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CHEMICAL INDUSTRY AND MACHINERY

CHEMICAL INDUSTRY PROGRESS REPORTED

Kiev PRAVDA UKRAINY in Russian 28 May 78 p 1

[Article: "The Industry of Miraculous Transformations"]

[Text] Chemistry gives us beautiful fabrics, footwear, detergents, medicine, machines and many other things. Chemistry is called a magician, and this is true: its potentials are truly unlimited. It is one of the basic sectors in modern industry. The country's economic potential is judged today according to the level of development of the chemical, petrochemical and microbiological industry. The Soviet Union occupies a leading place with respect to the production of the goods of these sectors among the most developed powers in the world.

Our country is in first place in the world with respect to the output of mineral fertilizers. This year over 100 million tons of them will be produced.

Technical updating of the sector is taking place, mainly as the result of introducing machines with a large unit capacity, continuous industrial processes with maximum utilization of the energy from chemical reactions, etc. Tremendous attention has been paid to the development of major chemistry in Siberia and the Far East. Production of synthetic fibers, synthetic resins and plastics are planned to triple here. In the Ukraine, the production facilities in the Severodonetsk Azot Association and the Gorlovka Stirol Association have been expanded and renovated, and a plant for fine organic synthesis has been launched in Ivano-Frankovsk. Planned to be put into operation this year are capacities for the output of complex liquid fertilizers at Rovno, Sumy and Cherkassy, and for the output of ammonia--at Dneprodzerzhinsk and Gorlovka.

The chemists are working well in the third year of the Tenth Five-Year Plan. The sector has successfully overfulfilled the assignment for five months. Over 20 percent of the products are put out with the State Seal of Quality. The workers of the Ukraine have made a large contribution to the overall success. The republic's enterprises provided almost one-fourth of the

mineral fertilizers produced in the country and over one-third of the output of the aniline dye and photographic chemical industry. New types of products have been developed by the Chernigov Khimvolokno Association, the Rovno Azot Association and the Krymsk Titanium Dioxide Plant. The collectives of the Severodonetsk Azot Association, the Sumy Khimprom Association and the Berlyanskiy Experimental Petroleum and Oil Plant, which achieved the highest indicators for the sector last year, are called the leading lights of the socialist competition.

Responding in action to the Letter of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council and the Central Committee of the All-Union Lenin Young Communist League on developing socialist competition in 1978, many of the republic's chemists have given their word to fulfill the plan for three years by the first anniversary of the adoption of the new USSR Constitution. G. Usatenko, twister at the Berdyanskiy Fiberglass Plant, was the first in the sector to report the completion of a personal five-year plan. The outstanding worker planned a new milestone--to fulfill two more five-year plans by 1980. Also famous for their good work are T. Kishchuk, senior instrument control operator at the Kremenchug Petroleum Refinery, V. Galkin, instrument control operator and L. Sorochinskiy, operator, from the Severodonetsk Azot Association, the shift of V. Loktinov from the Vinnitsa Chemical Plant, and V. Zhurba and M. Kondratov, vulcanizers from the Dnepropetrovsk Tire Plant.

At the end of last year, PRAVDA UKRAINA published the appeal of the collective of the Severodonetsk Azot Association--to provide as much mineral fertilizer as possible for the harvest of the third year of the five-year plan. The republic's chemists warmly supported the appeal. They planned to produce 230,000 tons of fertility vitamins above the year's plan. Moreover, most of them were to be in time for the spring field work.

They kept their word! In four months, 158,000 tons of fertilizers were produced. Today the initiators of the competition, the collectives of the Sumy Khimprom Association, the Krymsk Titanium Dioxide Plant and the Odessa, Konstantinovsk and Kaluga chemists are outstripping the schedules. The collective of the Rovno Azot Association is picking up the rates. Since the beginning of the year they have produced 45,000 tons of nitrogen fertilizers and 9000 tons of ammonia above the assignment.

12151

CSO: 1821

PROBLEMS IN LAUNCHING BIOCHEMICAL PLANT DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Jun 78 p 2

[Article by V. Zubchenko, instrument control operator of the Shebekino Biochemical Plant: "The Authority of a Signature"]

[Text] This is the story of the result of a surprisingly light attitude toward an official signature to a document.

On 14 January 1977 the State Committee signed an act on accepting the Shebekino Biochemical Plant for operation. This is not a simple plant, but the largest in the country for the production of fodder lysine. The day of 14 January, then, could have been an event: negligible additives of lysine to the ration for animals make it possible to increase livestock productivity by 30-35 percent. It need hardly be explained how important the launching of the ShBKHz [Shebekino Biochemical Plant] is for the country.

Two weeks later the act of the state committee was approved by the Main Administration for the Microbiological Industry at the USSR Council of Ministers. Earlier, even before being turned over for operation, a state plan had been established for the enterprise.

In January not a ton of the product had been made, and in February and March--the same. All last year and for a good two months of this year the plant was practically at a standstill. We obtained very little lysine --about 10 times less than planned. We were short many million rubles worth of products in supplying agriculture.

Construction of the plant cost the country 35 million rubles. As they say, the ink is scarcely dry on the act to put ShBKHz into operation, and already the question has arisen of its--renovation. It is already solved in principle. The additional sum required is known--about 22 million rubles.

How lightly we count it: 35 million there, 22 million here.... Someone certified with his authority, with his personal signature, with weight in the state, that these tremendous resources would be spent to good use,

expediently and economically. Just where, though, is this person's responsibility for his signature?

The brief biography of ShBKhZ is filled to overflowing with calamities and absurdities. Most striking among them: the largest enterprise of its kind in the country was designed, constructed and accepted, even though everyone knew that there was and is none of the raw material that the new production facility counted on.

Why did things turn out this way? Who is specifically to blame? Could they really forget about the raw material base for even a minute? It is as if I had taken over a shift and not looked at the instruments that would have confirmed that the apparatus was charged and the production process was in operation. As I understand it, the question of raw material is the most important one. They give me the answer that the technical-economic substantiation worked out by the Odessa branch of the Yuzhgiprobiosintez Institute was visaed at Gosplan, and therefore, what claims could be made against the plan? Well, Gosplan is big. To find out who was the first to place his high-authority signature, in order to construct the enterprise, without providing the future production facility with raw material, was beyond my powers. One document, however, shedding some light, but not the first one, was found.

Six months before the "launching," on 23 July 1975, the chief of the department of the microbiological and combined fodder industry of USSR Gosplan, N.P. Shcheblykin, visaed the distribution of raw material that didn't exist. V.D. Belyayev, chief of the Main Administration for the Microbiological Industry, was in agreement with him.

It is ridiculous, all the same, to divide up the pelt of a bear that hasn't been killed. There was a critical shortage of corn extract (the basic raw material) even 10 years ago, and this shortage has not eased even today.

In a word, the planners, acting in accordance with the rule, "within limits," substantiated and planned. Others, hoping for the best ("Perhaps the situation will change?"), approved the plans. Still others accepted what should by no means have been accepted.

The chairman of the state committee that accepted ShBKhZ was N.I. Radin, deputy chief of the Main Administration for the Microbiological Industry. He knew that there was no raw material. The committee was satisfied with acquiring a negligible amount (250-350 kilograms) of lysine for one fermenter (out of 40!). I did not speak with Comrade Radin. But I am convinced: he realized perfectly well that the enterprise would stand idle. All the same, he signed the act, as did most of the other committee members.

ShBKhZ could not operate also because 20 inoculation and 40 working fermenters were inoperative. They had been carelessly designed by the Irkutsk Scientific Research Institute of Chemical Machine Building and manufactured

the same way by the Kurgan Khimmash Plant and the Dzerzhinsk Chemical Machine Building Plant. For over a year we suffered torment, eliminating innumerable rejects through our own efforts. The fact that Dzerzhinsk Khimmash puts out equipment that is known to be unfit was well known at the Ministry of Chemical and Petroleum Machine Building, as can be seen from the correspondence between the ministry, the plant and the UkrNIIkhimmash Institute. Acknowledging that he was at fault, V. Ya. Gerasimov, deputy chief designer of Dzerzhinsk Khimmash, officially guaranteed in precisely stipulated periods to dismantle all the former (rejected) reducers and replace them with modernized ones. This signature too was worth nothing. After supplying seven reducers, the plant demanded that we pay them for them, threatening to stop the output if we refused. Do we really have the right to pay for both a reject and for its replacement? Where can we get another 120,000 rubles? It would appear that some people can not only renounce their duties and obligations, but count on obtaining profit on the reject!

What position has our plant found itself in? The so-called protein-vitamin concentrate (BVK) was hurriedly determined as the raw material. It is considerably more expensive than corn extract. The misfortune itself, however, lies elsewhere. Science has well clarified the processes for obtaining lysine from BVK in a test tube and even in relatively small (15-vat) fermenters. But how does the process take place in 100-vat fermenters? This was and still is unknown to the All-Union Scientific Research Institute of Genetics. Obviously they felt that the scale has no influence.

At one time the institute gave a "good" to the industrial process. It turned out to be unsupported. The process is essentially uncontrolled. It is not by chance that a group of the institute's scientific associates, which was commissioned to work out the process even on four pieces of equipment, went back to the institute with nothing. They did not work it out, because someone once made his vague guesses the scientific substantiation for the production, and for such major production. That is the payment.

Alas, it is not the guilty ones who are paying (they say that even the Board of the Main Administration of the Microbiological Industry did not establish who they were, after discussing the complicated situation). It is the state that is paying, as well as our collective, which has not been able to start mass output of lysine for almost six months now.

Still they managed to start. But it is not the powder, as it should be, but the liquid, which is not in demand. That is, the plant has no "finish" for the process. Nor does it have a "head"--a shop that would be able to accept at the proper level and prepare the raw material for further processing. Therefore, we handle manually many tons of BVK and ammonium chloride, the use of which was not, as we know, specified. It is easy to picture what the work conditions are like here.

In general, BVK is not suitable. A search is in progress for a more suitable raw material, and at the same time, preparation for expensive renovation,

which will begin sometime or other and will take no one knows how long. The plan also has many other gross miscalculations and omissions. It is clear that in such a circumstance the plant is not provided with a full complement of personnel.

All this is because the facts were one thing and the conclusions and the decisions based on them--another. Is there really no one who will answer for this?

