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CONSTRUCTION AND EQUIPMENT

No. 64

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CONSTRUCTION

FINISHED CONSTRUCTION GIVEN PRIORITY IN 1982 UZBEKISTAN PLAN

[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 8 January 1982 carries on page 1 a 900-word lead editorial titled "The Builder Is a Creator." The editorial notes that one of the features of the 11th Five-Year Plan is a decrease in growth of capital investment and an increase in putting fixed capital to work. The 1982 plan especially gives priority to completion of unfinished construction projects and utilization of existing material and labor resources, and calls for a 7 percent reduction of unfinished construction. The editorial specifies certain provisions of the 1982 plan for construction. Capital investment will rise 117 million rubles over 1981 to 5.5 billion rubles in 1982, 78 percent of which is designated for building production forces and reconstructing and reoutfitting existing enterprises. Development of the ferrous and nonferrous metallurgy industries will increase by 1.4 times, and of the gas industry by 1.5 times. The sum of 300 million rubles will go to increase production of consumer goods which is one-fifth of the total capital investment for industry. In the agricultural sector, 96,000 hectares of newly irrigated land will be made available, 80,000 ha of already irrigated land will be reclaimed, 60,000 ha of cultivatable land will be leveled, and 300,000 ha of pastureland will receive water supplies. The editorial warns that this plan cannot be fulfilled without an increase in productivity and greater economizing of all resources. In conclusion, the editorial states that a new economic management mechanism, whereby greater value will be placed on completion of construction projects than to volume of construction work, will be introduced beginning with 1982.

TASHKENT TEXTILE COMBINE RECONSTRUCTION SHORT OF MATERIALS, LABOR

[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 27 January 1982 carries on page 2 a 1,000 word article by newspaper special correspondent J. Kholqosimov and Uzbek Television correspondent B. Saydaliyev titled "It Takes Two." The article is the fourth in a series by the authors devoted to media coverage of the progress of the reconstruction of the Tashkent Textile Combine. Previous reports, which are also broadcast on Uzbek Television, appeared in SOVET OZBEKISTONI in April, July and October of 1981. The present installment reflects continuing problems with shortages of materials and labor, and includes several interviews. The first of these is with Viktor Ivanovich Koliberdin, UzSSR deputy minister of construction, who acknowledges that the 1981 plan was not carried out due to lack of a supply base and labor shortages. Capital construction peaked at 86.2 percent of the 2.5 million ruble allocation, while

construction and assembly works remained at 77 percent of the 1.5 million ruble allocation. U. Abbosov, a worker for the chief contractor 1st Administration of the "M ashpromstroy" Trust, says that work on one project ground to a halt for 4 months due to lack of mortar and brick. Although work recently started up again, the crew has only 4 of the required 15 workers and the supply of mortar and brick has not improved much. Another interviewee confirms that work has stopped on a number of projects. The correspondents remind their readers that the party especially demands productive use of capital investment funds, which means that construction of these projects must proceed on a consistent basis.

CSO: 1836/1014

MINISTRY COLLEGIUM SLOW TO USE NORMATIVE NET OUTPUT

Moscow PRAVDA in Russian 27, 28 Mar 82

[27 Mar 82 p 2 Part I]

[Article by A. Nikitin: "Oncoming Traffic." The Bachurin interview mentioned in this article was in JPRS 79940, 24 January 1982, USSR REPORT: ECONOMICS, PLANNING AND PLAN IMPLEMENTATION

> [Text] Today, PRAVDA is beginning a new column under the heading "Style of Economic Management." In it, we will be publishing materials devoted to problems of improving the style of planning and leadership in the branch ministries and departments, all-union associations and territorial planning agencies. Economic management aspects put forward in the course of perfecting the economic mechanism and introducing the achievements of science and engineering will be given a prominent place. The newspaper will be talking in this column about worker participation in production management.

1. Line of Attack.

The meeting of the Ministry of Heavy and Transport Machinebuilding collegium attracted attention apparently because of its unusual approach to usual matters. Although it was a "routine" question on the agenda, that of summing up results for the quarter, the proposal was that it be examined using normative net output. Sheets of paper with columns of figures lay fan-shaped on the meeting-room table.

A speaker came to the rostrum, then a second, and a third.... VPO [all-union production association] chiefs and production association general directors rose from their seats, pushed the fan of papers aside and pulled others from their pockets. The speeches and noisy debates dealt in tons of output, just as they did 10 years ago. Machinery and equipment is measured in tons in this ministry.

Perhaps, I thought, the head of the collegium would clarify things. But First Deputy Minister R. N. Arutyunov also pushed aside the summary laid out before him. He opened his own notes and found fault with several speakers for inaccuracies in their reports, also using...tons.

So I asked my neighbor in the meeting room: "Your branch was one of the first to use normative net output as an indicator. Discussion is not so much on that as on the tons we are so sick of hearing about."

"So what? Related production facilities demand not NChP [normative net output], but rolling mills. We are waiting for metal, not NChP, from the Gossnab...."

During a break, I approach L. A. Busyatskaya, collegium member and economic planning administration head, and remark, "I must admit, I expected a thorough discussion of progress in plan fulfillment in terms of NChP. Why are we again back to tons? Is it habit, inertia of thought?"

"It is essentially something else," says Lyubov' Anatol'yevna. "Ministry and ministry enterprise leaders are themselves most desirous of ridding themselves completely of the planning of production in tons. But the Gosplan did not take this proposal into account at the proper time, while permitting us much.

You can easily see Kalininskiy Prospekt from atop the ministry building in Arbat. Two streams of vehicles rush towards each other. If someone would try to turn into the on-coming traffic, I thought, he would either get hit or at least would have to brake. So it is with the branch. It is moving against the flow, so to speak....

The Ministry of Heavy and Transport Machinebuilding, its associations and plants, were among the first to embark on improving the economic mechanism. Were their leaders bold? They weren't cowards, that's for sure. But the main thing was something else: a tremendous burden was imposed on the branch. It had to produce the huge excavators for mastering the earth's riches, rolling mills, locomotives and other machinery at accelerated rates, to increase production more quickly. They therefore undertook to improve management and planning.

Large cost-accounting associations were created in the branch and brigade forms of labor organization and stimulation were introduced. Many collectives are seeking out reserves for using capacities to the maximum, following the example of Novo-Kramatorsk workers. All these are elements of an improved economic mechanism. It is a large, important task. And a very difficult one, naturally: much had to be introduced for the first time. But then there was the "on-coming traffic": planning in old indicators, along with the new. When we should have been following the course chosen, we had to constantly tack.

We have had to report both in the old indicators and in the new. And be accountable for both.

Which indicators ask more of us? Alas, still the former! As was evident at the collegium meeting. The overall state of affairs in the branch has not improved. Over the past 10 years, profit has decreased and profitability has dropped. Machinebuilders are in a difficult financial position: they have more than once "lost" their circulating capital. This past annual plan was not carried out in terms of either the old or the new indicators.

The pressing matter of improving the economic mechanism has become the domain basically of workers in the economic planning services. So the tempo with which this innovation is being mastered is slow and the approach to solving planning and management problems of long standing is haphazard and half-hearted. Take, for example, one which would seem to be most painful.

The central press has more than once been sharply critical of planning machinebuilding output in tons. This criticism was not met with complete silence. The economic

planning administrations of the Ministry of Heavy and Transport Machinebuilding, together with branch scientists, have worked out a new indicator to replace the ton. It is units and complete sets which reflect the labor-intensiveness of manufacture and the usable features of each machine. This was a kind of "signal to attack" the old.

The pioneers in introducing NChP, which more objectively reflects the labor contribution of each collective, would seem to hold all the cards. But "mistress" ton remains unshakeable. The proposal by the ministry's economic planning administration is not being introduced, inasmuch as it has not found support either within the collegium or outside it. Why? The ton still dominates in outside planning, that is, in the main links, the USSR Gosplan, the ministry and the plants.

In an EKONOMICHESKAYA GAZETA new-year's interview [reported in JPRS 79940, 24 Jan 82, USSR REPORT: ECONOMICS, PLANNING AND PLAN IMPLEMENTATION], USSR Gosplan Deputy Chairman A. V. Bachurin again maintained that the ton will remain the measure of output in blank production for general machinebuilding application. Translated into machinebuilding language, this signifies that the release of castings, forgings and stampings will be in tons, as before. Under these conditions, how can lightweight machines which are not metals-intensive be created?

But what is keeping the Ministry of Heavy and Transport Machinebuilding from introducing the new evaluation indicator at its own plants and associations? When planning and recording blank production within enterprises, where the ministry is completely in charge, the ton still remains the primary yardstick.

In fact, if the ministry and its plants were actually resolved to rid themselves of the ton, they would need first of all to do it themselves. The ton causes no less harm in blank production than in machine assembly. It would therefore be all the more intelligent to introduce the system worked out in the ministry for planning and recording the release of items in metallurgical machinebuilding first of all at their own enterprises. But this "signal to attack" has not appeared on the branch strategy map. The ministry is still in the stage of clarifying relations with the USSR Gosplan, which has been going on for more than 10 years now.

They explain in the ministry that one reason for the plan disruptions is the shortage of metal. And it actually is scarce. But why? There is not now any interest in making thin-walled castings or more lightweight components. Because the plan is in tons! It is not the number of parts that is important, but their weight. And since that is so, new brands of materials and new technological processes leading to a reduction in the weight of items become "disadvantageous." All this involuntarily pushes us into extravagance. Is this not one of the main reasons for the shortage of metal?

So the problem of the ton remains on the agenda. It is still there, even though the entire branch has officially been switched to operation under the new system. In practice, those using the ton are precisely those who supply blanks for parts for future machines. Although the output of such shops, in tons, has risen year after year, they have now become bottlenecks in branch development.

The ton has, so to speak, become heavy, especially in lifting the branch over the pass. The calls to replace it remind us of the waving of a conductor's baton for an illegible, blurred score. Iron logic, precise landmarks and their indisputability

in the economy must be equally as irreproachable as in the design and manufacturing technology of the machines.

The branch has a highly effective scientific-production association, the VNIImetmash, headed by Academician A. I. Tselikov. It has wrought engineering miracles. Take its rolling mills to produce hollow rail car axles. There is a colossal gain in using them. Creativity, innovation, boldness, risk and success. All that is straightforward. And alongside it, in the very same branch, there is fright when the talk is about the very same concepts applied to the economy.

