manipulator operates in the following sequence: on a signal it obtains the packing or a satellite at the warehouse. This is determined by the production operation plan, and moves the load to the exchange table.

After stopping and fixing its position the manipulator takes packing with machined parts from the exchange table and reloads the exchange table with intermediate products brought from the warehouse. The manipulator mechanisms operate in the following sequence: the grip moves into the exchange table zone and lifts the packing to the extreme upper position. After that it returns and lowers to the extreme lowest position, installing the packing taken from the storage device in the free cell of the two-place rack. Then the rack is moved along the longitudinal axis of the manipulator which places the packing above the grip and lifts the packing to the extreme upper position; the grip moves to the side of the exchange table, lowers to the extreme position, leaving the packing on the exchange table, and returns to its initial position.

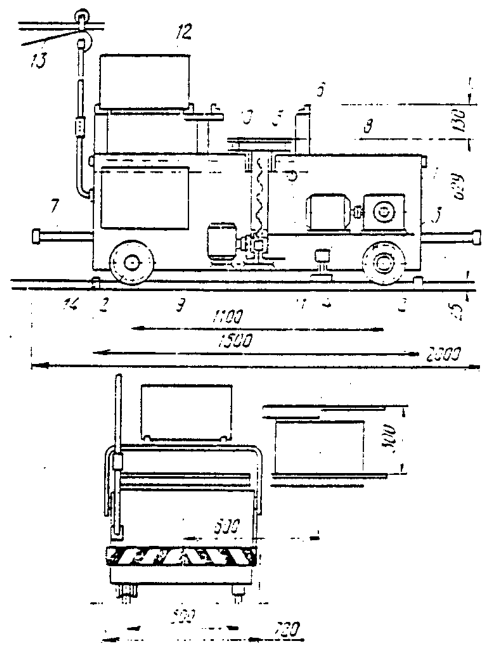

Fig. 1. Floor type transportation manipulator

After the completion of the "exchange packing" cycle, the manipulator returns to the warehouse and transfers the packing to the exchange table. The design of the grip makes it possible for the manipulator to work with loads located on both sides of the rail.

The manipulator is controlled through an on-board system with a K1-20 microcontroller from an operator's panel or a computer. A movement blocking unit is provided which acts on the mechanism's control system movement and brake for emergency stopping of the manipulator when it meets an obstruction.

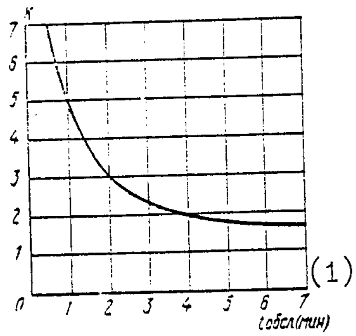

Fig. 2 Curve for selecting servicing coefficient
1 -- servicing time, minutes

Specifications of the transport manipulator

Load-lifting capacity, kg	100
Degrees of mobility	4
Size of packing, mm	480x356x250
Speed of manipulator, m/min:	
sustained	42
finishing	4.5
Speed, m/min	
movement of grip	6
grip platform lift	9
Stroke of grip, mm:	
horizontal	600
vertical	300
Stroke of П-shaped rack, mm	500
Power	over suspended cable
Size, mm	2000x720x750
Weight, kg	380

Operational possibilities of the transport manipulator are evaluated by the servicing time norm H which is a characteristic of the GPK [Flexible Production Complex] that determines the minimum machining capacity of a transported lot of parts T (min). In this case, according to the footnote*, it is possible to observe conditions that eliminate idle time of equipment, when the following inequality is achieved:

$$H = KtN \lesssim T$$

where K is a coefficient which takes into account the operational

*Push, V. Ye.; Pigert, R.; Solonkin, V. L. Automatic machine tool systems. Moscow, Mashinostroyeniye, 1982.

possibilities of the transport manipulator and determined, by an empirical relationship proposed by the authors and shown in Fig. 2; $t_{обс}$ -- time for servicing work position (average for GPK); number of service equipment units in the GPK is N.

Taking into account recommendation obtained from conditions of the most advisable organization and control of the GPK, the number in a section is usually taken to be equal to 20.

The experimental solution of a section with such a number of equipment and its linear disposition determine a length of the transport path of L=40 to 50 meters.