12151

CSO: 1821

AMMONIA, CARBAMIDE CAPACITIES FOR 1978 START-UP LACK EQUIPMENT

Kiev RABOCHAYA GAZETA in Russian 17 May 78 p 1

[Editorial: "New Chemical Construction Projects: Pace Yourselves"]

[Text] The mineral fertilizer industry in the republic is growing at a quickening pace. In what remains of the five-year plan period the industry's capacities have to be expanded by more than six million tons of standard units. And half the planned expansion volume must be mastered this very year. Four major ammonia complexes are numbered among the projects to be placed in service. Well, then, how are they progressing? The state plan was met overall by 101 percent. Since the year began nearly twice as much capital investment was mastered in construction and installation as in the same period last year. Most construction sites have been provided material and technical resources. The sites have enough workers. Many collectives of builders and equipment operators took on joint commitments for the ahead-of-schedule placing of new production lines into service.

Coming out with a valuable initiative, endorsed by the CC CPSU, are Sumy builders and equipment operators: they are stirring up the socialist competition for faster start-up and mastery of capacities in the fertilizer industry and chemical machine building and the manufacture of above-plan products. The masons and installers brigade headed by I. I. Klimenko, from the Odesskhimstroy Trust, is operating under the brigade contract method for erecting structures of the ammonia complex at the Odessa Portside Plant; the brigade committed itself to reach its production target of the third year of the five-year plan period by Builder's Day--12 Aug 78. The results of the first quarter show that the brigade collective has been true to its word. The masons and installers are pacing themselves, outstripping the schedule.

Regrettably, the enthusiasm of the front-rank brigades cannot conceal the bad management that has taken shape on the construction sites of the entire complex. Today the Odesskhimstroy Trust by its own efforts cannot handle the planned volumes of work at the start-up sections. The builders were at fault in not furnishing at the work front the installers in the reagent department, the slurry-thickening department, the air separation block, the water treatment area and other vital areas. The pace of work must be sharply accelerated at the portside Glavkhimprommontazh.

To date the lagging of the Rovnopromstroy and L'vovpromstroy combines in the erection of the capacities of the Azot Chemical Association and the Yarovskiy Mining and Chemical Plant has not been overcome.

This year a serious challenge looms before the organizations of the Ministry of Heavy Construction, UkSSR. The Donetsktyazhstroy and Dneprometallurgstroy combines must bring about the start-up of four large capacities. They include two ammonia complexes in the Gorlovka Stirol Association, in the second and fourth quarters, and a carbamide complex--in December. As for the first installation, all construction must be ended in May-June, including work at the liquid ammonia warehouse, the scrubbing structures and the amenities of the grounds. At the second, all foundations and rooms must be brought to a finish urgently, so that they can be transferred for installation. Special attention must center on construction of the parts of the carbamide complex, where only 13 percent of the annual volume has been completed, so that not later than September the last assemblies can be handed over to the installers.

Time pressure demands more drive in building the ammonia facility set to be started up in the second quarter at the Dneprodzerzhinsk Azot Association, where the plan has not yet been completed and construction work holding back the installation of equipment has not been concluded.

A crucial period of work has commenced at the subdivisions of the Ministry for Installation and Heavy Specialized Construction, UkSSR and the customer-enterprises. In fact, equipment must be installed on a broad front at many site areas. Therefore Ukrglavkhimteplomontazh must without delay dispatch additional qualified specialists to the first ammonia complex of the Gorlovka Stirol Association, provide it conditions for high-productivity labor and in this way double the rate of equipment and pipeline installation and ensure passing them over for start-up adjustment in May-June. Operations need to be speeded up at the second facility so that the installers freed can be grouped at the carbamide complex areas. This challenge demands to be taken up by the organizations of Ukrglavmetallurgmontazh at the Dneprodzerzhinsk Azot Association.

Some heads of enterprises making mineral fertilizers are slow in solving problems of on-time set-completion of project areas to start up with equipment, cable and conductor products and special materials. In the Gorlovka Stirol Association, for example, at the second-quarter start-up ammonia facility there has not yet been supplied part of the reinforcements, mountings, pipeline supports and other parts, dragging back installation work, and the delivery of several equipment items for the second facility is taking a long time.

The Odessa Portside Plant is not coping with transferring for installation of assemblies at areas of the auxiliary department. Up to now the customer lacks the requisitions for getting sanitary-engineering, pump and other equipment needed for placing the apartment houses in Novaya Sychavka in occupancy. The Rovno Azot Association has not been giving the builders the technical documentation for reconstruction of the shop making nitroammophoska; much equipment has not been ordered.

Party agencies, oblast executive committees, enterprise heads and the Glavsnab UkSSR must bring into unremitting monitoring the uninterrupted supply of construction sites under the ministry of fertilizers with equipment; they must form at all projects facing start-up operational groups for organizing set-complete and on-time transfer of the start-up project to installation status.

Builder and installer organizations and equipment operators must take extra steps for accelerating construction pace at chemical projects. Brigades and sections must be given additional complements of workers and provided with their metal and prefabricated reinforced-concrete structures. It is vital to show concern in arranging for good day-to-day living conditions for working people and in organizing public catering at all projects.

Party organizations of construction sites must see that the operating experience of front-rank collectives is widely publicized; they must more energetically support the new initiatives to accelerate the course of construction and to place into service capacities for making mineral fertilizers and the starting material for producing mineral fertilizers.

10123

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NEW POLYMER MATERIALS PRODUCED IN ARMENIA

Yerevan PROMYSHLENNOST' ARMENII in Russian No 4, Apr 78 pp 72-74

[Article by G. A. Zal'yants and N. V. Gubko: "New Polymer Materials"]

[Text] An analysis of the current variety of available plastics indicates that the majority (approximately 70%) are polyolefins (PO), polystyrene plastics (PS) and polyvinylchloride (PVC). Production of these thermoplasts will increase in the coming decade.

In contrast to heavy-tonnage traditional polyolefins, their various modifications and new types of homopolymers and copolymers form a large series of so-called "small-tonnage" PO, the role of which is increasing year by year. Some of them have already assumed industrial significance: a copolymer of ethylene with propylene (CEP) and with alpha-butylene (CEB).

CEP is a high-molecular product of polymerization of monomers. The process of copolymerization of ethylene with propylene is conducted in a solvent medium -- saturated hydrocarbons -- at a temperature below 100°C and at a pressure in excess of 10 atm. Mixtures of alkyls or alkyl halides of aluminum and titanium chlorides or other compounds of heavy metals of variable valence are employed as catalysts. The product, obtained in the form of a powder, is rinsed away from the catalyst residue, is dried, mixed with stabilizers, dyes, other additives (depending on what the material is to be used for), and is granulated.

CEP possesses a number of valuable property: high electrical figures and mechanical strength, resistance to heat and cold, improved resistance to cracking under load in aggressive media and to the action of acids, alkalis and transformer oil, as well as flexibility while retaining excellent strength characteristics. The material is unstable to the action of hydrocarbons (for example, benzene). The degree of crystallinity, density, rigidity, and yield strength decrease with an increase in propylene content in the copolymer. With a propylene content of 30-80% by molecular weight, CEP becomes totally amorphous. It can be processed into products by various methods: compression molding, injection molding, extrusion, and blowing off.

Powder CEP is employed in applying protective coatings, and granulated for extrusion and injection molding.

CEP is an indispensable material for producing wear-resistant coatings, strong films, pipe, flexible hose, extruded sheets, and consumer products. In addition, the obtainability and comparatively low cost of the raw material as well as ease of processing enable it to be employed in the electrical equipment, radio equipment, chemical, food processing and pharmaceutical industry, machine building, medicine, and agriculture. With a propylene content of 0.5-2% by volume, the copolymer is used in producing items of various types with improved resistance to cracking in a stressed state in aggressive media; with 2-3% by volume -- cable products; with 5-7% by volume -- pellicular material; with 8-10% by volume -- special products.

Film based on an ethylene with propylene copolymer can be used as a high-strength, freeze-resistant and moistureproof material for packaging and storage, and as an electrical insulating material.

CEB, obtained by copolymerization of ethylene with a small quantity of alpha-butylene in complex metalloorganic catalysts, is a new plastic which possesses a number of valuable properties in comparison with high-density polyethylene. CEB is characterized by excellent strength figures and impact strength, as well as improved resistance to cracking (1,000) and freeze resistance. It approaches high-density polyethylene in strength and heat resistance, and low-density polyethylene in elasticity.

Products of CEB have less shrinkage and tendency to warp. This copolymer has excellent chemical stability and electrical figures, possesses improved flexibility and high resistance to cracking under omnidirectional load.

Poly-4-methylpentene-1 is a new representative of the polyolefins. Following are its distinguishing features: low density (0.83 g/cm^3); high transparency, uncharacteristic of polyolefins (90%). It is also the highest-melting and most heat-resisting of the industrially-produced polyolefins (melting point 240°C , Wick heat resistance 180°C). A high thermal stability makes it possible to utilize this material for products subjected to repeated sterilization. Poly-4-methylpentene-1 is temporarily stable close to the melting point, that is, above 200°C . Tensile strength is 300 kg/cm^2 , relative elongation -- 15%, and strength under impact loads is twice to three times that of conventional polyacrylic plastics. It possesses excellent dielectric figures across a broad range of temperatures and frequencies and is resistant to nonoxidizing aqueous solutions of mineral acids and alkalis as well as to certain organic products and oils.

Up to a temperature of 100°C its yield strength is $70\text{--}80 \text{ kg/cm}^2$, while above 100°C its yield strength exceeds that of polypropylene under the same conditions. It is less responsive to impact loads than other PO, but greater than conventional grades of PS and PMMA. Characteristic of poly-4-methylpentene-1 is a sharp relationship between melting viscosity, temperature and

shear stress. This material is recommended primarily for injection molding (at 270-285°C) and extrusion (at 250-270°C). Its shrinkage ratio is fairly high (3%). Poly-4-methylpentene-1 is of interest to the electrical equipment industry.

Sevilene is a product of combined polymerization of ethylene and vinyl acetate in bulk under high pressure. It is obtained by the high pressure method. Introduction of a vinyl acetate unit into a polyethylene molecule leads to disruption of the molecule's crystalline structure, resulting in a substantial change in the properties of the product. Sevilene surpasses polyethylene in transparency and elasticity at low temperatures. The polar character of the vinyl acetate group increases the adhesion of Sevilene to various materials.

The properties of Sevilene are determined chiefly by the vinyl acetate content (5-30% by weight). With an increase in the quantity of vinyl acetate there is a decrease in crystallinity, ultimate tensile stress, hardness, and heat resistance, while density, elasticity, transparency and adhesion increase. Sevilene is used to produce weatherproof transparent films possessing a lower melting point than polyethylene films.

The high adhesion properties of Sevilene and its good combinability with waxes makes it possible to employ it as a paper and cardboard coating for packaging materials. Utilized for this purpose is a copolymer with a vinyl acetate content of 21-30% by weight. An important area of utilization of Sevilene is preparation of glues which are widely employed in the printing and publishing, furniture, shoe and other industries. Sevilene's good cross-linking capability makes it possible to modify its properties and to obtain rigid and heat-resisting materials.