As we see, the imprecision of specific resolutions has been reflected in the style of economic management. And it is hard to define any conventional watershed between them. They unavoidably influence each other. It is only important that that influence be fruitful. Not what it is in the production of blanks. It has come down to a situation in which the ministry collegium is distributing almost each individual scarce casting among the plants.

Branch enterprises produce dozens of diesel locomotive sections each month. It does not take either higher mathematics or a computer to determine precisely when and how many engines must be supplied by diesel engine builders to the locomotive plants of their own branch. The planning and management task is very simple. But collegium members in the Ministry of Heavy and Transport Machinebuilding are puzzled every quarter as to why the number of engines and the number of diesel locomotive sections do not coincide. Sometimes there are locomotives without engines, sometimes cars without axles, those marvelous axles!

Could the Gosplan take on the functions of proportional development of all branch internal links, determining structural precision and setting up interplant cooperation? No, it could not. Better put, it must not. On the other hand, it must not co-opt branch initiative. Especially when the reference is to indicators of planning the internal redistribution that blanks are. Why generate such indicators at the USSR Gosplan level? This must be done by the ministries themselves, for which they should be held strictly accountable.

But a promising resolution is often subverted by an operational-dispatching boom. Setting up the genuinely economic style of management required by the resolutions of the 25th and 26th party congresses is being done dissimilarly energetically in different links of management. Comrade L. I. Brezhnev noted at the November (1981) CPSU Central Committee Plenum that "...we still encounter economic situations in which enterprises and associations find it economically disadvantageous to take on taut plans, to force scientific and technical progress, to improve output quality. It is for precisely this reason that we have yet to rid ourselves of indicators which essentially promote waste."

For the Ministry of Heavy and Transport Machinebuilding, which has laid out the path for other ministries in the area of new methods of management, the two directions of economics and engineering must be combined more organically. But to do this, along with improving indicators, more attention must be paid to improving management style and work methods, to the comprehensive introduction of the new economic mechanism.

[Text] 2. The "Postscript" Principle.

The more often I go to the collegium meetings of the Ministry of Heavy and Transport Machinebuilding, the more surprised I am at the inconstancy of its composition. Sometimes this seat is vacant, sometimes that. And sometimes half the long table seems to have been swept by the capricious winds of Novyy Arbat.

The ranks thin most noticeably when the minister is not in his seat. In opening the meeting, one of his deputies usually says that the minister is in another department or commission, and how many of them have bred now....

So, what sometimes happens as a result? The final summary at the meeting often goes like this: "We have had a good talk today, somebody got raked over the coals pretty good, but we won't make a decision now. Not all questions have been explained. We instruct our comrades to work on it some more...."

It is especially alarming that even what is generally an aggressive, business-like collegium sometimes turns out to be behind events. An attentive look at its work plans and a familiarity with the course of discussions on them are sufficient to prompt this conclusion. The "on-coming traffic" has its effect here as well. A majority of the managers are people with a certain engineering bent of thought. And disputes are generally about technological aspects. There are rarely dialogs about economics in the collegium.

The debate at the meetings is sometimes essentially a postscript to events and occurrences. The RSFSR People's Control Committee discovered write-ups at Muromsk Diesel Locomotive Plant -- accounting procedures are being reviewed; large excavators were broken in Ekibastuz and Neryungri -- discussions about their quality are begun. If the topic is wages, that means somewhere a wage fund overexpenditure has been permitted.

The branch is experiencing a shortage of workers, and at the same time, the ranks of those operating several machine tools are increasing slowly. The collegium meets. But the meeting is prompted not by the events themselves, but by alarm signals in the press. Even when production assignments are discussed, time and again the primary stress is on why something wasn't done. The necessary attention is not paid to what work will face us tomorrow, to who must be helped and how.

The "postscript" principle is indisputably not the best one for leadership or for making important economic and social decisions. A better approach here would seem to be that of forecasting, anticipation and perspective. Which means what? The branch headquarters is called upon to look ahead vigilantly, to foresee coming events and meet them fully armed. And there are quite a few approaches working with a long-range view. Some are being used successfully. Others....

Over two years ago, when the new "Uralmash" general director, Ye. A. Varnachev, requested ministry assistance in reinforcing the worker ranks of his collective, V. F. Khigalin nodded in the direction of the noisy capital thoroughfare below and said: "I can't cast a net down there, my friend, and catch you 800 metalworkers. Get them yourself in the Urals...."

That's what the general director at that time left with. Of course, he knew ahead of time that the branch headquarters had no manpower reserve. He requested them more out of habit, along with his other requests.

Varnachev remembers the minister's reply. This free exchange of opinions, without irony, forced the Uralmash leaders to give serious thought to their own situation. Which was done in time. The association's plants found their own method of seeking out labor reserves.

Speaking at a meeting of branch worker aktivs, Ye. A. Varnachev defended several phrases: "But we still acquired our own method.... We began lowering output labor-intensiveness, even in the stages of design, developing technologies and normatives.

So that is where the real principle of "foreword" was used in its purest, most truely long-range form! Thanks to that, plant engineers have been able to save the labor of more than a thousand metalworkers in recent years. They did not need those 800 the general director had requested at all. And even other workers who retired during that period have not had an appreciable influence on "Uralmash" operations.

So, I'm thinking, now I'll witness a remarkable event. Someone from among the branch leaders will probably say: "We must teach all engineers to work this way!...." But the aktiv meeting moves right along, the people at the podium read their own reports with animation and timidly request help in the form of...personnel. Which is, after all, understandable. By no means all branch enterprises are meeting their assignments for lowering labor intensiveness and the ministry functional services have not done everything they could to introduce the Uralmash experience into practice.

I went to Sverdlovsk and met with "Uralmash" chief technologist I. V. Marakulin. And again, this time in detail, he opened up a goldmine of ideas and experience such that I could not but be amazed. Some "theoretician" was now proposing that labor reserves be sought out among...engineers. "We're being too soft on them," they were saying: put them to work at the machines!

Those in the Urals look at it differently. The engineer will always be able to work the machines. It is not a job that requires all that much cleverness. But then who would help us, through his knowledge and skill, to make many operations unnecessary and the machine tools themselves better? Only the engineers. The chief technologist's department at "Uralmash" has even been expanded a little, and the "yield" from it is, to put it bluntly, excellent.

"Previously," says Uralmash party committee secretary V. K. Vazhagov, "technologists did not know what they were competing for. Some for no idle time on the job, some for releasing documentation ahead of schedule.... All that turned out to be petty compared to what they are competing for now. For lower labor intensiveness! The best of the best, by perfecting technology, are reducing labor expenditures by a thousand or more norm-hours a year. This helps us free machine tool operators for other work and save quite a bit in other resources. The new basis of the competition has knit designers, technologists, economists and workers more closely together.

Perhaps we could return again to the promising search by Urals technologists, to make their experience accessible to all engineers? Probably never: commissions and meetings consume mountains of the time of managers.

It cannot be denied, this is not a new situation. Similar things have been encountered before in the domestic economy. In the Russian Communist Party (Bolshevik) Central Committee political report to the 11th Party Congress, V. I. Lenin requested that "...attention be paid to ensuring that the Sovnarkom [Soviet of People's Commissars] and STO [Labor and Defense Council] commissions be reduced in size so they can understand and deal with their own affairs and not be dissipated in endless commissions. There was a purge of the commissions several days ago. Of 120, how many turned out to be necessary? Sixteen."

When grasping a new truth, we must not forget the old ones. The valuable grains of economic experience are not given us so cheaply that they can be forgotten. Especially now. The complicated economic ties and broader scope of production demand precision in management and specific responsibility for work entrusted to us. And foremost of those concerned with them every day.

By being at the plants, you see, both the leaders and the workers are interested in everything on which branch headquarters lives, in what questions are discussed and when. And quite understandably so: people are interested in improving things, and their world view has become incomparably broader. The ministry is not doing enough to inform people locally about its own work. There are quarterly collegium meeting plans, but it would be good to have annual ones for long-range problems. The latter would be especially valuable, since they would help reveal ahead of time public opinion on particular problems, set up experiments and conduct additional experimental verification.

The abundance of questions (sometimes up to 10) brought up for brief review in the collegium does not always permit detailed illumination of all the problems presented. It would probably be more useful here to use a well-tested method: better less, but better. Better less, but in greater depth, with consideration of the opinions of a broad range of people. And not just ministry workers.

And there are means for doing so. The branch has an enormous scientific potential available to it, and its enterprises are huge. They generally hold interesting and effective worker meetings and have full-time production conferences. Life is in full swing. But these wellsprings of ideas do not always reach the higher floors of the ministry. Quietly, almost casually, the collegium listened several days ago to a report that the largest branch collectives had not adopted counter plans this year. In fact, branch headquarters is also to blame for this "apathy," the "postscript" principle making itself felt. There are still few out-of-town collegium meetings. And this form of work should obviously not be dismissed.

It is naturally not easy to manage large economic complexes. But neither should we accustom ourselves to locomotives without diesel engines or railroad cars without wheels. You won't get far on them, regardless of the traffic, on-coming or siding. And it does little to calculate, determine normatives and draw up general management plans. We also need to have each leader and each specialist make up his mind to reject everything obsolete and unnecessary, to select from past experience what is actually valuable and promising.

As PRAVDA recently wrote, territorial plans, as distinct from branch plans, will be assigned on a base of old indicators until the end of the five-year plan. And their influence will be omnipresent. Ministry of Heavy and Transport Machinebuilding enterprises, linked to a specific territory are therefore obligated to report in the old indicators as well.

And it happens that the indicator of normative net output, instead of being strictly mandatory, exists on "public principles," so to speak. And how could it be otherwise, when the primary evaluation of enterprise successes and failures is made locally on the basis of sales volume in rubles. This means lowering the materials-intensiveness of items, for example, can lead only to plan nonfulfillment.

In this case, let me note, the reference is no longer just to the Ministry of Heavy and Transport Machinebuilding, but to many other branches as well. There are more and more islets of the new in planning and management. But islets are still not a unified, strong continent capable of withstanding the shocks of bureaucratic waves of the old.

"If we change over to the new indicator," says Smelyanskiy Machinebuilding Plant director I. M. Yedneral (Cherkasskaya Oblast), "we must do it totally. Otherwise, nothing will happen except that the innovation will be discredited...."

