JPRS-UCR-84-009

25 April 1984

# USSR Report

## CONSTRUCTION AND RELATED INDUSTRIES



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## CONSTRUCTION AND RELATED INDUSTRIES

## CONTENTS

Briefs

CONSTRUCTION PLANNING AND ECONOMICS

# TRENDS IN RESOURCE CONSUMPTION IN CONSTRUCTION INDUSTRY

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 3, Mar 84 pp 73-79

/Article by V. Dubrovskiy, candidate of economic sciences: "Lowering Material-Intensiveness in Construction"/

/Text/ The efficient use of material resources is a condition for intensification of the national economy. At the present time, each percent of economy in their use, for the country as a whole, amounts to approximately 6.4 billion rubles. Thus, in the decisions handed down during the 26th party congress and subsequent plenums of the CPSU Central Committee, great importance is attached to lowering material intensiveness as a most important factor for production efficiency. In the decree of the CPSU Central Committee and the USSR Council of Ministers entitled "Intensifying the Work Aimed at Achieving Economies and the Efficient Use of Raw Material, Fuel-Energy and Other Material Resources, the task was advanced of mobilizing reserves at all levels of the economy and of carrying out the measures planned.

This is of special importance for capital construction -- after machine building, the largest consumer of metal and other types of material resources. It accounts for more than 19 percent of the overall consumption of rolled ferrous metals, 46 percent of the wire, 81 percent of the cement, 60 percent of the glass, 35 percent of the saw timber, 13 percent of the lumber and the greatest portion of piping. During the 1970-1980 period, the consumption of rolled ferrous metals increased by 25 percent, cement -- by 38, glass -- by 28, finished hardware for reinforced concrete -- by 23 and precast reinforced concrete -- by 45 percent.

The principal trends in the expenditure of material resources for capital construction -- construction-installation work, production of structures and parts and capital repair work. The relationship between the use of resources for construction-installation work and the production of structures and parts describes (especially from the standpoint of metal consumption) the scales for the industrialization of construction production. The consumption dynamics for the principal types of materials underscore the improvements that have taken place in the industrialization of construction and in the level of prefabrication. The rates for the expenditure of materials for the production of structures and parts are excessive compared to the level of construction-installation work. Thus, during the 1970-1980 period the consumption of rolled ferrous metal increased by 40 and 18 percent respectively and cement -- by 39 and 29 percent. In connection with the production of structures and parts, an increase took place in the expenditure of wire, finished hardware, saw timber and lumber.

For capital construction as a whole, the use of material resources for capital repair purposes was negligible. However, in large cities, considerable volumes of these materials are being consumed for these purposes owing to the tremendous scales of housing construction. For example, for the erection of housing in Moscow use is being made of soft roofing materials, the service life of which is considerably shorter than that of slate. More than 3 percent of the rolled ferrous metals, 12 percent of the construction glass and 15 percent of the linoleum are being consumed for the carrying out of repair work and these figures exceed by twofold the all-union indicators. In the future, the proportion of expenses for all-round repair work, of the overall volume of material resources for capital construction, will increase.

A judgement can be made regarding the trends in the material intensiveness of capital construction by comparing the rates of growth in construction-installation work against the dynamics for the consumption of material resources. The principal criterion is the expenditure of the latter per million rubles worth of construction-installation work.

At the same time, the cost of construction work has increased. Following the establishment in 1969 and 1970 of new uniform rates, norms for overhead expenses and planned savings in the estimated cost structure and raised wages for builders, it was expected that the indexes for increased costs would not exceed 1.3. Actually they turned out to be higher than the cost increases occasioned by the mentioned factors. Thus it is by no means a simple matter to evaluate the trend in material intensiveness. Many examples can be cited illustrating its growth.

An increase in material intensiveness and in the cost of construction is promoted by the existing system for determining the estimated cost for construction-installation work, with the overhead expenses being computed for the entire amount of direct expenditures and the planned savings for the total amount of direct expenditures and overhead expenses. Each ruble given to raising the prices for materials, with no special effort on the part of the builders, provides them with 25-30 additional kopecks from the wage fund, the same amount of profit and up to 10 kopecks from the economic incentive fund. Less attention is being given to the indicator for the production cost for construction-installation work, where the material expenditures constitute more than one half of all expenditures. However the profitability for construction, with a norm for planned savings of 6 percent of the production costs for the work, increased from 6.8 percent in 1968 to 15.9 percent in 1975 and only decreased somewhat as a result of reduction coefficients (from 12.5 percent in 1979 to 10.1 percent in 1982).