At the present time production is being started up on polymers which substantially broaden the variety of thermoplasts manufactured by Soviet industry. These include manufacture of polypropylene and propylene with ethylene block copolymer. Polypropylene will be produced by polymerization of propylene, and block copolymer of propylene with ethylene -- by sequential polymerization of propylene and ethylene in the presence of a complex metalloorganic catalyst in a solvent medium -- heptane. Plans call for producing 12 basic grades of polypropylene, meeting the requirements of principal customers in the USSR. Polypropylene and block-copolymer propylene with ethylene will be extensively employed in various branches of industry as structural, insulation, packaging and protective materials.

Manufacture of high-density polyethylene and its copolymers with propylene and alpha-butylene is scheduled to begin in 1978. There are to be produced 10 basic grades of material for the manufacture of various products, including pipe, sheets, monofilament, hollow products of various capacity, and consumer items. The materials will be distinguished, depending on grade, by heightened resistance to cracking and impact loads.

Of the polystyrene plastics, of the greatest interest are ABC/PBC compositions and sheet and pellicular materials based on them. Principal customers include

the automotive, aircraft and furniture industry. A decorative surface on the sheets makes it possible substantially to broaden the areas of application.

ABC/PVC film is manufactured on calender rolls of materials combining the best properties of ABC plastics and polyvinylchloride. It is produced by single and double-layer, in 600-640 mm wide rolls. ABC/PVC film is non-toxic, possesses a high degree of mechanical strength, is shape-stable, chemically stable, photostable, resistant to mildew, heat and freezing temperatures (-40+50°C). It is attractive in appearance, readily take dies of any color and shade, and its surface can be shiny or matte. Various patterns with deep embossing can be placed on the film.

ABC/PVC is processed into products by vacuum molding under the following conditions: under-screen heating temperature -- 160-170°C; distance from film to shield 20 cm, holding time under shield (for instrument panel) -- 15-20 sec. After molding the film is separated into layers and does not form cavities and bulges. It can also be processed by the pneumatic molding method.

Semirigid ABC/PVC film is employed for interior trim on automobiles, airplanes, helicopters, cabins on river and seagoing vessels, in the manufacture of furniture, briefcases, various haberdashery items, cases for electronic instruments, movie and still cameras.

Expanded polystyrene paper (sheet) is obtained by the extrusion method from PSB grade foaming polystyrene. It is used as heat insulation, radio equipment and packaging material, and is processed into products by the vacuum molding method. Text and colored illustrations can be printed on the sheet by methods employed in the printing industry. A new plant to produce polystyrene plastics is to go into production in 1978; it will include the manufacture of 800 tons per year of expanded polystyrene paper.

3024

CSO: 1821

KHIMVOLOKNO PLANT RECONSTRUCTION DISCUSSED

Moscow MATERIAL'NO-TEKHNIЧЕСКОYE SNABZHENIYE in Russian No 5, 1978 pp 72-75

[Article by S. Safronov, general director of the Barnaul Khimvolokno Production Association imeni Leninskiy Komsomol: "Barriers to Reconstruction"]

[Text] The reconstruction of industrial enterprises and their retooling are naturally linked to the demands of scientific and technical progress. The replacement and modernization of obsolete equipment permit an increase in the output of production, a heightening of its quality and a reduction of outlays on production with relatively small expenditures.

One can become convinced of this through the example of our production association, where almost all the basic production sections have been technically reequipped during the past 5 to 6 years. Hundreds of new machines and instruments have been installed in existing spaces in exchange for equipment which has gone out of operation. As a result, the output of synthetic fiber had grown in 1976 by 34.1 percent when compared with 1970, and that of artificial fiber, by 29.7 percent. For the first time during the past five-year plan, eight products were recommended for the State Seal of Quality, and during the first year of the current five-year plan the honorary pentagon appeared on yet another four products. The return on investment increased by 5.7 percent.

Or, let us look at how the economic planning indicators for kapron production, the largest in the association, changed. As a result of its reconstruction, the output of production increased by 1.85 times, labor productivity by 4 times, and return on investment by 16.4 percent. The annual profit reached 13 million rubles. In 1977 the turnover rate of rationed working capital was accelerated by 2.7 days (in comparison with

1976) and the number of people working on it decreased by 1,370. In this respect, it is appropriate to note that capital expenditures on the construction of the "big kapron" [plant] were recovered only after 7 years, while outlays on the first stage of reconstruction were recovered after 1.7 years.

In addition, under conditions of reconstruction, the production and economic ties which have developed with suppliers of materials, components and junctions as well as with consumers are preserved. In comparison with new construction, the period for putting production in operation is reduced through the utilization of already existing skilled personnel.

During this five-year plan there will be a continuation of the reconstruction of basic production lines: kapron (by virtue of which it has been planned to increase the output of synthetic fiber by 5,600 tons), rayon cord (which is being oriented toward the manufacture of new output--hay-winding twine, the output of which must reach 16,000 tons a year by the end of the five-year plan), staple (where the manufacture of high-module rayon fiber will be put in smooth working order), as well as of the chemical and acid shops and the ShA-20-I staple units (their productivity will increase from 30 to 40 tons per day).

The acceleration of scientific and technical progress is promoted above all by the retooling of existing enterprises and the replacement of obsolete equipment with new, more perfect equipment, which is, consequently, more productive. The operation of old machines which have outlived their time inflicts huge material losses on the enterprise owing to the growth of expenditures of monetary assets on current and capital repairs, as well as owing to equipment standing idle. Having purposefully utilized the basic part of capital investments (55 percent) on the replacement of the active part of producer goods, we have reduced the expenditure on capital repairs of equipment on an average of 6 to 10 percent, while savings as a whole consisted of several hundred thousand rubles.

According to calculations by the Institute of Economics of the USSR Academy of Sciences, each percentage of increase in the relative share of equipment in capital investments yields, as it were, a "free" increase in the production of output on a nationwide scale from that same volume of producer goods of approximately one billion rubles.

As is commonly known, optimization of the industrial structure is one of the basic ways to increase the effectiveness of capital investments. And here the relative share of material expenditures on the acquisition of new equipment occupies, as

before, a significant proportion in the current five-year plan. Thus, of the 14.2 million rubles released for the reconstruction of kapron production, 68.3 percent consists of expenditures on equipment. Other production complexes will also be reconstructed in an analogous manner.

Reconstruction is an important and serious period in the work of an enterprise, when the output of finished products, their shipment to consumers according to schedules that have been agreed upon, and the receipt of the necessary raw materials and materials are carried out alongside the execution of a series of organizational and technical measures. This is why the implementation within strictly set time limits of all the measures that have been planned is of decisive significance at such a time. Unfortunately, however, one does not always succeed in achieving this in practice.

I shall cite several examples. The installation of receiving tables, floatation [flotator] and refloatation [perflotator] devices, was envisaged by a plan for the reconstruction of rayon cord production, which is being transferred to the output of agricultural braid. Owing to a breakdown in their supply, they did not succeed in doing the installation work on time. The Ivanovo Tekstil'mash [Textile Machinery] Plant, which previously produced this equipment, is turning out other production. Now floatation and refloatation devices are being manufactured by the Balakovo Spare Parts Plant, which is sending us individual components of the necessary equipment in incomplete condition. We have to bring them up to condition ourselves. Such a practice leads to semi-primitive production methods, an increase in the cost of work and a breakdown in the deadlines for reconstruction.

At one time five floatation devices for staple production were manufactured as an exception by the Kiev Experimental Shops. But inasmuch as these shops were not adapted for series output of production, the people from Kiev refused to supply floatation devices. Meanwhile, they were extremely necessary for our production. Their application, which had been envisaged by the manufacturing process, was economically advisable. It is sufficient to say that the five existing floatation units on staple production permit one to save 215,000 rubles annually through a reduction in the input of sulfuric acid and zinc sulfate.

Yet another example. Reconstruction of kapron production calls for replacement of more than 280 units of obsolete, and to a large part, imported equipment. Instead, it has been planned to install highly efficient, rapid domestic devices with large individual capacity, one-process torsion machines, shuttleless looms, etc.

As early as the first year of the 10th Five-Year Plan, an installation for the continuous extraction and drying of polycapromid /nylon-6/ with a productivity of 40 tons/day, which permitted a reduction in losses of raw material, a decrease in power costs and in the number of workers and permitted one to begin installation of new equipment in the spaces which had been freed, was installed and is in operation at the association in place of 16 previously installed extractors and dryers with a total productivity of 20-22 tons/day.

In that same year the introduction of the new one-process KOE-315-IK machines began in kapron production for the first time in the industry. During the 3 years of the five-year plan, plans have been made to introduce 60 such machines. As a result, 265 basic and auxiliary workers will be relieved and labor productivity and the quality of the fiber will be substantially increased. In a word, the machines are worth it and they are of long-term significance. Meanwhile, the Orel Khimtekstil'mash /Chemical Textile Machinery/ Plant is slowly eliminating the shortcomings which have been observed in the construction of the machines. The construction of thread-tightening strands and of torsion heads is incomplete, the counters of the length of the thread have not been completed, the sensors for control over the breaking of thread do not operate reliably, etc.

Miscalculations in the planning and coordination of work on the output of new equipment are creating artificial obstacles in the process of carrying out reconstruction. At one time a plan was drafted for an automated installation for the filtration of rayon. However, the Ministry of the Chemical Industry has still not as of this time determined which plant is to manufacture it. And, as a result, the introduction of the installation has been delayed 2 years. As a result, considerable financial losses. Roughly the same unenviable fate also befell the automated installation for the filtration of rayon on frame filters with an alluvial layer. Unfortunately, such examples are not unique.

The Novosibirsk Sibtekstil'mash /Siberian Textile Machinery/ Plant is turning out the STB-2-175 shuttleless loom for light industry. We rebuilt two of these looms in order to utilize them for the manufacture of cord, after which their productivity doubled in comparison with the AT-175-K looms now being utilized. Cord kapron and rayon fabrics produced on the new loom went through testing at the Dnepropetrovsk Tire Plant and have received a positive evaluation. The Soyuzshina /Union Tire/ All-Union Association and the All-Union Scientific Research Institute of the Tire Industry acknowledged it. But the Ministry of the Chemical Industry again did not settle the question of the output of the new modernized looms.

Other difficulties are also frequently encountered on the path to the successful execution of reconstruction. When the question arose about increasing production capacities in the section for the pre-maturation of alkali pulp in Chemical Shop No 2, we decided to imitate the experience of the Kiev Khimvolokno Production Association, where the APL-240 installations successfully passed through testing and are now in operation. Unfortunately, however, we did not succeed in receiving these installations, since their series production has not been put into smooth working order as of this time.