"We know the plans of the cities, oblasts and republics are also themselves laws, in a way," says N. N. Trofimov, head of the heavy industry department of the Permskaya Obkom. "And if they are laws, they must be obeyed. So they are, though we know it sometimes harms the economy, and not everything is done to manage thriftily. Why? The work of the local party and soviet agencies is, after all, evaluated on the basis of territorial plan fulfillment, that is, based on the obsolete indicators. The old traditions still prevail in practice. Be they of the gosbank, the oblplan or the republic gosplan....

This is what the "postscript" principle leads to in economic planning, to introducing innovations in "islands," to discredit, loss of proper reference points and narrowing initiative. The "on-coming traffic" interference only exacerbates conflicts, weakens everything new and truly advanced and, in so doing, seems to make it ineffective. This is what happened to the initiators and what may happen to their followers if the process of introducing the innovation is as before, sluggish and not comprehensive.

Economic work and the significance of its fruits are inconceivable without further improvement in the style of economic management, without developing democratic principles in production life. This is demanded by the tasks of intensifying the economy. Only then will there be no "on-coming traffic" interference and will the innovation become strong and lead us forward!

11052
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METALWORKING EQUIPMENT

GDR SCIENTIST ON CEMA COOPERATION IN MACHINE-TOOL PRODUCTION

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 2, 1982 (signed to press 26 Feb 82) pp 33-37

[Article by Reinhard Martin, Technical University of Dresden (GDR): "New Frontiers of CEMA Member-Nation Multilateral Economic Cooperation in Machine-Tool Production"]

[Text] During 1971-1980, CEMA member-nation economic cooperation in machine-tool production was aimed at implementing the measures outlined by the "Comprehensive Program of Further Intensifying and Improving Cooperation and Developing Socialist Economic Integration of CEMA Member-Nations."

CEMA member-nation economic cooperation in machine-tool production, a key machine-building branch, is currently being developed intensively and is helping accelerate the creation and development of progressive machine tools, forging-pressing machines, technological equipment for foundry shops and plants, wood-processing equipment, various types of robot-manipulators, and metalworking tools and abrasives in all CEMA member-nations.

The efforts of CEMA member-nation machine-tool builders have been aimed at increasing the release of these types of machinery and equipment for the purposes of meeting their own requirements for them, raising the technical level, productivity, precision and reliability of their operation and their degree of automation.

CEMA member-nations have paid much attention to improving the production structure of machine-tool building industry, increasing the release of the most progressive types of machinery and equipment such as special and specialized machine tools, automatic and semiautomatic machines, unitized machine tools, automated lines, high-precision grinders, special forging-pressing machines and foundry equipment. Heavy machine-tool production for transport, heavy and power machinebuilding has received appreciable development.

Particular attention has been paid to creating and developing the production of numerical preset control (NPC) machine tools and processing centers, which are an important element of technical progress in world metalworking practice.

Over the past 10 years, CEMA member-nations, because they attach great importance to developing machine-tool production as the basis of retooling all machinebuilding branches, have increased production capacities year after year and have thus significantly increased the production of machine tools and forging-pressing machinery.

Thus, CEMA member-nations produced 370,800 units of metalworking equipment and 81,700 units of forging-pressing machinery in 1979. (Metalworking equipment production in the main industrially developed capitalist countries was: 263,000 in the USA, 56,000 units in Britain, 122,300 units in the FRG and 163,700 units in Japan.) Increasing forging-pressing machinery production in CEMA member-nations enabled us to raise its proportion of total metalworking machine tool production to 22 percent in 1979, as against 19 percent in 1970. The release of machine tools with numerical preset control increased more than two-fold in all CEMA member-nations.

At present, countries of the community are engaged in producing machine tools at upwards of 200 specialized enterprises and about 70 plants specialized to produce forging-pressing machines, as well as at a number of enterprises of other branches of industry. Thanks to multilateral production specialization and cooperation done within the CEMA framework, enterprises specialized to produce individual types of metalworking equipment have been formed and developed in CEMA member-nations.

The volume of metalworking equipment currently being produced, in a broad products list, in CEMA member-nations covers all the basic groups of machine tools and machinery available in world machine-tool production and permits us to satisfy quantitatively the basic domestic requirements of the national economies of these countries. At the same time, certain progressive, scarce types of equipment are still being produced in insufficient quantities.

The growth in the production volume of machine tools and forging-pressing machines in 1979, in cost terms, is described by the data of Table 1 by individual country.

Table 1 (1975 = 100)

CEMA member-nation	production volume growth in 1979	
	machine tools	forging-pressing equipment
PRB [Bulgaria]	115	121
HPR [Hungary]	117	160
GDR [East Germany]	145	131
PPR [Poland]	147	160
SRR [Romania]	195	305
USSR	135	143
CSSR [Czechoslovakia]	138	121

The indicated rates of machine-tool and machinery production growth are in considerable measure a result of the economic and scientific-technical cooperation among CEMA member-nations.

Change in the machine-tool and machinery production structure has led to an increase in their cost, testifying to the recent preference for developing the production of more progressive and at the same time technically more complex types of machine tools and forging-pressing machinery corresponding to world trends in machine-tool production development.

Work Results for Multilateral Machine-Tool Production Specialization and Cooperation.

During the course of implementing the Comprehensive Program of Socialist Economic Integration, interested CEMA member-nations prepared and concluded 12 multilateral international agreements on specializing and consolidating the production of metalworking

machine tools, forging-pressing machinery, foundry and wood-processing equipment, items and subassemblies in complete sets, abrasives and tools. These agreements cover the basic technological groups of multipurpose and special machine tools and machines intended foremost for such important branches of industry as automotive and tractor, tool and bearings industries.

In 1976-1980, economic ties in the area of machine-tool building were maintained both within the framework of the indicated multilateral machine-tool production specialization and cooperation agreements and within the framework of bilaterial economic cooperation. The growth in the proportion of specialized metalworking equipment exports, which comprised 41.9 percent of reciprocal exports of this equipment by CEMA member-nations in 1979 as against 19.3 percent in 1975, is testimony to the development of these economic ties. Growth in metalworking equipment commodity exchange, which reached 146 percent in 1979 as compared with 1975, is also an indicator of the growing economic ties in the area of machine-tool production.

In 1971-1978, the specialization of about 40 percent of the products list of machine tools and about 50 percent of the forging-pressing machinery being produced by CEMA member-nations was determined by agreements concluded on production specialization in the area of machine-tool production.

Below, we present data describing specialization coverage, production concentration and levels of reciprocal deliveries for 1976-1980 by type of equipment included in the indicated agreements (Table 2).

Table 2

type of equipment	number of type-sizes covered by agreements, in units	reciprocal deliveries in 1976-1980, in units	number of type-sizes produced			
			one nation	two nations	three nations	over three nations
machine tools	395	38,860	122	163	72	38
forging-pressing equipment	300	12,150	121	127	42	10
foundry equipment	120	2,360	57	33	30	--
wood-processing equipment	168	9,740	79	55	33	1
complete sets of items and subassemblies for machine tools	96	59,640	26	37	33	--

We need to note that actualization by CEMA member-nations of obligations assumed on specializing production and reciprocal deliveries as outlined by these agreements has permitted resolution of important national economic tasks in providing the necessary types of machine tools and machines. Thus, organization in the GDR of a facility specialized to produce highly productive, precision automatic and semiautomatic grinding machines for manufacturing ball and roller bearings and races turned out to be very influential in developing CEMA member-nation bearing industry. The deliveries of this equipment to CEMA member-nations anticipated in the production specialization agreement, more than 6,000 units during 1976-1980, resolved the task of meeting the basic needs of bearing industry in community countries for this equipment and permitted bringing purchases of it in other countries up to the minimum.

The organization in the USSR of specialized, cooperative production of highly productive automatic and semiautomatic single- and multiple-spindle lathes and highly productive automatic and semiautomatic cold upsetters for manufacturing hardware, which was outlined in a corresponding agreement, has enabled us to achieve positive results in meeting the requirements of CEMA member-nations for this equipment and in reducing imports from other countries.

As a result of the implementation of agreements concluded on production specialization and cooperation, positive results have been achieved in meeting the requirements of CEMA member-nations for other types of highly productive metalworking equipment as well.

Preparation of Production Specialization Agreements and Agreements on Scientific and Technical Cooperation in Machine-Tool Building Stemming from LTPC Measures.

Beginning in 1978, cooperation in machine-tool building has been aimed at preparing production specialization and cooperation agreements and agreements on scientific and technical cooperation as anticipated by the "Long-Range Target Program of CEMA Member-Nation Cooperation in the Field of Machinebuilding."

At the same time, work has been done to extend previously concluded production specialization agreements in the field of machinebuilding through 1981-1985.

The specific tasks set by the long-range target program of cooperation to ensure the development of machinebuilding branches and their qualitative restructuring in the area of machine-tool building are as follows:

create and expand the production of heavy-duty and single-purpose machine tools for heavy, power and nuclear machinebuilding;

create and master the release of highly productive machine tools with numerical preset control, multiple-operation machine tools with machines for automatically changing tools and complete-set sectors comprised of them, with the extensive use of standardized assembly components for use in small-series and series production;

broaden the products list and increase the release of automatic lines of special and specialized metalworking equipment, with the extensive use of standardized assembly components and subassemblies for application in large-series and large-scale production;

expand production of highly productive automatic forging-pressing equipment and means to mechanize and automate it;

create and manufacture single-purpose foundry equipment complexes for all foundry production conversion;

create and produce various types of industrial robot-manipulators;

work out and expand the release of highly productive tools using powdered ceramic material and tungsten-free hard alloys.

Previously concluded agreements on production specialization in the field of machine-tool building anticipated a partial resolution of the above-indicated tasks. Therefore, when preparing steps to implement the LTPC, our main efforts were aimed at expanding the specialization of machine tools, machinery, equipment and assembly components and encompassing new ones with specialization.

Six large-scale combined agreements on production specialization in the field of machine-tool building were worked out and concluded for 1981-1985 on the basis of previously prepared and new proposals on production specialization and materials on

extending previously concluded agreements in the field of machine-tool building to 1981-1985. Their implementation will enable us to encompass nearly 50 percent of the products list being released by CEMA member-nations in machining, foundry and wood-processing equipment and 70 percent of the forging-pressing machinery products list by specialization (Table 3, page following).