Taking into account the technical characteristics of the developed transport manipulator the time norm (H) for servicing 20 work positions in the GPK is 90 to 120 minutes. Therefore, the transfer operation at one work position will take not less than 1.5 to 2 hours; this interval determines the minimal machine tool capacity for machining parts of transport lot T, average for the GPK. The advantage of the transport manipulator proposed in this paper, as compared to existing designs of transportation facilities is simplicity of design and being able to purchase complementing parts which reduces costs and makes possible its being made by the enterprises that introduce the GPK.

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ROBOTICS

BRIEFS

CHOREOGRAPHED PROGRAMMING OF ROBOTS -- The number of professions for robots is growing year after year. It is no longer unusual to see robots engaged in painting automobiles, manufacturing parts, assembling machinery, and performing various repair and installation operations. However, the motor capabilities of robots are limited compared to those of humans. One of the difficulties here is the development of programs which make it possible to give the robot a sufficient degree of freedom of movement. A possible solution to the problem was prompted by choreography, or more correctly, a universal method of writing down dance movements, developed by the young Chinese husband and wife team of specialists, (U Tszima) and (Gao Chunlin), which they called, "The Coordinate Method of Choreographic Annotation." The authors' point of departure was the fact that all movements are divided into three types: those accomplished in the vertical plane, the horizontal plane and by rotating movements of the arms and legs. Using their method, it is possible by combining 16 letters and 8 numbers, to write down millions of movements of all kinds, in sort of the same way music is written down using notes. The Institute of Applied Mathematics of the PRC Academy of Sciences submitted the method to a commission of experts and acknowledged that it is fully sound scientifically. Not only figures in the field of dance, but also electronics specialists were interested in this. In the opinion of (Lyu Tszunduan), vice president of the scientific and technological society for experimentation in the field of artificial intelligence, the method will undoubtedly simplify the development of appropriate programs and help teach the robot to move like a human being. One of the authors, (Gao Chunlin), with the support of the PRC State Committee on Science and Technology, is now engaged in translating the method to computer language. "When information obtained by our method is entered into the machine, choreographic representations will appear on the display screen," he explains. "And vice versa. Images from the screen will be transformed into the choreographic annotation. The robot will begin to accept corresponding commands from the computer." And, who knows, perhaps soon it will learn to dance. [By A. Zaytsev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 July 85 p 3] 9069

NEW TYPE ROBOTS PRODUCED -- In 30 of the country's industrial centers, approximately 200 "Moment" model industrial robots have been registered. They were designed and are being series produced in the Kompleks Production Association in Novgorod. Due to the introduction of its own robots, labor productivity has tripled in a number of the shops of the association itself. Robotics systems are improving. Thus, during modernization of the manipulator turning mechanism found in the automatic stamping line of the association's chief factory, pneumatic hydraulic engines of a fundamentally new type were installed. This is resulting in an annual economic savings of 600,000 rubles. The improvement will also be used in series production. The association has organized a consultation point for innovators from the machine building enterprises of various types who are involved in improving the effectiveness of robotics systems. [By V. Proskura] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 August 85 p 2] 9069

ROBOTS IN BAKU MACHINE BUILDING -- At the Baku Electromachine Building Factory imeni 50th Anniversary of the Komsomol of Azerbaijan, stamping, coiling, mechanical machining of parts, painting of electric engines and other labor-intensive operations have been transferred to robots. The automation of the process of stamping electrotechnical steel alone made it possible to eliminate 10 manual presses and reduce by more than half the amount of scarce metal lost in the cutting process. The increased level of automation and mechanization helped to reduce sharply labor intensiveness in manufacturing. The reorganization of auxiliary production freed dozens of people and made it possible to transfer them to skilled operations. [By I. Kuliyev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 July 85 p 2] 9069

ROBOTS MONITOR PRESSURE REGULATORS -- (Sumgait, 10 August) A robot of fundamentally new design has been created by a group of scientists from the Neftekhimaftomat Scientific Research Institute. It can not only perform the duties of an entire brigade of controllers, but it also determines the reasons for the production of defective products and promptly reports this to the control panel. The skillful assistant will take its workplace in instrument building factories which are experiencing difficulty in monitoring pressure regulators. A worker spends no less than 30 minutes checking one such regulator. In this time a robot is able to check no less than 5 instruments. [Text] [Baku VYSHKA in Russian 11 August 85 p 2] 9069