Serious hindrances in carrying out reconstruction are being created by the organizations that put together the full assortment of supplies in the allocation of resources for shut-off accessories, cable production and instruments.

The reconstruction of production, the incorporation of new equipment, the making of new types of production operational and the heightening of its quality depend to a large extent on the widespread introduction into use of the newest means for measurement, verification and automation, as well as on the replacement of obsolete brands of monitoring and testing instruments. At the present time, there number in the association more than 4,000 obsolete and physically outdated instruments turned out between 1956 and 1960. Among them are 1,250 automatic axles, potentiometers and flow meters, whose replacement is of extreme necessity. The fact of the matter is that these instruments operate in aggressive media: the vapors from carbon bisulfide, hydrogen sulfide, ammonia, acids, alkalis, etc. and that is why they do not withstand even the warranty period for operation (6 to 8 years). And industry is not turning out the spare parts for them.

Supervisory organizations have more than once pointed out to us in formal documents and instructions the fact that we are not provided with measuring equipment. However, we are not able to implement these instructions, inasmuch as the supply organizations are doing an extremely unsatisfactory job of providing us with instruments.

Over the course of 4 years the association has been carrying on a correspondence on this matter with the Administration of Materials and Equipment Supply of the Kuznetsk Coal Basin region, the Administration for the Supply of Complete Sets of Equipment to Enterprises under Construction and Reconstruction of the Gosplan USSR, the Soyuzglavpribor [All-Union Main Administration for Instrument Building] of the Gosplan USSR, the Ministry of Instrument Building and the Ministry of the Chemical Industry. But, as they say, there's a heap of them over there.

They fail to give us more than 20 instruments a year. At such a rate for supplying complete sets of equipment, the association would require 50 to 60 years for the replacement of obsolete equipment and the installation of new equipment! Such a practice in no way fits in well with the task of accelerating scientific-technical progress.

The Soyuzkhimvolokno [All-Union Chemical Fibers] Production Association is doing an unsatisfactory job of settling questions concerning the supply of equipment for operational needs and rather frequently does not fill orders for shut-off accessories, pumps, winding wire, metal-processing machine tools, materials handling equipment and other equipment. All this leads to an increase in the downtime of machines and the cost of repairs and delays the mechanization of labor-intensive processes.

The Administration of Materials and Equipment Supply of the Kuznetsk Coal Basin region is not fully taking into consideration our demand for lighting, electrical accessories and low-voltage electrical equipment for repair and operational needs.

The base of the Kuznetsk Coal Basin Administration for the Supply of Complete Sets of Equipment often sends shut-off accessories with missing and damaged junctions and components. There have been instances where the invoice is written out for one piece of equipment, but an entirely different one arrives.

The time has come to increase the responsibility of territorial organs for the sale of resources allocated to an enterprise in full compliance with the contracts for delivery.

Shortcomings in the organization of material and technical supply as well as the slow settlement of questions relating to series production and to the introduction of new equipment drag out the periods of time for reconstruction and force plant suppliers to take recourse to searches for "non-liquid" objects at other enterprises, which has entailed excess expenditures of time and monetary resources. In addition, the need can no longer be put off for centralized provisioning of projects being erected independently by enterprises, inasmuch as the volume of such construction is increasing from year to year.

The development of the chemical fibers industry in Western Siberia is putting the question of the construction in this region of a specialized plant for the manufacture of new chemical equipment on the agenda, which, unquestionably, would have a positive effect on the outfitting with full sets of equipment of projects that are being newly built as well as those that are being rebuilt.

And there is yet another important problem on which one must dwell. As is known, the 25th party congress set forth the task of reducing the duration of construction of enterprises, accelerating the process of making capacities that are being put into operation operational and of reducing the volume of incomplete construction to the normative number of projects in progress. A reduction in the periods of time for putting projects into operation provides an opportunity, all other conditions being equal, to increase the production of output more intensively and to satisfy more fully the requirements of the national economy.

During the current five-year plan our association must receive a large increment in its output by virtue of putting the capacities of the synthetic fiber plant that is under construction into operation. The first section of the plant with a capacity of 25 tons a year must go into operation at the end of 1978. However, the rates of construction leave much to be desired. Not only contracting construction organizations, but also supply organizations engaged in questions of outfitting plants with complete sets of equipment are guilty in this respect. For instance, the Soyuzglavkhimkomplekt [Main Administration for Ensuring the Supply of Complete Sets of Equipment, Instruments, Cables, and Other Products for High-Priority Construction Projects of the Chemical and Pulp and Paper Industries], which regularly takes our orders for the necessary equipment, does not always fill them. Thus, of the 9 ANP-10-EM installations ordered, not one has yet been received. Of the hundreds of pieces of required equipment, only three units have been allocated. In compliance with the technical specifications for planning for 1977, we were to have received 100 pumps, but the job authorization came through for only one (?!). At the present time there are no accessories with large diameters, which are extremely necessary for the construction of trunk systems. Few high-pressure accessories for the nitrogen-oxygen [nitric oxide] shop are coming in, and, likewise, there are few industrial accessories for the water supply, heating layout and other distribution lines. A plant newly under construction requires several dozen units of materials handling equipment; however, we have received in all one stacking crane.

Stacking (baling) equipment was to have been installed at the plant under construction in 1977; however, by the middle of the year the Soyuzglavkomplektavtomatika [Main Administration for Ensuring the Supply of Complete Sets of Automated Equipment] had not delivered one instrument.

I would like also to touch on another such question. As a rule, a plan for construction and installation work is drafted for

each year and, in compliance with it, orders are drawn up to Soyuzglavkhimkomplekt for equipment. However, 4-5 months have passed and the customer knows nothing about the fate of the orders. Then, when the time comes to refine the protocol for the process of outfitting the plant with a complete set of equipment, it turns out that the Soyuzglavkhimkomplekt had substantially cut back the orders or changed them. As a result, the schedule for construction and installation work breaks down, which entails material costs.

Sometimes the Soyuzglavkhimkomplekt replaces cable production at its own discretion without taking its cost into account, proceeding only on the basis of technical descriptions. The increase in cost is, as a rule, not provided for in the manufacturing instructions estimates, which creates difficulties in the relations between clients and contracting construction organizations.

There are also other cases of dereliction. The plant under construction requires 12 conditioners with a productivity of 250,000 cu. meters/hr. Six conditioners were delivered in a complete set. Then a discrepancy turned up concerning the other six, since the supplier plant had now made the transition to new specifications for the output of production. The new construction project now lacks half of the required conditioners, although the substructures under the mountings have long been ready.

Putting enterprises under construction and reconstruction into operation as rapidly as possible and reducing the periods of time for construction depend to a large extent on promptly and fully supplying them with all types of equipment and materials. This problem can be solved only with the joint efforts of the organizations that plan, the organizations that outfit enterprises with complete sets of equipment, and those that market it.

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PHOSPHORUS SUPPLY FOR SIBERIA

Moscow PRAVDA in Russian 23 Jun 78 p 2

[Article by V. Boldyrev, director of the Institute of Physical-Chemical Principles of Processing of Mineral Raw Materials of the Siberian Department of the USSR Academy of Sciences: "Phosphorus for the Fields of Siberia"]

[Text] The problem of providing phosphorus fertilizers is one of the most complex for Western Siberia. The shortage of phosphorus in the region's agriculture is about 60 percent. Still more complex is the situation in Eastern Siberia, where soils that are poor in this element are encountered more often. In the Far East economic region, 82.9 percent of all the fields are noted for a low and very low content of it.

Production of the corresponding fertilizers has still not been set up in Siberia, however. The nearest source of them are enterprises in Dzhambul, Chimkent and Almalyk, operating by using the phosphorites of the Karatau basin. True, construction is planned in Siberia of the Zima Electrochemical and Zabaykalsk Chemical Combines. Even when they go into operation and begin to produce superphosphate, however, there will still be a shortage of phosphorus.

At the same time, the perspectives for the development of a raw materials base for the production of phosphorus fertilizers in our country is in many ways connected with Siberia and the Far East. Beyond the Urals are many untouched deposits of phosphorites and apatites. Their development is being held back either by the fact that the traditional industrial methods for processing are inapplicable for this raw material, or because some deposits do not ensure the conditions for profitable chemical production.

Therefore, studies for the purpose of designing industrial systems and methods, new in principle, for processing various forms and types of phosphorus raw material in a form soluble in soil acids are very urgent.

Such studies have been made in our institute for a large number of domestic phosphorites and apatites. The ore is processed in a mechanochemical activator---a special apparatus, creating stresses, deformations and defects

in the crystals of hard substances. At the same time, a strong, in most cases even multiple, increase is taking place with respect to the proportion of phosphorus assimilated. The ore processed in this way may retain its active quality for a long time.

The results of these studies make it possible to think about a new, reagentless way to obtain phosphorus fertilizers. It will help to avoid the sizeable consumption of scarce sulfuric acid, and to process apatites, inactive under ordinary conditions, without chemical and thermal conversion. The advantages of this method are its simplicity and speed, since the maturation of the superphosphate during the acid processing is eliminated. The possibility appears of setting up mobile units and working small-resource beds of good phosphorus ores, of which there are so many in Siberia.

Our colleagues on this subject--the associates of the Institute of Chemization of the Siberian Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin and the Primorskiy Institute of Agriculture--have made a series of vegetation tests using various crops (wheat, oats, peas, barley and Amur soy). Mechanically activated apatites and phosphorites from various deposits in Western and Eastern Siberia were used as fertilizers. It turned out that they are often no less efficient than superphosphate. Agrochemists discovered that the year after applying the fertilizer its action was retained, and sometimes even intensified.

These studies are being made, together with Soviet scientists, by the associates of the Central Institute of Physical Chemistry of the GDR Academy of Sciences. We make our efforts in close cooperation and complement each other. A detailed plan for scientific-technical collaboration was recently adopted. Its implementation is in the interests of science and production for both countries and for the entire socialist community. Ultimately the combined work of the specialists from Siberia and the German Democratic Republic is called upon to alleviate the "phosphorus famine," from which many fields on the earth are suffering.

It is still too early to speak of all the potentials of the method: studies in this direction are continuing and have only recently ceased to be of a seeking nature. There is still a great deal to be done. There are plans to develop fundamental research on the relation between the reactive ability of crystalline apatite and phosphorite and the nature of the violation of the structure in mechanical deformation. Mechanochemical equipment must be designed that is suitable for industry. Agrochemists are continuing tests on plants, in order to determine which crops and soils respond best to the application of activated phosphates.