Common conditions for designing automatic machine-tool lines and common methods of acceptance-release testing these lines at manufacturer and client plants have been prepared and agreed to by all CEMA member-nations as a result of scientific research. This will permit a significant increase in their quality, durability and reliability of operation. Also developed were specifications and recommendations on working out new high-speed grinding machine designs, a technical assignment for creating standardized means of automating and mechanizing presses and recommendations on preparing effective means of ensuring press operation safety and technical proposals on creating a series of highly productive foundry machines. The technical documentation for developing modern, unitized assembly-component sets for NPC machine tools and proposals for introducing them in CEMA member-nations have been adopted. These sets include: ball-and-screw gages, guide races, modern electric feed drives with high-torque motors, and others.

Corresponding scientific-technical cooperation programs including detailed scientific research topics for 1980-1985 and specific schedules and implementers have been worked out for comprehensive resolution of the tasks outlined by the long-range target program of cooperation on developing new types of highly productive metalworking and foundry equipment, various types of robot-manipulators and highly productive tools using powdered ceramic material and tungsten-free hard alloys. In a juridical-legal sense, these programs are an integral part of the 1980-1985 multilateral CEMA member-nation scientific-technical cooperation agreements signed by the parties concerned, which include the:

agreement on further improving and developing promising machine-tool designs, including NPC, and automatic lines;

agreement on further improving and developing automated forging-pressing equipment, standardized subassemblies and means of mechanizing and automating forging-pressing machines;

agreement on developing new types of automated and completely mechanized lines for premixing, molding, casting and pouring out, new types of scouring machines and equipment for special casting methods;

agreement on further improving and developing promising preset-control systems for machine tools, forging-pressing and foundry equipment, automated lines and automated sectors using them, industrial robot-manipulators;

agreement on developing modern industrial robot-manipulator designs of various types;

agreement on developing highly productive powdered ceramic material and tungsten-free hard-alloy tools.

We are completing work on an agreement on scientific and technical cooperation on improving and developing highly productive wood-processing equipment for furniture production, including equipment to work agglomerated sheet.

The main direction of scientific-technical cooperation in machinebuilding in 1981-1985 as outlined by these agreements is the further development and intensification of cooperation to resolve the tasks stemming from LTPC's on machinebuilding, raising

Table 3.

agreement	number of specialized type-sizes, in units	anticipated 1981-1985 reciprocal deliveries	contracted production concentration							
			one country		two countries		three countries		more than three countries	
			units	percent	units	percent	units	percent	units	percent
1	786	57,700 machine tools, 333 complete automated lines, 1.073 million subassemblies and accessories	207	26.3	224	28.5	160	20.4	195	24.8
2	426	13,000 units	195	45.8	113	26.5	83	19.5	35	8.2
3	193	2,100 units	95	49.2	53	27.5	41	21.2	4	2.1
4	157	50,000 units	58	36.9	46	29.3	28	17.9	25	15.9
5	36 powdered ceramic material tools;	6,578,000 rubles	16	44.4	20	55.6	--	--	--	--
	30 accessory tools	1,809,000 rubles	1	3.3	7	23.3	11	36.7	11	36.7
6	65	1,630 units	6	9.3	10	15.4	14	21.5	35	53.8

[key on following page]

Key:

1. Agreement on Multilateral International Specialization and Cooperation in the Production of Machine Tools, Including NPC's, Automated Lines, Special Machine Tools, Single-Purpose Heavy-Duty Machine Tools, Assembly Components and Subassemblies, Accessories and Technological Fittings for Machine Tools
2. Agreement on Multilateral International Specialization and Cooperation in the Production of Multipurpose and Automated Forging-Pressing Machines, Complete Subassemblies and Means of Mechanizing and Automating Forging-Pressing Machines
3. Protocol on Extending Through 1981-1985, Supplementing and Refining the 22 April 1977 Agreement on Multilateral International Specialization in the Production of Complete Technological Lines and Equipment for Foundry Shops and Plants
4. Agreement on Multilateral International Specialization and Cooperation in the Production of Wood-Processing Machinery and Equipment
5. Agreement on Multilateral International Specialization in the Production of Highly Productive Tools Using Powdered Ceramic Material, Tungsten-Free Hard Alloys and Other Tungsten-Free Super-Hard Materials and Accessory Tools for NPC Machine Tools
6. Agreement on Multilateral International Specialization and Cooperation in the Production of Various Kinds of Robot-Manipulators

the technical level of metalworking and foundry equipment, accelerating the rate at which machinebuilding is being provided with highly productive, automated machine tools and automated lines, forging-pressing and foundry equipment and industrial robot-manipulators which ensure a higher level of production and labor productivity at minimal expenditures.

Basic Tasks of CEMA Agencies and Parties Concluding Agreements and Contracts in the Field of Machine-Tool Building.

In order to ensure the accelerated introduction of scientific and technical progress and retooling of machinebuilding itself, it will be appropriate in the future to concentrate our efforts on cooperation among CEMA member-nation machine-tool builders and corresponding CEMA working agencies foremost on meeting all obligations of contracting parties to specialize production and all scientific and technical cooperation agreements stemming from the contracts and agreements concluded in the area of machine-tool building for 1981-1985.

The contracting parties themselves must play a large role in carrying out the indicated obligations. They, jointly with the CEMA Permanent Commission for Cooperation in Machinebuilding, are called upon to work systematically to raise the technical level of specialized equipment, implement the program of scientific and technical cooperation on developing new types of machinery and equipment, and work continuously to meet the needs of the countries for specialized equipment and eliminate the remaining deficit in this equipment, as well as to reduce unjustified imports of machine-tool building output from other countries.

In conclusion, it must be stated that the strong scientific, engineering and industrial potentials achieved by CEMA member-nations in the field of machine-tool building and the experience accumulated in multilateral and bilateral cooperation on production specialization and cooperation and on scientific-technical cooperation will enable us to resolve successfully and very quickly the tasks set by the long-range target program of cooperation in machinebuilding on further developing machine-tool building and creating a base which will ensure a qualitatively new level of CEMA member-nation machinebuilding development.

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PLAN UNFULFILLED AT NOVOSIBIRSK 'TYAZHSTANKOGIDROPRESS' PRODUCTION ASSOCIATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 7, Feb 82 p 9

[Article by V. Solov'yev, chief, planning and economic department, Novosibirsk Production Association "Tyazhstankogidropress" "Why the Machine Tools are Idle".]

[Text] It must be said right away that last year was a difficult one for the "Tyazhstankogidropress" production association at Novosibirsk. The plan for certain types of articles was not fulfilled during the year.

In analyzing the existing situation, the economic service of the plant studied, inter alia, questions of utilization of basic capital. Analysis indicated that the increase in the basic production funds of the association over the preceding five years made it possible to increase the output of production by 25.4%, with capital productivity increasing by 5.1%. While 66.4 copecks of production was produced per ruble of basic capital in 1975, by the end of 1981 this figure had reached 69.8 copecks.

However, these figures are for the association as a whole. We analyze the utilization of basic capital in ten shops and established that the capital productivity over the preceding years had remained unchanged in two shops -- the welding and blanking shop and the open-hearth shop. Capital productivity dropped in four shops, and increased in four others. A significant increase in capital productivity was achieved in the cast roughing shop -- 52.5%. The capital productivity increased by 22.4% in the third mechanical shop.

The effect of utilization of basic capital shows up most brightly in the first mechanical shop, which had been a bottleneck for a long time at the enterprise. By the end of the enth Five-Year Plan, equipment had been installed here with numerical program control, consisting of a "processing-center" type of machine. This cost the association 1.086 thousand rubles, but the yield was substantial. Within a short time, the previously lagging shop had increased its output by a factor of 1.5.

The welding and blanking shop operated stably during the entire five-year plan. The average annual basic capital cost increased by 40% here, and the output of product increased by the same amount.

Unfortunately, this is not the case everywhere. The second mechanical shop has the poorest capital productivity indicator today. The basic capital increased by 810 thousand rubles in the shop, or 48%, but did not produce the required effect. The capital productivity dropped by 27% for the shop as a whole. The expensive program-controlled equipment installed in the shop is not providing the required yield, and an imported gear-grinding machine costing 300 thousand rubles is not being used at all.

The forging and pressing shop had a shortfall of 2800 tons of forgings in 1981. The reason was that capital repair of equipment done in 1979 was done very poorly. Once equipment has been repaired improperly, what kind of output can it provide? Equipment downtime is unacceptable here.

As was noted previously, the work of the association is lagging in many respects. However, the experience of the best shops convinces us that we do have reserves. Every ruble put toward production provides a good yield in areas where there is a proprietary attitude toward the equipment, where extensive modern equipment is utilized to its maximum and where existing machines are repaired properly and on time.

The economic services of the association in conjunction with engineers and production innovators have developed a set of measures aimed at improved utilization of basic funds. The realization of these measures will help the association to fulfill their plans successfully, and these plans are intensive ones. For example, twice as many forging and pressing machines are to be produced in 1982 than were in 1981, 19% more metal-cutting machine tools and 34% more cable press machines.

These and other important problems must also be resolved under new management conditions. Starting 1 January 1982, our activity will be planned and evaluated according to the normative pure production indicator. In addition to volume of production, labor productivity and wage fund, the use of basic funds will also be determined according to the normative pure production indicator.

Eliminating shortcomings in the utilization of basic funds and of production capabilities thus takes on a new color, and becomes a priority task.

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METALWORKING EQUIPMENT

LABOR SHORTAGE IN HEAVY AND TRANSPORT MACHINERY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Oct 82 p 2

[Article by correspondent B. Markov "The Tools Must Not Stand Idle".]

[Text] On 22 September, SOTSIALISTICHESKAYA INDUSTRIYA published an article by Aleksandr Durnin, foreman at the Zhdanovtyazhmash Production Association entitled "Let the Tools Not Stand Idle" which posed the urgent question of why the machine-tool operators' movement is expanding so slowly. This article was discussed subsequently at a joint session of the collegium of the Ministry of Heavy Machine Building and the Central Committee of the Heavy Machine-Building Workers' Trade Union.

There are now more than 90,000 pieces of metal working equipment in place at heavy and transport machine building enterprises, while there are nearly half as many machine tool operators. If we assume two-shift operation, it turns out that over half the machine time is lost in the branch. Furthermore, the number of metal workers is dropping.