ROBOTS SERVICE NC MACHINE TOOLS -- The general purpose robots produced by the Mogilev Tekhnopribor Factory received high marks from the country's factories. For example, TUR-10 robots are successfully servicing automated equipment and numerically controlled machine tools. Consumer goods with the Tekhnopribor brand name, such as the Foton musical light show attachment, are also in high demand. [Text] [Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 3, March 85 p 34] 9069

NEW UNITIZED DESIGN MANIPULATOR -- A new manipulator, the construction of which was completed yesterday at the Central Institute of Robotics and Technical Cybernetics, will work together with a quantum generator. Under a steady laser beam engaged in the hardening of metal, it is capable of presenting a part in such a way that the entire surface is machined. The innovation, which will be sent to Moscow, to the All-Union Institute of Electrothermal Equipment, is distinguished by a modular construction. The device consists of standardized units which are fastened together by brackets. This design can be changed in half a day. Such rapid transformation enables the robot to conduct different kinds of machining of parts, for example, either planar or spherical. [By Yu. Vorobyevskiy] [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 26 April 85 p 2] 9069

ROBOTS WELD TRUCK CABS -- (Minsk) A flexible automated system for welding new generation MAZ cabs has begun operation at the Minsk Automobile Factory. All of the processes are carried out by robots. It takes only a few minutes to restructure the system to weld cabs of various sizes and configurations. [Text] [Moscow SELSKAYA ZHIZN in Russian 10 April 85 p 1] 9069

ROBOT ADJUSTORS SCHOOLED -- The administration of Vocational and Technical School No. 65 had barely announced the recruitment of students for a new specialty, adjustors of modern automated machine tools and manipulators, when a stream of applications poured in. The Volga Automobile Factory imeni 50th Anniversary of the USSR (Tolyatti) has organized new production to manufacture robot systems. During the 12th Five-Year Plan, 930 welding robots and 6,500 manipulators will be manufactured there. Thus, the young specialists will have some place to apply their knowledge. [By N. Chulikhin] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 August 85 p 2] 9069

ROBOTS MANUFACTURED AT DIVNOGORSK -- Setup and adjustment in the stamping and machining shop of the low-voltage apparatus factory of a second robotized system based on a large 100 ton press has been completed. The first such system has been in operation for two years now, has been completely assimilated, and made it possible to improve labor productivity significantly and free several workers from monotonous work. Since there is still a shortage of industrial manipulators, the design and construction of their own robots became a concern of the robotics design buro organized in the factory. It is headed by young engineer A. Ryzhenkov. Robotization began by setting up one manipulator acquired by agreement at the Volga Automobile Factory. Now the young engineers are designing robots themselves. And the department of mechanization and automation has undertaken to organize series production of manipulators. Soon the stamping and machining shop will shift to humanless technology. Several hundred people have already been freed since the beginning of the five-year plan, due to comprehensive automation at the factory. [By V. Sbitnev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 August 85 p 2] 9069

NEW WELDING ROBOT DESIGNED -- Series production of robotics systems designed for welding operations will begin this year at the Elektrik Factory, in accordance with the "Intensifikatsiya-90" [Intensification-90] program. The first industrial models of these automatic quickly adjustable assemblies have already been tested at the All-Union Scientific Research, Planning, Design and Technological Institute of Electric Welding Equipment. The specialists gave the new equipment high marks. The design, created in Leningrad, incorporated the best characteristics of similar machines. The system can work both autonomously and as a part of flexible automatic production lines. It does not require the creation of a special program. It is enough for the operator to "tutor" the robot once on the entire technological process, and subsequently the assembly will operate "from memory." The productivity of the new assembly is three times that of the most highly skilled welder. [Text] [Leningrad LENINGRADSKAYA PANORAMA in Russian No. 6, June 85 p 40] 9069

TASHKENT ROBOTICS DEPARTMENT OPENED -- A robotics department, the first in the republic, has opened at Tashkent Vocational and Technical School No. 44. Its graduates are awaited by the Tashkent Aviation Production Association imeni V. P. Chkalov. The association even helps to organize the study of robots at the school. A line of manipulators was set up in the training shops. In the coming five-year plan, the Uzbekistan vocational and technical school will train several hundred specialists in the operation and maintenance of computers and robots for enterprises and computer centers. [Text] [Moscow SELSKAYA ZHIZN in Russian 25 August 85 p 1] 9069

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