It is already clear, however, that the work not only presents an example of successful use of solid state chemistry in solving important applied problems, but also serves as an example of fruitful collaboration between scientists with different specialties and from different countries in the course of socialist economic integration.

RUBBER PRODUCTS PLANT LAGS BEHIND--INSUFFICIENT SPECIALIZATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 24, Jun 78 p 14

[Article by V. Grigor'yev, director of the Kazan Industrial Rubber Products Plant, and F. Nakipov, deputy director for production: "Specialization Must Be Intensified"]

[Text] Enterprises of our specialty are called upon to satisfy the needs of various sectors of the national economy for an important type of product such as industrial rubber products (RTI). The demand for them made by the enterprises of various sectors of industry grows every year. The smooth work flow of such important sectors as motor vehicle, tractor and agricultural machine building in many ways depends on the supplies of our products. It is important to our buyers that each type of item ordered appear on the assembly conveyor on schedule. It is clear that under these conditions a special responsibility is imposed on us for smoothly flowing fulfillment of the supplies in a widely developed assortment.

Unfortunately, however, we still cannot boast of ideal completeness and smooth flow of supplies. At our plant the average level of plan fulfillment for example, for molded items in a developed assortment, has been fluctuating in the last few years in a range of 95-96 percent.

Can this indicator be improved? Of course, the ways to a solution to this problem lie mainly through improving the use of the production capital and improving production organization. One of the reasons for the still unsatisfactory fulfillment of the plan for supplies, characteristic, by the way, not only of our plant, but also of other enterprises with our specialty, is insufficiently thought-out specialization.

A considerable part of the output of the RTI enterprises under the jurisdiction of the Soyuzrezinotekhnika Industrial Association is made up of the so-called molded items. There are over 60,000 descriptions and type-sizes of them.

Today our plant manufactures items made of rubber sheets in 400 different modifications. They differ with respect to the type and purpose, degree of

hardness and gage. About 20 more plants in the Soyuzrezinotekhnika All-Union Production Association produce almost the same list of items. In all, 35 plants supply nonvulcanized rubber, and each of them should strictly adhere to the assortment, estimated as hundreds of items, duplicated at the other enterprises.

I would like to mention one more point. The series in which many type-sizes of molded items are produced are so small that it does not take a full enough shift to fulfill the monthly production plan. It is disadvantageous to produce such items on highly productive equipment of the automatic molding type. Just replacing the press-molds and readjusting the mechanisms takes more time than to fulfill an entire monthly plan. Therefore, it is not by chance that labor productivity at the molding equipment shop at our plant, for example, is more than eight-fold lower than at the gluing and sealing shop and three-fold lower than at the hose shops.

Just where can we see a way out of the complicated situation? In carrying out well thought-out, consistent intrasectorial specialization.

In our opinion, Soyuzrezinotekhnika needs to revise the procedure for allocating items or groups of items for the supplier plants, to eliminate duplication, and on this basis to reduce the assortment and enlarge the series. With a view to more efficient use of the production capacities and a rise in the workers' labor productivity, the production of molded items should be redistributed in consideration of the possibility of manufacturing the same type of product using specialized equipment.

In parallel manner, intensive work should be done to unify and standardize the industrial rubber products, with a reduction, within reasonable limits, of the type-sizes used.

It is already necessary to restrict sharply the production of parts made in accordance with individual designs when there are standard items that satisfy the requirements imposed.

The system of planning the production of molded items also needs improving. The plan, established in tons, is an inducement to increase the output of the "weightier" items, that is, to the detriment of fulfilling the assortment. Planning the output volumes in monetary terms, with the prices established in consideration of the labor-intensiveness of the item will contribute to more even fulfillment of the plan in the assortment, and thus, to the smooth flow of fulfilling the contractual commitments.

12151
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RUZAYEVKA WORKERS TURN OUT SET-COMPLETE CHEMICAL PROCESS UNITS

Moscow PRAVDA in Russian 13 May 78 p 1

[Article by K. Kuznetsov, correspondent of the press center, USSR Ministry of Chemical and Petroleum Machine Building: "Only as Complete Units--All Orders on Time!"]

[Text] Not long ago the CC CPSU endorsed the initiative of collectives at construction, installation and design organizations in the production of mineral fertilizers and chemical equipment. They decided this year to stir up the socialist competition for accelerated start-up and mastery of capacities in the fertilizer industry and chemical machine building and the output of above-plan product. Named among the competition initiators is the collective at the Ruzayevka Chemical Machine Building Plant.

This plant ships its product not just to the operating enterprises and the new construction sites of our country, but to many foreign firms, too. It specializes in making nonstandard equipment for mineral fertilizer shops. Some units are being built here for the first time. Numbered among the customers of the Ruzayevka workers are the pacesetters of the chemical industry--like the Voskresensk, Gorlovka, Dneprodzerzhinsk and Dorogobuzh production associations.

Since the first few days of this year competition at the plant has been stirred up under the slogan "Workers' Relay-Race." Special attention was given to the orders from mineral fertilizer enterprises; a delivery schedule was set up for shipping equipment to users.

"A vital feature of what our collective is doing," said plant director Yu. Surdolenko, "is that we deliver units complete. What I mean is that we take it on ourselves to get many assemblies and equipment components from other enterprises, then ship out to the customer then and there everywhere in the complete package. All he has left to do is install everything on

the site, not in the least concerned over whether the remaining suppliers (and they can be numbered in the many dozens) ship in their products on time. In the collective competition is going on to fill all orders only on schedule. This is no easy matter, considering the added commitments on the set-completion of deliveries.

Mention must be made of the fact that the organization of set-complete shipments of equipment is the focus of special concern at the ministry and all production collectives in chemical and petroleum machine building. This mode of delivery helps increase product output, expand product lines of machines and equipment and lift product quality. Precisely owing to the new methods the machine builders are operating under, the Sumy Khimprom Association, for example, was able to start up ammophos production five months ahead of the schedule; this helped in obtaining more than 200,000 tons of mineral fertilizers above and beyond the year's target.

Ruzayevka workers must in the first half of this year ship 370 units of equipment and apparatus to 52 enterprises that make mineral fertilizers. Forty-two of these enterprises have already been shipped complete sets of necessary machines, specifically, the Aktyubinsk Chemical Plant, the Gaurdak Sulfur Combine and the Novo-Dzhambul Phosphorus Plant, as well as the Kemerovo Azot Production Association.

The form of labor organization such as integrated brigades is promoting the buildup of the competition for more efficient performance.

"Working on a complete order," said boiler operators brigade leader N. Bochkarev, "does a lot to make each participant more responsible for the job he is charged with and makes each more personally interested in the end results of their common efforts. Material incentives are reinforced with moral incentives. The "labor fame torch" is lit in honor of the best brigades; the labor results of the front-rank workers are displayed widely on the 'socialist competition screen.'"

Machine builders are completing their mastery of the new building, equipped with modern process installations; they are putting in a mechanized flow line for making containers intended for shipping and storing liquid chlorine and they are mastering the section where titanium products are made. Much is being undertaken for more gains in product quality.

"How effective competing under the 'Workers' Relay-Race' principle is," remarked the deputy secretary of the party committee, V. Kotlov, "depends on how smooth-working and responsible all the competition participants are. The results of our plant's work could have been better if the Karaganda Combine and the Cherepovets Metallurgical Plant had shipped in the rolled stock more on time. Let me use this occasion to send a request through PRAVDA to the party organizations of these enterprises to put our orders on a monitoring basis."

This year the Ruzayevka Plant will raise its output by about one-fifth. As before it will compete for the delivery of all products exactly on schedule, strictly on time.

ABOVE-PLAN PRODUCTION OF CHEMICAL FERTILIZER

Kiev PRAVDA UKRAINY in Russian 4 Mar 78 p 2

[Unattributed article: "Chemists hold the word"]

[Text] March has come into its own--on settling, the snow darkened; brooklets began trickling. Workers of the soil wait for the fine spring days--planting time draws near.

The farmers are receiving a great deal of help from the republic's chemical workers. This year they decided to produce nearly 230,000 tons of chemical fertilizer more than the plan calls for, much of it in the early part of the year. We note that they are as good as their word: just in January and February the enterprises under the Ministry of the Chemical Industry shipped an extra 66,000 tons of fertilizer to the farms of the republic.

In February all enterprises performed fairly well. Highest results were recorded by Rovno chemical workers--in February they produced 17,971 tons of chemical fertilizer more than the plan target. Production of more than 8,000 tons is to the credit of both Sumy workers and the initiators of the completion for extra amounts of farmland vitamins--the collective at the Severodonetsk Azot Association.

From the results of two months of the completion of the chemical workers, out in front are the workers at the Sumy Khimprom Association, by producing 14,200 tons of output most necessary to the countryside. A modest plus was scored by Rovno workers--167 tons: in fact, in January the collective of the Rovno Azot Association fell through on meeting the plan for the production of ammonia and nitrogen and complex fertilizers. That is why they must now make up for lost time.

Let us give special place to the grains at the Konstantinovka Chemical and the Stebnik Potassium plants, the Krymskiy Titanium Dioxide Plant and the Gorlovka Stirol Association.

Other enterprises, too, could have made a better contribution. But, again, the railroad workers are dragging their heels. Rail cars are supplied erratically, with delays, at the stations of the Donetskaya, Pridneprovskaya and Odessko-Kishinevskaya railroads. The directors of these trunk lines must prove, in short order, the reasons for the miserable supply of rolling stock to the enterprises under the Ministry of the Chemical Industry. The resolution of the CC CPSU and the USSR Council of Ministers, "On Additional Measures for Preparation and Carrying Out of Spring Field Work in 1978," emphasizes that when it comes to freight for the countryside, including chemical fertilizer, the railroads are obligated to furnish rail cars at top priority.

"Now about 35,000 tons of fertilizer has been piled up at warehouses," said V.V. Snizhko, chief engineer, Konstantinovka Chemical Plant. "The fertilizer is very much in demand by our grain farmers these days. But there is no way to carry it out. Not a single enclosed car was available the morning of 2 March."

Things are not going at all smoothly with apatite shipments. If this problem is not cleared up in the immediate future, the enterprises in Sumy, Konstantinovka and Vinnitsy will fall under a threat of production curtailment.

As in the past, the coal-tar chemical workers are undermining the Gorlovka workers. The Yasinovka and Gorlovka Coal-Tar Chemical plants underproduced in February some six million cubic meters of gas. Cooking gas poor in quality is coming from Avdeyevka. The result is that production capacities often stand idle for entire shifts. And this means that agriculture is shortchanged the granules of fertility.