We have arrived at a difficult situation; however, the way out was found out long ago, which is re-affirmed by the experience of A. Durnin's crew. This crew is made up of 16 men who operate 29 machines in two shifts. There are three or four machines per worker. There are about 10,000 multiple machine operators working at enterprises of the Ministry of Heavy Machine Building, allowing approximately another 10,000 tools and machines to operate.

Nonetheless, this is not enough; furthermore, there is another dominant trend. Over the past five years the amount of equipment in the Ministry increased by 11%, while the number of multiple machine operators increased by only 2%. Not only that, these numbers do not fully reflect the situation. Thanks to the accounting practices used at some other enterprises, the ranks of multiple machine operators include individuals who have mastered a related profession; in addition, this indicator is sometimes just a guess.

This is why the collegium of the Ministry of Heavy Machine Building, in posing the question of how to utilize the potential possibilities of the progressive movement, focused the discussion on the difficulties which hinder the development of the

movement. Serious shortcomings and omissions were disclosed during the wide-ranging discussion. Specifically, many of these problems result from the low level of organization of production at enterprises. Shortages and imperfection of machine tool attachments and mechanized facilities cause the machine tool operator to spend about 40% of all shift time on auxiliary operations. The operator often has to remove chips manually. If an operator has to handle even two machines, he clearly will practically not have enough time to make the product itself.

The configuration and structure of the equipment itself do not agree with the principles behind service zone expansion. Almost one-fourth of the machines and tools are over 20 years old, and the operator has to spend most of his working time making repairs and adjustments. At the same time, new high-output equipment is not generally installed in a systematic fashion, and there is no allowance for using the progressive method. Any attempt to use this method under these conditions will meet with failure.

Even where the technical conditions exist, the progressive movement is developing poorly.

Aleksandr Durnin addressed the session of the collegium, pointing up the economic side of the question. The pay for multiple machine operators is different at different enterprises, and there are now no unified clear documents for wage standardization, which frightens the workers. The multiple machine operator is also omitted from traditional forms of socialist competition, without which the competitive spirit disappears and many reserves remain untapped.

Other problems were also pointed out which hinder the dissemination of advanced experience. However, none of these belongs to the category which we call "objective", for whose illumination there are either no effective methods or means. The following example was cited at the session of the collegium. More than one-third of the machine tool operators at the Altay car building plant operate two or more machines each, while five times fewer workers are doing this at the Stakhanov car building plant, where the conditions are the same. Why is this?

Pointing out one important aspect of the problem, Deputy Ministry E. Zvizhulev stated that "the multiple machine tool operator seems to have disappeared from the engineer's field of view, and it is the engineer's direct duty to create the best possible working conditions for the operator, to ensure that there is interest in expanding service zones and to provide conviction of the advantages of working in the new way. But if the worker in his own progressive undertaking looks for help and does not find it, this means only one thing: that we, engineers of whatever rank, are outside the mainstream of life and are not heeding the call of time. Even in designing enterprises, we often arrange the machines in row, back-to-back, without considering the fact that they would have to be moved and rearranged in the future for these multiple machine operators. In accepting new equipment from the machine builders, we allow ourselves to stipulate that we can get along without the attachments which are needed to make the work easier, and do not even admit to ourselves that this is unprincipled and inexcusable for an engineer..."

This turn in the conversation forced the participants to look differently at the problem of the shortage of workers as a whole. It was pointed out at the session that many management and technical supervisors are not against perpetuating this shortage in order to retain the possibility, under the pretext of unbalanced production tasks by machine-hours, to reduce these hours. Is this not why there is so much talk about the difficulties in expanding multiple machine operation while so little is being done to overcome them? We are not talking simply about inertia and passivity. Passivity actually is an active attempt to protect oneself against worries and, so to speak, to win the right to inactivity.

One of the most urgent questions is that of equipping machines with standard mechanized attachments. This problem received special emphasis in A. Durnin's article in SOTSIALISTICHESKAYA INDUSTRIYA. This is hardly the main barrier in the way of widespread multiple machine operating practice, and will not be overcome in one step; however, the solution is as follows. A Ministry-wide decree for last year authorizes assignments to 26 branch enterprises to manufacture these attachments, for which one million rubles have been allocated. However, only one-third of this fund has been spent. Only nine enterprises have concluded agreements to manufacture and deliver these attachments!

In analyzing the assignments to develop the multiple machine tool operators' movement, the collegium arrived at the conclusion that they are far below the current capabilities of the enterprises, and 29 plants of four VPO [All-Union Production Association] did not have them at all last year. The VPO supervisors do not find this matter worthy of attention and management of the organization of labor, wages and branch headquarters personnel has been taken in hand.

In summarizing the session, First Deputy Minister R. Arutyunov pointed out "we therefore consider it especially important to recognize Aleksandr Durnin's article in SOTSIALISTICHESKAYA INDUSTRIYA in that he raises particular facts. We are not talking only about a proprietary attitude toward equipment, but also about rational utilization of one of the most important composite parts of our economic resources -- working time. We are all convinced today that multiple machine operation can be moved ahead only if it rests on a strong planning foundation".

Accepting the questions posed by the worker to be correct and timely, the collegium of the Ministry of Heavy Machine Building and the trade union Central Committee accepted a resolution to re-examine tasks to transfer equipment over to multi-machine operation based on the achievements of leading collectives. The planned equipment shift-operation factors must also be increased.

It is proposed that enterprise supervisors take two months to check the proper loading of equipment and take steps to improve the structure of the pool, and to create councils for the introduction of multi-machine operation.

Personal responsibility for development of the progressive method has been defined, and is imposed on the chief engineers of enterprises and VPO. At the Ministry level, this work must be guided and monitored by the directorate for the organization of labor, wages and personnel and the directorate of technology and metallurgy.

The collegium also instructed the functional directorates to study thoroughly all problems associated with organizing the multiple machine tool operators' movement and hold a meeting of foremen's councils. The dissemination of leading experience will result in an expanded decree of the collegium and trade union central committee to develop the progressive movement further.

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PROBLEMS AT GOR'KIY MACHINE BUILDING ASSOCIATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 42, Oct 81 p 4

[Article by V. Varavka "Where Are the Machines 'Stuck'?"]

[Text] Our conversation with V. Morozov, deputy chief of the planning and economic department of the Gor'kiy Machine Building Association, was held at the end of the third quarter. With a heavy sigh, my conversational partner had the following to say: "There is nothing to boast about." Explaining why, he said, "During January-August we had a shortfall in delivery of milling machines of over 500. September this number increased by half again. Our delivery agreements continued to be violated, and I personally see no improvement."

Nothing comforting could be heard from V. Kisov, deputy chief of the supply department.

"Our workers," he said, "cannot answer the incoming telegrams and letters from customers who, directly speaking, have been let down."

What is the matter here? Why has this enterprise, which used to be singled out for its good work, become chronically insolvent?

The first to provide some clarity was production department supervisor A. Kozlov. According to him, the main factor hindering fulfillment of the plan is foundry work. The foundries do not always produce high-quality parts, and all hopes are pinned to its reconstruction. However, nobody in plan management has any idea when this will be done.

The impression is that enterprise management did not recognize that the casting shop was wearing out. Expansion and re-equipping was undertaken only after there was no place to go, and even now work is proceeding at less than shock tempos. At the present rates, reconstruction will take several more years.

Existing capacities are far from being fully utilized, and are not being managed in a proprietary manner. Foundry chief V. Morozov reported that during the second six months of the year the foundry, which employs over 900 people, stood idle for 10 days. The supply activities are moving very slowly (department chief A. Volodin). For example, the foundry had to wait several months to obtain a single binder tank, even though no scarce materials were involved.

The position of the management at "Soyuztyazhstankoprom" (V. Pokasyuk, chief) also seems peculiar. Large-scale production was five weeks behind schedule for nine months, the VPO [All-Union Production Association] puts on the appearance that nothing alarming has happened.

Something else must be mentioned as well. The VPO considers that the association ships 2400 tons of castings to other enterprises. In fact, including add-on tasks they are supposed to send about 4000 tons to other cities. Furthermore, a large number of castings are shipped to Gor'kiy from Kolomna and Kashira.

It is reasonable to ask the comrades from the VPO and Minstankoprom whether it would not be possible to get along without these excessive intra-branch cross-shipments. This creates an additional load on transportation and makes supply and production management more complicated. Is there such an urgent need to plan for shipping castings from Gor'kiy in 1982 to, say, Krasnodar? After all, the supplier himself is existing on hunger rations and is failing to fulfill urgent assignments for machine production.

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METALWORKING EQUIPMENT

POOR SUPPLY HINDERING FACTORIES IN GOMEL' REGION

Moscow EKONOMICHESKAYA GAZETA in Russian No 10, Mar 82 p 6

[Article by L. Lozovskiya, department chief, Oblast Statistical Directorate, B. Zakharin, department head, GOMEL'SKAYA PRAVDA and Ya. Glezer, correspondent, EKONOMICHESKAYA GAZETA "Delivery Agreement - As a Stepchild".]

[Text] According to folk wisdom, good things come in small packages. Any production worker knows that the lack of some small, apparently trivial part can idle the main production line at a large plant, causing hundreds of machines, tools and devices to lie idle in warehouses and in the plant yard due to its lack, even though customers are waiting impatiently.

Something like this is happening with the balls for ball bearings produced by the Gomel' bearing plant. More than 1200 enterprises and organizations around the country are the consumers of its output. This plant is not listed as being late either at Minavtoprom nor within the oblast . In addition, this enterprise achieved second place among the collectives of Minavtoprom for its work totals during the fourth quarter, and was awarded a monetary prize.

At the same time, the collective at this plant was behind in orders for more than 100 enterprises in the first year of the 11th Five-Year Plan, with shortfalls in ball and bearing delivery amounting to 195.5 thousand rubles. Among the guilty though guiltless are the largest motor vehicle plants in the country, the Khar'kov bicycle plant, the Melitopol' motor vehicle hydraulic assembly plant and a number of enterprises in Tashkent, Vladivostok, Chelyabinsk and other cities. There has been no noticeable improvement this year either. The delivery plan for January was fulfilled by only 88%. Customers failed to receive 80,000 rubles worth of various product.

No matter how odd it may seem, the situation is not alarming the enterprise managers, although the stream of warning telegrams and letters continues.