The mass replacement of steel structures by reinforced concrete ones began in the 1960's. In 1980 the use of the former had decreased by 4 percent compared to 1970 and the latter had increased by 45 percent. The intensive production and use of precast reinforced concrete brought about an increase in the cost of construction-installation work and produced a situation wherein, in a number of economic regions, there is an abundance of such construction and thus the reinforced construction production enterprises are forced to find new consumers and this is accompanied by inefficient shipments and additional transport expenses. Thus, 800,000 cubic meters of precast reinforced concrete

are being shipped annually from Moscow and more than 1 million cubic meters are being shipped over the Northern Railroad.

The question concerning an expedient sphere for and the scales of use of precast reinforced concrete is becoming of priority importance at the present time. The opinion concerning the need for halting further intensification of this production using the traditional method is being heard more frequently at the present time. According to published data, the expenditure of metal for the production of 30.2 million cubic meters of reinforced concrete structures in 1961 amounted to 5 million tons and for the production of 123.2 million cubic meters of precast reinforced concrete in 1978 -- 15 million tons. The proportion of metal in reinforced concrete structures, compared to the overall volume of its consumption in construction during this period, increased from 37 to 52 percent*. According to our computations, the use of reinforced concrete structures instead of metal ones in 1978 produced a maximum savings in metal -- 5 million tons and this exceeded the annual consumption volume for metal structures by 19 percent. In other words, the advisability of using reinforced concrete structures instead of the latter, from the standpoint of the equivalent obtained in metal savings per year, was confirmed after only 15 years. Obviously the computation of such a unique "repayment period" is extremely arbitrary, with the advantages and shortcomings associated with substituting reinforced concrete structures for metal ones being considered on a unilateral basis. However the consumption of metal for the country as a whole, per cubic meter of precast reinforced concrete, despite the fact that it has decreased from 166 to 122 kilograms, nevertheless is still considerable.

Meanwhile the experience accumulated in the erection of KamAZ /Kama Motor Vehicle Plant/, Atommash, Krasnoyarsk Excavator Plant, a number of enterprises of USSR Minmontazhspetsstroy /Ministry of Installation and Special Construction/, Minneftegazstroy /Ministry of Construction of Petroleum and Gas Industry Enterprises/ and USSR Minenergo /Ministry of Power and Electrification/ testifies to the fact that it is possible to reduce the weight of buildings considerably and to decrease the construction schedules through the use of progressive steel structures and complete-unit assembly operations. The introduction of structures made out of low alloy steels and steel profiled flooring instead of precast reinforced concrete panels for covering industrial buildings is making it possible to reduce metal consumption considerably. For example, 1 square meter of roof paneling of the light type, made out of profiled flooring and having a light heater, weighs approximately 40 kilograms, whereas a traditional one made out of reinforced concrete and having a heated lightweight aggregate -- almost 300 kilograms. The orientation towards reinforced concrete panels for the covering of buildings with metal forms is conditioned by the insufficient production of steel profiled flooring and progressive types of curved profiles.

Quite often an overexpenditure of material resources takes place during the planning stage and we believe that one reason for this is the fact that the planning and estimates documentation is not always developed by specialized subunits. This is especially typical of industrial construction where, in addition to the organizations of TsNIIproyektstal'konstruktsiya /Central

* See: VOPROSY EKONOMIKI, No 3, 1981, p 83.

Scientific Research and Planning Institute for Construction Metal Structures/, the development of plans was carried out by the organizations of various ministries and departments, mainly of a technological nature. In the planning of similar type installations, they employ various design solutions which quite often lead to over-expenditures of materials. The plans developed by technological institutes are oriented towards expending large quantities of rolled metal. Lightweight metal structures and particularly large tubular structures and thin-walled structures for covering industrial buildings are not being employed extensively in the production of rafter girders in place of girders made out of the conventional profiles. The plans do not provide for the efficient use of footings, the volume of which is increasing with each passing year. The absence of reliable information obtained from engineering-geological studies of the properties of soils is being compensated in the plans by a raised expenditure of hardware, reinforced concrete and cement. Quite often the building plans call for deep basements, the floors of which are considerably lower than the ground water level. Quite often the erection of the underground portion involves up to 50 percent of the volume of general construction work.

Just as in the past, the structural solutions in industrial construction call for large expenditures of brick. The plans call for it to be used not only for the foundations and first floors of framework-paneling buildings, but also for a considerable portion of the partitions -- the most material and labor-intensive work. Experience has shown that the replacement of brick partitions by large plant produced elements makes it possible to reduce the weight of the structures by a factor of 3-4. Great results are achieved through the use of hollow brick, which makes it possible to reduce the thickness of walls by 20-30 percent, however the production of such brick does not exceed 9 percent of the overall volume of brick production. Brick possesses high heat, water and sound insulating qualities, strength and fire resistance and its use in the enclosing structures of unheated buildings or in buildings having an excess of heat is hardly recommended.

It is obvious that the organizations of TsNIIproyektstal'konstruktsiya and other specialized subunits are unable to provide all of the clients with plans and thus the possibility of having such work performed by departmental organizations should obviously not be ignored. Hence the formation of a "portfolio of orders" for such institutes and an increase in the level of their activities -- is a task of priority importance.