Europe's biggest sulfuric acid shop went into service at the Rozdol Sera Production Association. Already it has produced the first thousands of tons of product. This enabled the association chemical workers to over-fulfill February's target in sulfuric acid production by 3400 tons.

Not much time at all remains before the start of spring fieldwork. And it is essential to try to use all opportunities for the farm fields to get as much of the vitamins of fertility as possible.

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MINERAL FERTILIZER CONSTRUCTION PROJECT DELAY

Kiev PRAVDA UKRAINY in Russian 14 Jun 78 p 1

[Article: "Dzhambulkhimstroy and Kemerovokhimstroy"]

[Text] Mineral fertilizer construction projects are now being paid particular attention. They are under constant supervision and there is priority concern for them. It would seem that the construction workers should respond to this attitude toward them only with highly productive work. Many contractors do just this. But not all of them.

This year, at the Kemerovo Azot Production Association, large production facilities for ammonium nitrate and dilute nitric acid, plus the ammonia production capacity carried over from last year's plan, should be put into operation. Some 17.7 million rubles must be utilized at these projects before the end of the year. The impression is, however, that the general contractor--Kemerovokhimstroy (director, I. Mol'nikas)--is staking everything on having all hands at work. In four months, at the ammonium nitrate and dilute nitric acid complexes, respectively 17 and 10 percent of the year's program has been fulfilled.

The situation at the ammonia production facilities, at first glance, is better: the assignment is fulfilled by 51 percent. After all, though, the time for turning over is here--the end of the second quarter.

Things are going even worse on the construction of the sulfuric acid production facilities at the Dzhambul' Superphosphate Plant. The large capacity (yearly program for the construction workers--over 21 million rubles) should be put into operation in the fourth quarter of this year. But will it be? The grounds for apprehension are more than serious. On the calendar it is already the middle of May, and it is time for the Dzhambulkhimstroy General Contracting Trust (director, V. Shalepo) to prepare to emerge at the finish line, but the construction workers are still fiddling about at the start: in four months, they have fulfilled 6 percent of the year's program.

It would interest the readers to find out how comrades I. Mol'nikas and V. Shalepo intend to get their collectives out of this serious debacle. No less important is what they think about it at the USSR Ministry of Construction of Heavy Industry Enterprises.

BRIEFS

BEREZNIKI POTASSIUM PLANT--Principal work in sinking the first and third mineshafts drew to an end in the construction of the Fourth Berezniki Potassium Plant--the country's biggest potassium fertilizer plant. Now builders have temporarily transferred the structures to the customer for building up the subsurface department. The subsurface department with tens of machines, many-kilometer-long network of workings and rail lines is referred to as horizons. Discovering these subsurface horizons is no easy business in the Northern Urals. Soils in Verkhnyaya Kama are complex. Water inflow underground is 700 or more cubic meters an hour. "Round each bore 36 wells are being drilled to 260 meters," said D. Sidorenko, section chief of the Berezniki Administration of the Shakhtospetsstroy Trust. "Calcium chloride slurry is pumped through them and it is frozen at minus 40 degrees. The bore sort of stiffens together and then shaft sinking can start." Shaft builders of the brigade led by communist party member S. Mendel' concluded building up the channel of the first shaft bore in 35 days: two months had been allowed for this operation based on calculations. The bores are concreted with a four-meter-high metal jacket, hung from cables. Part of the shaft is sunk; it is stabilized with a half-meter-thick concrete wall. But this is not the end. Cast-iron tubing is installed, then the same kind of concrete wall is built up. Sometimes it happens that after the shaft has been frozen, when hot steam is pumped into the shaft the reinforcement leaks. "Hole's dripping," is how the miners call it. To keep the moisture out of the mine, S. Mendel's brigade insulated with polymeric film. Vas. Pankratov (correspondent). [Text] [Moscow STROITEL'NAYA GAZETA in Russian 28 Apr 78 p 1] 10123

PHOSPHORS AT KONSTANTINOVKA--Konstantinovka, Donetskaya Oblast--The production line making barium phosphate began moving at the Konstantinovka Chemical Plant imeni XXV s"yezda KPSU. This intermediate product goes into making phosphors--glowing paints for the printing, textile and other industries. The first batch of the new product was sent to the Stavropol' Plant of Chemical Reagents and Phosphors. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Mar 78 p 1] 10123

GLASS FIBER-RESIN PIPE--Voroshilovgradskaya Oblast--The Severodonetsk Steklo-plastik Production Association mastered the manufacture of specialized pipes for the chemical industry--made of glass fiber and chemical resin. The experimental unit for making 400 and 600 mm diameter pipe was installed by staff members from the Kiev branch of the Moscow All-Union Scientific Research Institute of Glass Fiber. Ten chemical enterprises in the country are sent the Severodonetsk workers' product. The pipes function in the most corrosive environments. Acids and gases can be passed through the pipes. Their resistance is triple the value for metal pipes. Manufacturing the "arteries" from glass fiber saves 50-60 tons of stainless steel over just a single kilometer of routing. "Already we have gotten a good number of favorable responses about the high functional qualities of the pipe," said N. G. Nesterov, acting association director. "But the pipes are efficient not only because of their strength and resistance--they are much lighter to install--one meter of glass fiber pipe is 50 kilograms lighter than steel pipe. True, our product cost is high right now--the chemical resins are somewhat steep in price. But we'll take care of this problem, too, in the future." A. Zharkikh, PRAVDA UKRAINY correspondent. [Text] [Kiev PRAVDA UKRAINY in Russian 18 May 78 p 1] 10123

NEW ODESSA CHEMICAL PLANT--One can count the days remaining to the launching of the first section of the Odessa Port Plant being constructed at Grigor'yevka. On 1 July the liquid ammonia shipment complex should begin work. Day and night, the rhythm of this important construction project for the Tenth Five-Year Plan remains unabated. Here is happy news--the air division shop obtained the first nitrogen, which is necessary for scavenging the pipelines of the complex for shipping liquid ammonia and superphosphoric acid. The construction workers of the Odeskhimstroy SMU-1 Trust, the installation workers of the start-up and adjustment administration No 233 of the Zaporozhmetallurgmontazh Trust and the collective of electricians headed by chief power engineer of the shop, V. Kamenetskiy, made a considerable contribution to this great labor victory. The first shop included in the huge complex for the production and shipping of ammonia has begun operation. [Text] [Kiev PRAVDA UKRAINY in Russian 14 Jun 78 p 1] 12151

NEW LIQUID AMMONIA COMPLEX--Gorlovka--Having almost doubly outstripped the normative schedule, the brigade of L. Arabskiy completed the installation of the industrial equipment at the main scaffold of a new complex to produce liquid ammonia, being constructed at the Gorlovka Stirol Association. The construction workers at the complex made wide use of the method of consolidated assembly and combined installation of the structures of the buildings and equipment. Now the baton is being taken up by the operations workers, who have begun the start-up and adjustment work. The new complex, the first section of which is slated to be turned over for operation by the end of June, will produce 900,000 tons of liquid ammonia a year, necessary to produce nitrogen fertilizers. A considerable part of the output of the new complex will enter the ammonia pipeline that is being laid from Tol'yatti to the Grigor'yevka Port Plant near Odessa. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Jun 78 p 1] 12151

GIANT NEW CHEMICAL PLANT--On the left bank of the Tom', in the vicinity of Kemerovo, construction of the Ammiak-2 Complex is being completed. The new, highly mechanized chemical giant should yield 410,000 tons of ammonia a year, from which the chemists of the Azot Production Association will be able to obtain 1.5 million tons of mineral fertilizers. In the photograph: assembly of the industrial equipment for the Ammiak-2 complex [Photo not reproduced]. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 May 78 p 2] 12151

MACHINES DRAWN FROM MARKET--Numerous advertisements have appeared for automatic wrapping units for pulp and paper machines produced by the Verkhnedneprovsk Paper-Making Plant (director, V. Tyutyunik) of the Ministry of Chemical and Petroleum Machine Building. After the routine test, the associates of Gosnadzor prohibited further supply of the items to consumers because of serious violations of the requirements of the normative-technical documentation. The designs of the automatic units and their quality in manufacture were of a low technical level. Economic sanctions were charged against the enterprise; the sum of the output sold was reduced by 80,000 rubles. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 24, Jun 78 p 15] 12151

CSO: 1821

ELECTRONIC AND PRECISION EQUIPMENT

BUREAUCRATIC NEGLECT BLAMED FOR LACK OF MOTORS FOR AUTOMATION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Mar 78 p 2

[Article by G. Spynu, doctor of technical sciences, O. Kudryavtsev, candidate in technical sciences, and O. Pozdnyakov, candidate in technical sciences:
"Who Insulted the Robot?"]

[Text] The technical progress of the most important industries of the national economy is determined above all by the level of development of automation systems. There is no need to convince anyone of this. The level of automation systems themselves and of computer equipment depends to a great deal on the dynamic properties of actuating motors. In order for automation systems to meet ever increasing requirements, motors must be replaced every five to seven years.

Meanwhile, the "SL," "MI," and "SD" motors and those like them produced for these purposes were developed about 30 (!) years ago. Therefore, their technical and economic characteristics cannot satisfy anyone today. To make them the foundation of plans for newly developed systems is extremely disadvantageous, for yesteryear's technical level was based on this kind of automatics. This is why we consider the problem of creating and producing actuating motors with high dynamic characteristics important for the country's national economy.

But it is being solved today not on a statewide, but on a narrow departmental basis. Some organizations, resigning themselves to the current situation, are using outdated motors; others are buying motors abroad; still others are developing, designing and producing their own motors for themselves, which are by no means of the highest quality; a fourth group has taken the technical documentation which has been developed by the Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] Kiev Scientific Research Institute of Automatic Apparatus and is making motors itself, but again each his own.

It must be said that the team of one of the laboratories of this institute has created the most effective motors for automation systems of the "MIG-DT" type and for "MIG-PK" and "MIG-PR" computer equipment.

For example, "MIG-DT" type 40- to 550-watt motors are characterized by high dynamic indicators and have built-in velocity gauges (tachogenerators), which is very important for operation in rapid-response and precision automation systems. These motors match the best models in the world. They have been received with high esteem by interdepartmental commissions and have been recommended for series production at enterprises of Minelektrotekhprom [Ministry of the Electrical Equipment Industry]. But after these motors were approved and recommended for series production at plants of Minelektrotekhprom there was no hurry to introduce them. Moreover the recommendation was interpreted, one might say, as an unobliging desire. This attitude on the part of Minelektrotekhprom forced directors from six Union ministries to turn to V. Nellin, deputy minister of the electrical equipment industry, with the request that a solution nonetheless be found to the problem of introducing "MIG-DT" type motors into series production.