"We are working as well as anyone else," says plant director Yu. Ryumstev calmly. "Look," he continues, indicating the Ministry list, "our percentage of underdelivery is no greater than anyone elses. The problem is the large nomenclature and small groups of orders." The director glossed over the fact that the list contains many plants which are fulfilling their delivery agreements completely.

The main cause of the interruption, as was established by a raiding team, is the lack of precise monitoring of production at the plant, poor executive discipline and insufficient monitoring on the part of Minavtoprom of the fulfillment of delivery agreements by their subordinate enterprises.

As concerns the favorable indicators which distinguish the Gomel' bearing plant, these were achieved primarily through increasing the output of more expensive balls in accuracy class I. The fact that the plan assignment for the production of articles in accuracy class 3 and 4 was underfulfilled for many users bothers few at the plant.

Concern about the final national economic effect apparently is not yet at the center of attention of the enterprise supervisors and its economic and technical services.

The Rechitsa hardware plant belonging to the USSR Ministry of Ferrous Metallurgy has more than 1200 customers. This enterprise produces metal and wood screws, washers, bolts, nuts and nails. How is the collective here meeting its contract obligations?

Directly speaking, unsatisfactorily. For example, 141 customers failed to receive goods as agreed and in the required nomenclature last year. These include the Karacharov metallurgical base, which was short 32 tons of wood screws last year, the Borisovsk motor vehicle electrical equipment plant, which was short 12 tons of nuts; the Gomel' metallurgical base was short 29 tons of nuts, and this is not the end of the list.

The supply department showed us a large folder full of telegrams which were received during February of this year. Here is one of them: "The lack of 16 x 42 and 16 x 52 rivets is threatening to stop automobile assembly at the Minsk automobile plant. As of 2 February, the shipment against 1982 funds had not been made. This is an emergency situation. Please instruct your supply department to ship these rivets immediately."

Tens of such telegrams, wires and letters addressed to the plant managers (enterprise director A. Korol'kov and deputy A. Lisovskiy) are sent directly to the supply department without any kind of resolution, where they are filed. No one has any idea of their disposition. Even paid-reply telegrams go unanswered, and no one has been asked about it. Is this because this plant is listed among the "favorable" enterprises with the Rechitsa city party committee and in the branch? This plant has won numerous awards.

It must be admitted that inaccurate suppliers have contributed to the difficulties existing in the plant. We are talking especially about the metallurgical plant at Krivoy Rog, which failed to deliver a large amount of metal according to agreement last year and during the first months of this year. Nonetheless, if more attention were paid to delivery schedules, the Rechitsa hardware plant would be able to better organize the supply of its customers.

Nonetheless, there are many labor collectives in the oblast which are filling all orders in a timely fashion. The experience of the Machine Building Plant imeni Kirov at Gomel' is deserving of attention and wide dissemination. The workers here are achieving superior results through more complete and efficient utilization of technology in conjunction with good labor organization based on the team principle and using paid incentive for end results utilizing KTU.

The teams have reached agreements for socialist competition under the banner of "all orders on time and at a high technical level".

The social and production activity of the people is increasing at the enterprise, and the experience of the leaders is becoming everyone's achievement. The overall volume of production is increasing here through increased labor productivity. Machines and other products are being delivered to customers in full amount and nomenclature and in strict accordance with orders and agreements.

During the entire 10th five-year plan, there were no shops, sections, teams or workers among the Gomel' machine builders who failed to fulfill their assignments. In response to the resolution of the 26th CPSU Congress, the collective of the enterprise took the initiative to fill all orders on time and at a high technical level. This initiative received warm support in many of the labor collectives in the city and oblast , and has been approved by the Gomel' city committee of the Belorussian Communist Party.

The unceasing attention of many party committees to the planned introduction of new management methods helps to reduce each year the number of enterprises in the oblast which are not meeting product delivery plans according to agreements and with the established nomenclature. The operating experience of the Tsentrolit plant at Gomel' is deserving of wide dissemination. For a long time this enterprise was lagging in both the branch and the city. Thanks to the purposeful work of the party organization and management supervisors, the plant is now operating stably and fulfilling planned assignments in terms of all technical and economic indicators. Progress has also been achieved in fulfilling agreement assignments: in 1981 this plan was fulfilled by 99.7%.

Today's call is for the collectives at all of the industrial enterprises in the oblast to fulfill their obligations for product deliveries according to agreements and nomenclature. Socialist competition, a system of profit-producing measures and incentives must be directed toward this at each enterprise.

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SEMINAR ON ROBOT, MANIPULATOR APPLICATIONS REPORTED

Moscow PROMYSHLENNYY TRANSPORT in Russian No 11, 1981 (signed to press 12 Nov 81) pp 14-15

[Report by V. S. Konovalov: "Seminar on Robot and Manipulator Applications"]

[Text] On June 2 and 3 of this year, the Leningrad Scientific and Technical Information Center held its seminar "Applications for Industrial Robots and Manipulators in Transport, Storage and Transfer Operations during the Eleventh Five-Year Plan Period," the first meeting of this seminar, which drew a large number of specialists.

Some 20 representatives of industrial enterprises and engineering and design, scientific research and educational institutes presented papers. Doctor of Technical Sciences Ye. I. Yurevich (Leningrad Polytechnical Institute) familiarized attendees with the current status and the outlook for the future development of robotics. As a result of implementation of decisions of the 25th CPSU Congress in accordance with the program of the SCST [State Committee on Science and Technology], the Tenth Five-Year Plan period saw the development of some 110 models of automatic manipulators (industrial robots), more than 40 models being turned over for series production. Annual production of these models reached 6000 units, a figure double that called for by the plan. A large number of them are employed in lifting and transport operations associated with the servicing and support of production equipment. The MP-1, TsRV-50, PF-24 and other robots found application in interoperation transport. The TRT-1-250 ("Sprut") and MP-12 robots are used for intrashop and intersectional conveyance, the lifting and transport manipulators MAK-1 and MAK-2 for loading and unloading trolley conveyors and moving loads, containers and packages to the loading positions of industrial production equipment.

The introduction of robots has made it possible to increase the productivity of labor, raise equipment and facility use coefficients and improve overall production standards and conditions. Our country's inventory of industrial robots is growing continuously: while it amounted to all of 300 units in 1975, it had grown by 1980 to 6500 units, as compared with the 4000 units in the countries of western Europe, 6000 in the U.S. and 8000 in Japan. Over the period extending to 1985 the USSR plans to introduce some 35,000 industrial robots using microprocessors and minicomputers and to employ them as a basis for the development of automated sections and shops. Our domestic inventory of industrial robots will as a result be the largest in the world. The development of production sections based upon lifting and transport robots and the introduction of a unified system of control for a section as a whole constitute a promising

new direction in integrated production operations. Another version would be systems incorporating MP-12 adaptive, floor-type mobile industrial robots and electromechanically driven overhead mobile robots controlled by the Elektronika-60 microcomputer.

Considering the fact that industrial robots are being introduced chiefly by employing them as components of standardized production systems, our ministries have been charged with the task of developing, fabricating and delivering these systems.

A paper by Yu. I. Skoropisov, candidate of Technical Sciences, et al., "Robot Application in PRTS [possibly Industrial Transport and Warehousing] Operations," dealt with a robotics module developed by the Kievskiy zavod production association assisted by the computer department of the Leningrad Institute of Aviation Instrument Manufacture. This robotics module is a unique system incorporating domestic series-produced equipment and one of the first models of a loop-controlled manipulator robot with visual adaptation. The system by which the robot is taught makes it possible within a short (30-40 min) period of time to "teach" it to perform a specific production operation or series of operations requiring visual adaptation to a spatial arrangement of moving or nonmoving objects, which are also moving along a three-dimensional trajectory at a given velocity. Small and lightweight (approximately 300 kg), the robot has six degrees of motion and a wide range of manipulation: horizontal gripper sweep - 1.7 m, angle of rotation of "arm" plane - 200° and billet payload - up to 40 kg. The use of robotics modules in series and small-scale production operations as components of specific sections, to include lifting and transport equipment, can be of great advantage. E. I. Zhukovskiy (Odessa Institute of Food Industry Technology imeni M. V. Lomonosov), candidate of Technical Sciences, delivered a paper entitled "Outlook for the Application of Robots and Manipulators in Food Enterprise Warehouses." Results of a study of a number of branch enterprises showed that some 15-25 per cent of all personnel employed in their storage facilities were engaged in PRTS operations, half of this number doing manual labor. Such laborious, monotonous, mass-scale operations, for example, as packing glass containers in cases and boxes and then taking them out, packing these cases and boxes in containers, these operations, as a rule, are performed by manual labor alone. This confirms the timeliness associated with the use here of manipulators both with manual control and with automatic control, that is, industrial robots. E. I. Zhukovskiy set forth his institute's recommendations concerning procedures to be employed in selecting types of robots and manipulators. The paper presented by V. S. Konovalov, candidate of Technical Sciences (VNIIPTmash) [All-Union Scientific Research, Planning and Design Institute of Lifting and Transport Machine Building and Loading, Unloading and Warehouse Equipment and Containers] dealt with the design of the MAK-1 and MAK-2 manipulators and standardization of lifting and transport robots developed for heavy and transport machine-building enterprises. With its 50-kg load capacity, the MAK-1 manipulator has been designed to automate the loading and unloading of load-carrying trolley conveyors and the process of feeding blanks to the loading positions of production equipment (storage and supply units etc.) or the direct loading of containers and pallets, but in a number of instances production equipment can be loaded as well. The MAK-2 manipulator with its load capacity of 320 kg serves to automate the loading and unloading of overhead conveyors by hanging suspended carriers with multiple or single loads on a hook. Lifting and transport manipulators fall into three standardized groups of machines: manipulators developed on the basis of bridge, gantry, single-rail overhead travelling cranes and cantilever cranes, as well as stationary portal cranes; single-rail overhead manipulators and manipulators for loading and unloading overhead conveyors.

The paper by S. V. Gusev, engineer, et al dealt with a variety of control programs and algorithms for lifting and transport robots and demonstrated that the adaptive control system shows itself to advantage over others. This advantage consists in the possibility it offers of circumventing obstacles and in its insensitivity to substantial perturbations. Computerized or microprocessor-based robots with adaptive control may be employed to economic advantage to perform lifting and transport operations in automated shops and warehouses.