Comrade Nellin sent them all negative replies. His refusal was motivated by the fact that the production scale is low. And in conclusion the deputy minister advised each department producing robots and automation systems to make motors, too.

Is the production scale really low? Well, no. The annual demand of industries in the current five-year plan period is 5000 to 10,000 motors. In the next it will probably be 20,000 to 30,000. As is obvious, the demand is high enough. And this means that the main reason for the refusal does not lie in the low production scale.

It is advantageous for the ministry to adopt machines with high power per unit (not 40 W to 550 W, but hundreds of kilowatts), since with them it receives money for capital investment. It has psychological and tangible incentives for them.

There is more to it. It is not of advantage to Minelektrotekhprom to take on an "outside" development, when its own organizations for several years now have not been able to create anything near what customers have been asking for.

Thus, the absence of series production of motors (more precisely, the interests of a single department) is holding back the development of industries responsible for technical progress.

We could end there. But, unfortunately, not only series production, but also the development of new motors depends on departmental interests. While at the beginning stage Minpribor agreed that the institute of automatic apparatus would do the work on contract, then, after promising machines had been created (and these are needed more by "outsiders"), the ministry began to hamper the further development of scientific research and experimental design work. Therefore directors of a number of departments and high-ranking scientists in the field of automatics turned to Minpribor to request a continuation of the work so successfully begun by the institute of automatic apparatus. In particular, the president of the Ukrainian SSR Academy of Sciences, Academician B. Paton,

wrote in a letter to Minister K. Rudnev: "The subject matter is of a general industrial nature, and its results will be used in various industries of the national economy. According to our information the institute of automatic apparatus is the organization best prepared to solve this problem."

But in spite of cogent requests the chief engineer of the Soyuzpromavtomatika All-Union Production Association, A. Levin, refused to include this subject in the institute's schedule, attributing his refusal to the non-specialization of the scientific research institute.

It might be possible somehow to understand Comrade Levin if the laboratory were loaded down with other more important jobs. Alas, the laboratory's associates today are without a scheduled set of topics. They are about to be dismissed.

To close the laboratory which has achieved the best results in the USSR in the area of creating actuating motors for automation systems and computer equipment and which has outstripped other organizations for several years--this is an archdepartmental decision. In our opinion, with the interests of the State in mind, utilizing the advantages of a planned socialist economy, it is necessary to further the activity of the laboratory and to keep it fully occupied with the subjects for whose solution it has acquired vast knowhow.

To sum up, it can be said that the problem is interdepartmental. So, an interdepartmental organization needs to solve it. Directors of consumer industries have turned to the USSR Gosplan. But even there they have run up against lack of understanding of the importance of the problem. A letter addressed to the deputy chairman of the Gosplan, G.A. Titov, has received no reply.

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EXPERIMENTATION ON SCREW-TYPE PRESS

Moscow KUZNECHNO-SHTAMPOVOCHNOYE PROIZVODSTVO in Russian No 5, May 78 pp 26-28

[Article by V. P. Salov, D. M. Kaminskiy, V. Ye. Stokolov, V. I. Myakinenkov and A. N. Buynitskiy: "Experimental Investigation of Screw-Type Presses with an Arc-Stator Drive"]

[Text] The most progressive drives for screw-type presses at present are hydraulic and direct electric drives.

One version of a direct electric drive for screw-type presses is an arc-stator electric drive without a reducer, adopted in presses manufactured by the Chimkent Automatic Press Plant imeni Kalinin (ChZPA). The schematic diagram of such a press is shown in Fig. 1.

The press consists of bedplate 1, along which slide block 3 moves along regulated guides 2. Nut 4 is attached to the slide block, in which screw spindle 5 is turning. Flywheel 6 is attached to the other end of the screw spindle, it being at the same time the rotor of an induction motor of an arc-stator type. The flywheel rotor is turned by the traveling magnetic field created by two diametrically located stators 7. The originality of a domestic electric drive without a reducer for screw-type presses consists in that the motor uses not the usual closed circular stator, but open arc stators, which reduce the rpm of the motor at a standard network frequency without increasing the number of pairs of poles. The use of two arc stators diametrically opposite and multiple connected provides for compensating the forces of magnetic attraction of the flywheel rotor and, as a result of this, removes loads from the spindle and the screw transmission from radial forces."

*Fridkin, P. A. "Arc-Stator Electric Motor without Reducer.
Moscow, ENERGIYA, 1970

The braking of all moving parts of the press and holding in the braking position is done by pneumatic frictional brake 8.

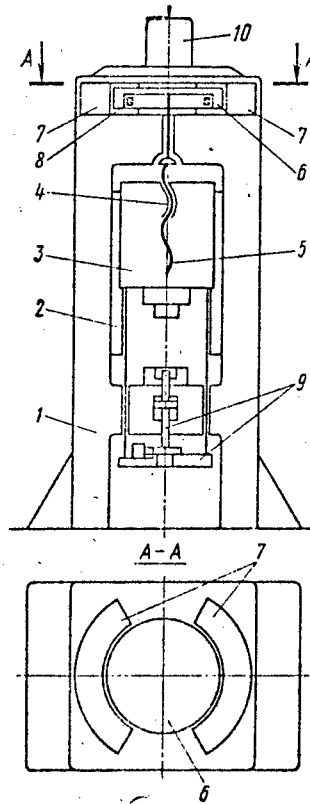


Fig. 1. Schematic diagram of a screw-type press with an electric motor without reducer.

The presses are equipped with controlled lower ejectors 9, connected to the slide block. Fan 10 is provided with an individual induction motor for cooling the arc-stator motor. The control circuit provides for three modes of operation: automatic, single stroke and adjustment.

In the single stroke mode, the press operates as follows: When starting buttons (pedals) are depressed, an instruction is issued for releasing the friction brake, after which network voltage is applied to station 7 of the electric motor. Flywheel rotor 6 of the motor begins turning and since screw spindle 5 cannot move along its axis, its rotation by means of nut 4 is converted into forward movement

of the slide block. When the slide block moves through the given stroke and the speed of the flywheel reaches the value corresponding to the necessary kinetic energy, the arc-stator motor is disconnected from the network. Further, down motion of the slide block occurs by inertia, and for presses without counter-weights even with some acceleration and in increase in the kinetic energy due to the mass of the slide block.

At the end of the slide block stroke there occurs plastic deformation of the intermediate product and the motor of the press is connected for a reverse stroke by applying the network voltage to the stators of the motor (with corresponding switching of phases on the windings). When the slide bar raises, the motor of the press is disconnected when the slide block is in a certain position, the slide block continues its upward motion by inertia for some time and then stops and is held in its extreme upper position by cutting in brake 8. To repeat the cycle it is necessary to depress starting buttons (pedals) again. The value of the acceleration of the stroke (i.e., the operating speed and the stored energy), the moments of disconnecting and reconnecting of the motor and the brake are determined by the position of the limiting contactless switches or metallic shields that cause them to operate. The schematic diagram provides the possibility of controlling the presses not only by means of the slide bar, but also by the speed of the motor which is a more precise method for determining energy, and is also obtained easily by programming for 2 to 3 blows with various energies.

In automatic operation the single stroke cycle repeats continuously until the proper instruction is received from an external (automatic feed) and internal sensors.

In the adjusting mode the slide block moves up or down until the proper button is depressed.

The ChZPA organized the production of screw-type presses with arc-stator motors. The basic parameters of these presses are shown in Table 1 for the fast type in accordance with GOST 713-74.

As may be seen from Table 1 and GOST 713-74, such indicators, important to users, as the speed of the slide block at the moment of striking, the maximum force (of the rigid impact), the useful work of the deformation and the power used from the network are not regulated.

To determine these values, as well as to establish the actual values of the energy-force indicators, experimental tests were made of all eight models of the series of screw-type presses with arc-stator motors (fast-acting in accordance with GOST 713-74).

Table 1

(1) Параметры	(2)							
	Ф1726	Ф1728	Ф1730	ФБ1732	Ф1734	Ф1736	Ф1738	Ф1740
(3) Усилие, тс:								
номинальное (4)	40	63	100	160	250	400	630	1000
допустимое	63	100	160	250	400	630	1000	1600
(5) Эффективная энергия, кгм (6)	80	160	315	630	1250	2500	5000	10000
(7) Ход ползуна наибольший, мм	200	230	260	320	400	460	520	580
Число ходов ползуна в мин при наибольшем ходе (8)	42	40	38	36	34	30	25	20
(9) Расстояние между направляющими в свету, мм	360	400	450	500	560	675	830	1000
Размеры стола, мм: (10)								
слева направо	400	450	500	580	670	775	900	1030
спереди назад (12)	450	500	560	650	750	875	1000	1180
(13) Наружный диаметр рабочего винта (шпинделя), мм	110	140	140	180	210	260	320	400
(14) Ход резьбы рабочего винта, мм	75	128	128	160	176	188	216	320
Число заходов резьбы рабочего винта (15)	3	3	3	3	4	4	4	8
(16) Нижний выталкиватель:								
усилие, тс (17)	4	6	8	12	16	20	25	32
наибольший ход, мм	85	90	95	100	105	115	125	135
(18) Габаритные размеры в плане, мм								
(19)	2160	2210	2210	2560	3710	4525	4370	3910
	1380	1560	1560	2020	1925	1790	2200	3150
	2320	2980	3375	3840	4525	5560	6155	6990
(20) Высота над уровнем пола, мм								
Масса, т (21)	3,5	5,2	6,2	11,0	15,5	30,0	45,0	75,0

1. Parameters
2. F1726
3. Force, ton-force
4. nominal
5. allowable
6. Effective energy, kg meters
7. Maximum stroke of block, mm
8. Number of slide block per minute at max. stroke
9. Distance between guides to clearance, mm
10. Dimension of table
11. from left to right

12. from front to back
13. External diameter of working screw (spindle), mm
14. Stroke of spindle thread, mm
15. Number of stops of spindle thread
16. Bottom ejector
17. force, ton-force
18. maximum stroke, mm
19. Size in plane, mm
20. Height above floor, mm
21. Weight, tons

On oscillograms, obtained by means of the N102 oscilloscope using calibrated crushing samples, changes were determined in the velocity of the flywheel (by the output voltage of a speedometer), and the current and power of the drive motor. The force of a rigid impact was determined by the impact of the upper striker on the lower one and was determined by oscillograms. By taking the oscillograms of the short-circuit mode when the slide block of the press was against the stop, as well as by a calibrated 3-phase load, scales of all values on the oscillograms were determined.

Due to the magnetic asymmetry of the arc-stator motor windings, the power used from the network (starting an average for the cycle) were determined for all phases of both stators and their totaled. The results of processing the oscillograms are shown in Table 2 and Fig. 2 shows one of the oscillograms (a full cycle of crushing sample motion in model Fl738 press).

The kinetic energy at the moment of impact was calculated by the usual method, namely, by the value of the reduced moment of inertia of all moving parts of the press and the angular velocity of the flywheel at the moment of impact.

Curves shown in Fig. 3 of changes in the kinetic energy of several presses depending upon the accelerating stroke of the slide block show the possibility of regulating the energy of the impact by simply changing the acceleration of the working stroke of the motor.

Respective tables and curves shown in certificates of technical and operational data and directly on the presses, make it possible to regulate, during operation, stored energy by a simple change in the position of the contactless turn off shield. In using the system of dispensing energy in accordance with the speed, the indicated readjustment consists of changing the position of the speed regulator on the control panel. The number of strokes of the slide block per minute was calculated in accordance with the length of the cycle, determined from the oscillogram between two adjacent impacts when the press operates in the automatic mode.

The forces of a rigid impact were recorded on the film by means of tension sensors pasted on the tie columns of the press. The tension sensors were calibrated beforehand by loading the press with a hydraulic loader. An 8ANCh-7M amplifier was used for amplifying the tension sensor signals. The force and useful work of deformation were determined by the reduction in the length of crushing samples made of 45 brand steel with a diameter of 24 mm and a height of 36 mm. A lot of crushing samples was made for testing each press and the hardness of each sample was determined. Then five samples were chosen from the lot and they were calibrated, i.e., "force-deformation" and "useful work-deformation" were determined. These relationships were used to determine the efficiency of the impact as a ratio of useful work to kinetic energy at the moment of impact.

Table 2

(1) Параметры	(2)							
	Ф1726	Ф1728	Ф1730	ФБ1732	Ф1734	Ф1736	Ф1738	Ф1740
(3) Запасаемая кинетическая энергия, кгс·м	95	170	345	780	1450	2550	5250	11700
(4) Число ходов ползуна (при наибольшем ходе) в минуту	42	41	44	37	35	30	25	20
(5) Наибольшая скорость ползуна, м/с	0,5	0,68	0,7	0,63	0,73	0,62	0,74	0,784
Путь разгона ползуна, мм (6)	150	180	180	160	220	170	300	300
(7) Мощность двигателя (среднецикловая, потребляемая от сети), кВт	4,5	6	11	20	39	63	81,5	194,7
(8) Максимальный пусковой ток двигателя, А	36	43	98	140	330	513	780	1300
(9) Среднецикловой $\cos \varphi$	0,30	0,31	0,32	0,34	0,35	—	—	0,4
(10) Усилие деформирования крешеров, тс	13,1	47	52	68,5	128	210	540	975
(11) Путь деформирования, мм	6,1	3,95	6,5	12,7	10,75	12,83	8,7	11,8
(12) Полезная работа деформирования, кгс·м	70	151	280	670	1080	1915	3300	7900
(13) Усилие жесткого удара, тс	107	136	237	310	497	820	—	—
(14) Электромеханический КПД (при осадке крешеров)	0,13	0,19	0,225	0,235	0,215	0,2	0,23	0,24
(15) КПД удара по крешерам	0,74	0,74	0,81	0,85	0,74	0,75	0,69	0,7

1. Parameters
2. F1726
3. Stored kinetic energy, kg-force.meters
4. Number of strokes of slide-block (at max. stroke) per minute
5. Maximum speed of slide block, meters/second
6. Acceleration path of slide bar, mm
7. Motor power (average per cycle used from network), kw

8. Maximum starting current of motor, amps
9. Average cycle $\cos \varphi$
10. Force of deformation of crushing samples, ton-force
11. Length of deformation, mm
12. Useful work of deformation, kg-force meters
13. Force of rigid impact, ton-force
14. Electromechanical efficiency (in upsetting samples)
15. Efficiency of impact on crushing samples

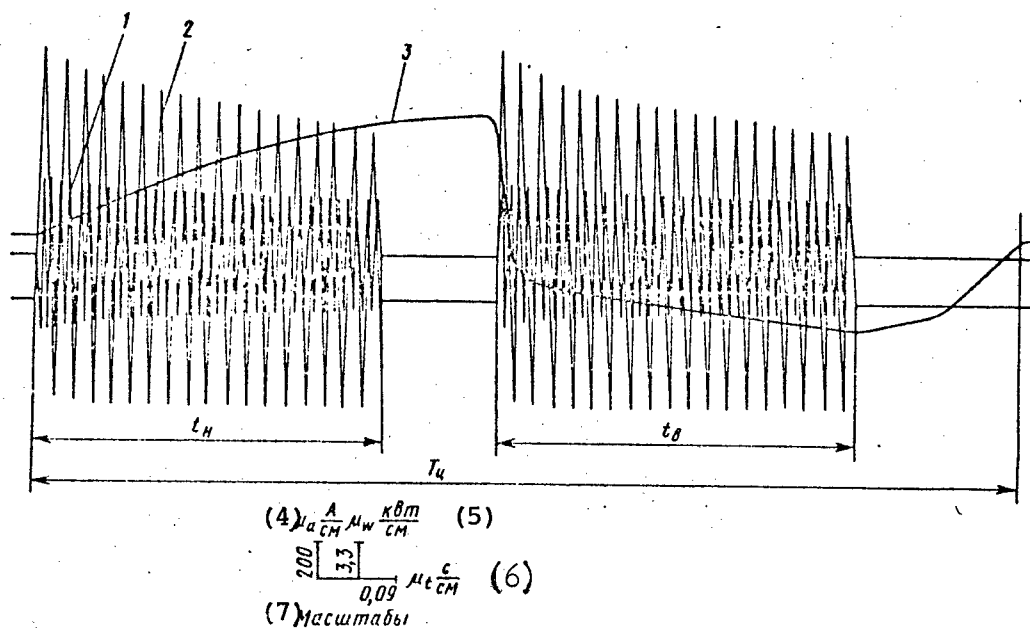


Fig. 2. Oscillogram of a full cycle of operation of a model F1738 press:

- | | |
|---|---------------|
| 1. Motor current | 4. Amps/cm |
| 2. Power | 5. kw/cm |
| 3. Voltage of speedometer
(proportional to number
of turns of the flywheel) | 6. seconds/cm |
| | 7. Scales |

The power used by the press motor during a full cycle was determined by the area of the active power curve on the oscilloscope. The ratio of this power to the time of the cycle will give the value of power consumed for an average cycle (see Table 2). The electromechanical efficiency of the press was determined as the ratio of the stored kinetic energy to the electrical energy used by the motor from the network during one full cycle T_u .

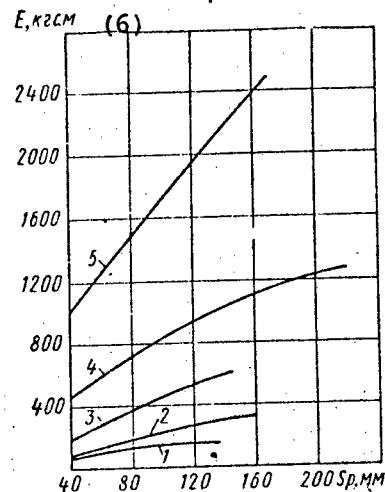


Fig. 3. Changes in the kinetic energy of arc-stator presses depending upon the accelerating stroke of the slide block:

- | | |
|--|--|
| 1. Model F1728 with force of 63 ton-force | 4. Model F1734 with force of 250 ton-force |
| 2. Model F1730 with force of 100 ton-force | 5. Model F1736 with force of 400 ton-force |
| 3. Model F1732 with force of 160 ton-force | 6. kg-cm |

The obtained oscillograms make it possible to get the values of the electromechanical efficiency for the working strokes (during time t_H) and the reverse strokes (during time t_B) of the slide block. Since counterweights are not used for the slide blocks in the manufactured presses, their weight in the operating stroke creates a positive torque, and during the reverse stroke--an additional resistance torque. As a result of this, the efficiency of the working stroke is 1.3 to 1.7 times greater than the efficiency of the reverse stroke (depending upon the model of the press and the weight of the slide block).

The general cycle efficiency of the press, rather than these individual efficiencies is of practical value in operating the presses and, therefore, only the generalized parameter is shown in Table 2.

The values of the maximum starting current shown in Table 2 were obtained from the current oscillograms of two multiple connected windings of the arc-stator motor and its short-circuited mode (the slide block against the stop).

The values of $\cos_{ave}$ shown in Table 2 were obtained by calculation from the power oscillograms, as a ratio of the average active power to the total power.

On the screw-type presses investigated, in accordance with the test program, tests were made in the mode of rigid (recoil) impacts. In this case, maximum forces were recorded (Table 2) by means of calibrated tension sensors, an amplifier and a loop oscilloscope. The obtained data shows that, on an average, the rigid impact forces exceed the nominal force of the press by 2.1 times. GOST 713-74 allows operation with a force exceeding the nominal force by 1.6 times, while in presses of several foreign firms this parameter is limited to twice the nominal force. The higher values of the rigid impact compared to GOST 713-74 are due to some reserve of kinetic energy achieved when operating with the nominal voltage in the electric network. In practice, under shop conditions when operating with a network voltage, reduced to allowable limits, this phenomenon will not take place. Moreover, operating with rigid impacts should be considered as occasional, which was taken into account when calculating the strength of the press parts.

In carrying out the numerous operating tests (in the automatic mode under load), the rise in the temperature of the motor winding was checked at the rated strokes per minute. The highest steady-state temperature rise of the windings did not exceed the values for the class of insulation used in the arc-stators.

The experimental results obtained were utilized for the selection, operation and improvement of electric screw-type presses, as well as for creating new models of such presses.

Conclusions. 1. The use in screw-type presses of arc-stator electric motors without reducers, instead of the traditional friction motor, led to considerable simplification of the design, the elimination of side forces and shocks in the screw pair, an increase in the reliability and life of the motor, reduction in noise, and an improvement in the appearance of the press as a whole and conditions of servicing it.

2. The arrangement of screw-type presses with arc-stator motors are protected by Soviet Author's Certificates and foreign patents. These presses are used widely in many industries and are exported. They are universal machines and are designed for hot and cold stamping; bending, broaching, finishing to final dimensions, upsetting, stamping, trimming etc.

3. The stored kinetic energy and the number of the slide block strokes per minute (for the greatest stroke) meet parameters of the first version presses of GOST 713-74. The speed of the presses increases with a reduction in the stroke of the slide block.

4. The electromechanical efficiency of the investigated presses during the working cycle when upsetting samples was 0.19 to 0.25. This parameter may be raised by reducing the starting losses of the arc-stator motor, by improving it and using special starting systems.

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