Discussing in his paper the problems and methods of adaptive industrial robot control, A. V. Timofeyev, Candidate of Technical Sciences, pointed to the importance of the algorithmic design of these adaptive systems and described methods of plotting programmed robot movements conforming to a selected plan. The paper by Yu. D. Zhabotinskiy, engineer, "An Adaptive Industrial Robot for Loading and Unloading Operations," contained an example of the automatic loading of equipment with blanks fed to it in bulk in an ordinary container by a robot generating appropriate signals upon contact with the surface of an object. This makes it unnecessary to employ a special container and eliminates expenditures of labor in the event of a changeover to the manufacture of other items. The paper presented by V. L. Zhavner, Candidate of Technical Sciences, et al, "A Robotized System for Containerizing Finished Production in Dairy Industry Enterprises," describes this system, the sequence in which it processes the containers and the control system involved. The system combines production and transport operations into a single automated engineering process. Its component parts are as follows: a stacking manipulator, a container manipulator, interchangeable gripping devices, a control device and auxiliary equipment in the form of container feed cutoffs coordinating the operation of the production equipment with the movements of the robot and the kicker. The system performs the following operations: it removes an empty container from the conveyor and positions it, removes finished product from production equipment, packs it in the container, caps the container and then places it on take-off conveyor.

The paper by S. O. Suzdal'skiy of the Leningrad Institute of Rail Transport Engineering imeni V. N. Obraztsov, "A Servomanipulator for Unloading Meat from Refrigerator Cars," familiarized attendees with the design of this manipulator, which has an hourly capacity of 90 frozen half-carcasses (2.5 m long weighing 160-200 kg). Nineteen eighty-one plans call for a prototype of this manipulator to be fabricated and checked out.

I. L. Yerosh, Candidate of Technical Sciences, presented a paper offering a comparative evaluation of a number of algorithms and image discrimination systems. He discussed work being done with visual adaptation and described a generalized scheme for an object-recognition algorithm which incorporates a teaching phase. In his presentation, "A Manipulator with Load-Balancing Mechanisms for Moving Objects between Operations," V. M. Kuznetsov, engineer (VITstroydormash scientific-industrial association), reported on work under way on the development and assimilation of production of a number of manipulators with manual control. These include a 100 kg-load capacity manipulator incorporating a load-balancing mechanism. In contrast to manipulators with pneumatic and electrical balancing, this manipulator maintains balance by means of a special spring mechanism combined with the lift drive.

In his paper, "Experimental Research on a Pneumatic System of a Robot for Packing Objects in a Container," engineer V. V. Arshanskiy described a positional pneumatic servo system which has been developed for the MP-3 industrial robot with fluid control, which permits loading operations with stationary containers.

The paper delivered by Yu. A. Perten, Candidate of Technical Sciences, et al., "Manipulators for Assembling a Combined Transport Unit from Individual Container Loads," familiarized attendees with this type of manipulator, which has been developed in Leningrad's Light Industry and Textile Institute imeni S. M. Kirov, and with the results of tests conducted with it under laboratory conditions. Engineer V. A. Vasil'yev presented a paper entitled "An Adaptive Electric Drive of an Industrial Robot for Loading and Unloading Operations." He pointed out that the application of adaptive electric drives in robots makes it possible to maintain the insensitivity of their dynamic characteristics to changes over time in the parameters of their electromechanical components and the monotonic nature of the movements of their working elements at a given speed of operation. This also makes it possible to achieve a motion program reproduction accuracy higher than that in existing robotics systems and to reduce the time required to adjust the robot. The use of adaptive electric drives in industrial robots incorporated in a machine-robot-machine system increases system capacity by 17 per cent.

Engineer V. A. Yakovlev's paper, "Questions Concerning the Use of Digital Adaptive Regulators in Electric Robot Drives," describes a procedure making possible the synthesis of digital adaptive regulators for servosystems of industrial robots which are acceptable from the point of view of practical realization, the paper delivered by engineer E. A. Mikhaylova, "A Visual Device for a Robot System for Sorting Objects on an Overhead Push Conveyor," a procedure involving three-dimensional locally-linked regions (OLSO [ob"yemnyye lokal'no-svyazannyye oblasti]). Construction of a discrete visual system requires that we find that set of OLSO which with the minimum number of regions and satisfaction of certain technical conditions will insure recognition of all objects presented. Informative OLSO, which permit recognition of three-dimensional objects, are found as a result of a certain sequence of operations, which are listed in this paper. The paper presented by engineer S. Ya. Sadovskiy, "Robot Control Devices," contains a description of devices developed by the Leningrad Electrical Equipment Works production association, with which a number of series produced industrial robots are equipped. The simplest devices have up to 10 operating commands, the more complex devices as many as 100, which can be transmitted to industrial robots and production equipment. Some devices control the operation of stationary robots, the Universal-15, for example, others that of mobile manipulators.

The paper presented by engineer A. R. Malkovich, "Safety Considerations in the Design and Operation of Robots and Manipulators for PRTS Operations," contains ideas and suggestions concerning adherence to safety procedures in designing and operating robots and manipulators.

The Leningrad Scientific and Technical Information Center has published summaries of papers delivered at the seminar. Seminar participants took away with them comprehensive, detailed recommendations concerning this problem.

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ROBOTS, MANIPULATORS IN FOUNDRY SHOPS

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No 1, Jan 82 (signed to press 12 Jan 82) pp 37-39

[Article by A. A. Belyayev: "Robots and Manipulators in the Foundry"]

[Text] Rationalizers of the Dmitrovgrad Automatic Multistation Machine Facility imeni 50th Anniversary of the USSR have developed a kicker for the SLT-160-10 casting machine. In combination with a lubrication system and other components, it has made it possible to automate the casting process.

This kicker is pneumatic cylinder 50 mm in diameter with a rod stroke of 500 mm. Mounted on the end of the rod is a fork for ejecting the casting. The pneumatic cylinder is attached to the upper slides of the casting machine. Control signals are fed to end release switches. The casting machine opens in two stages. After the mold is first slightly opened, the ejectors are activated and a command sent to the air distributor controlling the pneumatic kicker cylinder; the rod with the forked end drops to hold the casting together with the moving portion of the mold. The casting machine then opens completely, and the casting drops onto a balance tray, which controls the distance between the casting and the mold; the kicker fork returns to its initial position, and a command is sent to the mold lubrication system. After the mold is lubricated and blown out the cycle is repeated.

The lubricating system consists of a tank containing cooling and lubricating fluid, four spray nozzles, an electromagnetic control valve and supply lines. The cooling and lubricating fluid is fed to the spray nozzles under compressed air pressure (p = = 0.5 MPa).

Introduction of the four kickers and the lubrication system has made it possible to reduce the labor intensity of the process of fabricating an item by some 8000 norm-hours, that is, to free three workers. The system is simple in design and reliable; it does suffer from drawbacks, however: it does not treat its castings with anticorrosion fluid, so that moisture makes chips and nicks on their surfaces. So far, moreover, it lacks a conveyor to transport castings from the casting machine to container.

These deficiencies do not characterize the systems with automatic manipulators, which have been developed at the plant and now introduced, and which are designed to extract castings from their molds, treat them with anticorrosion fluid and then transport them to either the trimming press or a container.

Each system comprises a component mold-lubrication system, a transporter, a manipulator and an SLT 160 casting machine.

A pulse-counting relay and two time relays make it possible within broad limits to regulate both the frequency and duration of lubrication. The lubricating fluid is atomized by air entering the spray nozzles simultaneously with the fluid. As is the case with the kicker, it is supplied from its tank by compressed air (p = 0.5 MPa). Fluid expenditures are regulated by two air distributors.

The transporter is designed to move castings from the anticorrosion fluid tank to either a container or a trimming press. Its working component consists of a continuous, flexible, slotted conveyor with rakes located at certain intervals. Sheet provides support for the working length of the belt. The transporter's angle of incline may be varied by changing the height of the telescoping support.

The automatic manipulator (Figure 1) is designed to extract a casting from its mold and then move it to an anticorrosion fluid tank; it has three degrees of freedom.

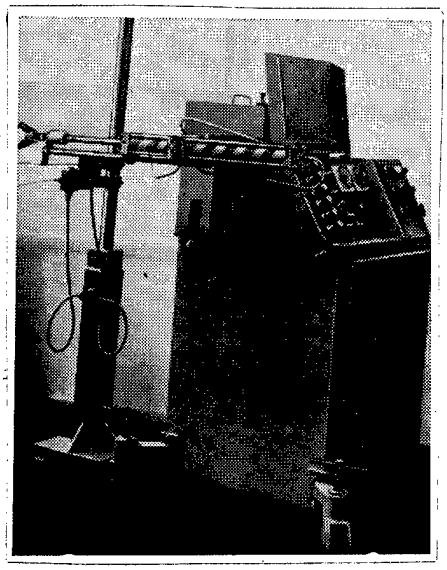

Figure 1

Serving as the manipulator's servomechanisms are pneumatic cylinders with two-way action and fed by the shop's main supply line via an air preparation unit and an air-distribution block. The technical characteristics of this manipulator are briefly presented below. When the air distributor *I* is switched, air is fed to the upper cavity of the pneumatic cylinder *3* and the control air distributor *2*, which cuts off and throws the contacts on electrical transformer *1*. As the piston of pneumatic cylinder *3* moves downward, the pressure is maintained in its lower cavity until the piston moves to the lowest point on the cylinder. At this point, air distributor *17* opens and activates electric transformer *16*, which sends a command to air distributor *III*, which in turn controls pneumatic cylinder *5* providing lateral movement of the manipulator arm. Upon completion of the movement of cylinder piston *5*, a terminal switch is activated, which sends an instruction to air distributor *V* controlling the pneumatic cylinder of gripper *18*. Then activated are air distributor *19* and electrical transformer *20*, which sends a command to air distributor *III*. Pneumatic cylinder *5* returns to its initial position. Via the terminal switch and air distributor *I*, pneumatic cylinder *3* receives a new command; and pneumatic cylinder *18* returns the gripper to its initial position. Then, via air distributor *IV*, pneumatic distributor *2* and electrical transformer *1* activate pneumatic cylinder *12* of the locking mechanism, terminal switch and air distributor *II* pneumatic cylinder *4*, which rotates the manipulator's wrist.

The working position of the gripper is determined by the position of the "RELEASE" switch on the control panel: in one instance the terminal switch rotating the gripper sends a command to air distributor *1* of pneumatic cylinder *3*, in another, to air distributor *V* of pneumatic cylinder *18*. When it stops moving, the gripper opens up.

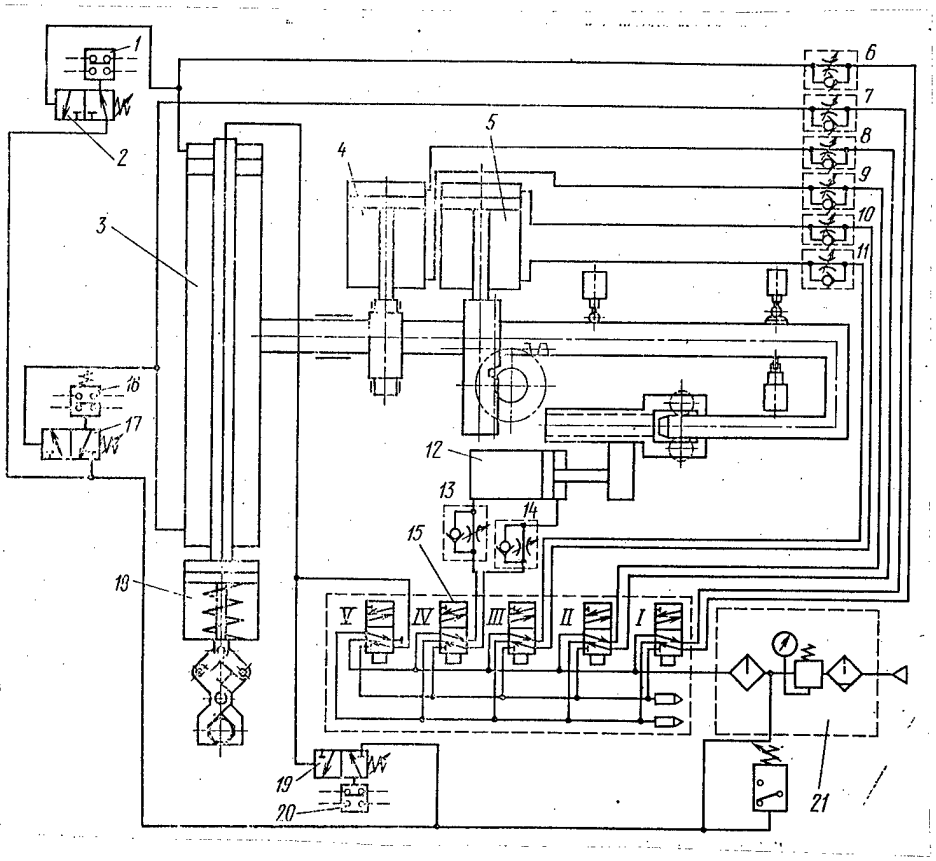

Figure 2

All system components are interlinked via a unified control circuit located in electrical cabinets in the CLT 160 casting machine and the automatic manipulator. The control circuit in the automatic manipulator is mounted on removable pneumatic and electrical panels, which is a convenience in servicing. The system is equipped with blocking devices which prevent the mold from closing with an unremoved casting or if the manipulator mold is separated:

Cycle time, s	8
Time to remove casting from work zone, s	5
Maximum weight of extractable casting, kg	2.5
Type of drive	Pneumatic
Operating pressure in pneumatic system, MPa	0.4-0.6
Number of Pneumatic cylinders	5
Hand stroke, mm:	
laterally	500
longitudinally (with respect to casting machine)	100
Angle of hand rotation in vertical plane, deg	90
Gripper control with respect to height, mm	150
Maximum air expenditure, m^3/h	3
Dimensions (length, height, width), mm	1065x(1200--1350)x985
Manipulator weight, kg	470

Let us now look at the manipulator's control circuit. Air distributor block *15* controls the five pneumatic cylinders *3*, *4*, *5*, *12* and *18* (Figure 2). Throttles *6-11*, *13* and *14* regulate the speed of pneumatic cylinder movement.

From unit *21* the air is supplied to the air distributor block.

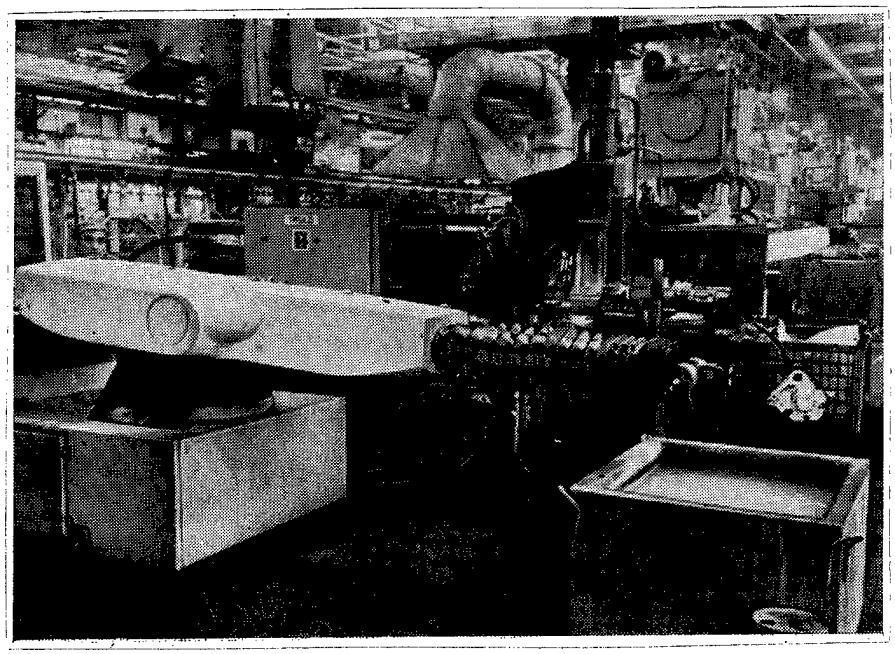

Figure 3

Systems with these manipulators have made it possible to eliminate the monotonous and difficult physical labor associated with these operations. The introduction of automated systems has, in addition, brought with it the possibility of multimachine operations, greater smoothness in equipment operation and, accordingly, greater machine productivity. We also now see higher mold stability and better-quality castings due to stabilization of the temperature regime. Introduction of two automated systems has freed two workers on a double-shift schedule.

The plant has also introduced five casting systems operating on the casting machine -- robot - trimming press principle. These systems incorporate the Unimate (US) industrial robot (Figure 3). It performs the following operations: extracts castings from molds, transports them to a water bath, removes fluid from casting cavities by rotating arm about its axis, then transports casting and places it in trimming stamp.

This robot is capable of operating in shops with temperatures elevated to 323 K (~50°C). Its control system provides three motions of the entire arm, two of the wrist (the motion of the gripper is the sixth). All motions, except that of the gripper, are executed in accordance with a program (from the hydraulic cylinders) in the servo mode. The gripper is driven by a pneumatic cylinder. The robot's hydraulic unit and control panel are mounted on its body. The control system is positional. Its memory unit has a capacity of 180 commands, which can be divided into either three programs of 60 commands each or six of 30 commands each. All programs are stored in the memory unit.

The robot's control system offers the capability of interfacing with external production equipment. Programming is accomplished by the teaching method. This involves using a manual control panel to move the robot's arm sequentially through the desired points on the operating trajectory of the gripper. While the arm is positioned at

each desired point, the user presses a button on the manual control panel to record the coordinates of these points as well as their number in the sequence. This information is then passed to the memory unit. Received here are commands to open and close the gripper, commands to systems controlling production equipment and signals indicating anticipation of information that the working components have executed these commands. While in the teaching mode the robot's arm may be moved at one of two speeds, the slower of which is used to bring the wrist to a desired position for extracting or positioning a casting and for testing a program which has been written.

The robot's technical characteristics are given below:

Arm movement, mm:	
radial	1067
vertical	80-2300
Angle of rotation, deg:	
arm around horizontal axis ...	180
wrist in vertical plane	220
Speed of linear movement, mm/s:	
radial	762
vertical	1270
Rate of rotation, deg/s:	
arm	110
wrist	110
Positioning repeatability at each coordinate, mm	±1.27
Load capacity (kg) at operating speed:	
reduced	34
normal	11.3
Gripping force (kN) at end of 100-mm gripper	130
Power requirement, kVA	11.5
Service life, h	40,000
Dimensions, mm	1520x1370x1590
Weight, kg	590

Introduction of five systems incorporating Unimate industrial robots has made it possible to free 20 foundry workers over a three-shift schedule.

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METALWORKING EQUIPMENT

ROBOTICS RESEARCH AND DEVELOPMENT

[Editorial Report] Vilnius SOVETSKAYA LITVA in Russian on 26 Mar 82 p 4 carries Yu. Stroganov's discussion of recent developments in visual sensor technology for industrial robots at the neurocybernetics laboratory of Vilnius State University imeni Kapsukas. Scientists working under the direction of candidates of biological sciences D. (Kirvyalis) and V. (Vanagas) have developed an "eye" which enables a robot to determine the speed of a moving object. (Kirvyalis), (Vanagas), A. (Damiyenyatis) and senior science associate V. (Gustaytis) have developed an "eye" operating on bionic principles for controlling a robot's manipulators. Current activities at the laboratory include studies of the functional properties of living animals' eyes for the purpose of expanding robot capabilities: judgment of distance, distinguishing objects by their shape and to perform other operations. Special computer programs are to be developed for this purpose. A. (Daktaryunas), a junior science associate, and scientists of the university's semiconductor physics research laboratory are studying the possibility of developing matrices similar to the retina of the human eye and, reportedly, they have achieved positive results. Long-range goals for the scientists include the development of an "eye" which, when linked to a computer, could perform a whole series of operations, including determination of speed and distance and the ability to distinguish objects by shape.

TBILISI FACILITY DESIGNS MACHINE TOOLS

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 25 February 1982 page 4 has a 200-word brief, with photos, on the Tbilisi Machine Tool Special Design-Technology Bureau, which has been in existence since 1936 and has designed numerous machine tool models used all over the USSR and abroad. At present the staff is working on a new universal lathe with microelectronic gear and on-line control.

CSO: 1813/723

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