In the standard planning for housing construction, over-expenditures are taking place in the use of material resources and particularly metal. For example, 40 kilograms of metal are utilized on the average per square meter of usable space in panel buildings and in many instances -- more than twice this figure.

Experience has shown that large contractual organizations quite often propose more progressive technical solutions. Their participation in improving plans constitutes an important reserve for lowering material-intensiveness and reducing the construction schedules. This is borne out in particular by the experience of Glavzapstroy /Territorial Main Administration for Construction in the Western Regions of the RSFSR/, where as a result of recommendations by a bureau of experts and improvements in the planning solutions, the construction

costs were reduced by tens of millions of rubles and considerable savings were realized in the use of deficit materials. At the present time, USSR Gosstroy is carrying out an extensive experiment aimed at increasing the role played by contractual organizations in improving the planning solutions.

The material-intensiveness of construction is conditioned to a considerable degree by the technology employed for producing the more important types of products and by the economic interests of the producer and consumer. The construction materials and structures produced by industry are quite often material and labor-intensive. Individual types of reinforced concrete and particularly ceiling panels, partitions, window units and flights of stairs are produced with a low degree of plant readiness and with a deviation from the technical conditions. Some items are produced with an unjustifiably high mechanical strength and this results in additional expenditures of materials. The problem is complicated by the absence of a general purpose unit of measurement for the "production-consumption" line. Thus the production of a majority of the types of piping, the entire assortment of ferrous rolled metals, wire, hardware for reinforced concrete and cement is planned in tons, whereas their consumption is often planned in linear and square meters. The permissible deviation from the computed weight is largely based upon the fact that a unit of industrial output in the main construction ministries is formed in different ways. One can refer to the production of precast reinforced concrete. Of its overall volume of industrial production, the construction industry enterprises of the main construction ministries account for more than 80 percent. In 1980, 65 kilograms of rolled ferrous metal and 344 kilograms of cement were expended per cubic meter in the construction ministries, in USSR Minstroy -- 57 and 334 kilograms respectively and in Glavmosstroy -- 42 and 410 kilograms.

The problem concerned with improving the natural measurement units and defining the sphere of their feasible use is closely associated with the economic interests at all administrative levels. For example, Glavpromstroymaterialy has converted over to the production of reinforced concrete structures in a new measurement -- conventional cubic meters and this will ensure equally profitable production operations for all items being produced using the new complicated technology. The national economic effect would have been greater if the enterprises of USSR Minchermet /Ministry of Ferrous Metallurgy/ had supplied reinforced steel for the production of reinforced concrete in conformity with the computed weight. Actually, its weight exceeds the computed figure by an average of 1-2 percent and this increases the consumption of reinforced steel for capital construction in Moscow to 2,000 tons annually. At the same time, Glavmospromstroymaterialy is supplying large covering panels (3 X 6 meters) for industrial construction in the capital, panels which often exceed the weight called for in the technical and planning solutions by 25-30 percent and this raises the need for strengthening the supporting structures of buildings. Hence there are additional expenditures of metal, cement and other limited materials. According to estimates by the builders, the production of items with plus tolerances in excess of 1 percent is equivalent to a reserve for the possible production of approximately 1 million cubic meters of precast reinforced concrete annually for capital construction as a whole throughout the country.

Improvements are required in the assortment of rolled ferrous metals being consumed in construction and the proportion of effective rolled sheet metal must be raised and its metal-intensiveness lowered. Cold-rolled sheet metal ensures the possibility of developing sheet metal stamping -- a cheap and economic method for producing finished products.

Of the overall quantity of low-alloy steel used in construction, roughly 80 percent is expended for strengthening reinforced concrete and approximately 20 percent -- for the production of steel structures. During the 1970-1980 period, the production of rolled metal made for low-alloy steels in this branch increased by a factor of more than 4 and yet the demand for it remains high as in the past. At the present time, rolled metal made from low-allow steels is being distributed among capital construction and the production-operational sphere in a ratio of 68 : 32, with the predominant portion of the overall consumption volume of the latter (more than 96 percent) being associated with repair-operational needs and this can hardly be justified in such a situation.

In connection with achieving economies in the use of metal, great importance is attached to lowering the zone of tolerances for rolled metal. In all probability, the time is at hand for re-examining many of the parameters established almost 40 years ago. The modern rolling mills are making it possible to produce rolled metal with minimum tolerances.

The standard calls for 27 profile sizes for H-beam girders. Sixteen profile sizes are actually being supplied and this is resulting in an increased expenditure of metal and in raised costs for the structures. H-beam girders of profile sizes 18a, 33 and 70b are not being supplied in sufficient amounts. In the face of a large requirement for H-beam girders, their replacement by wide-flange girders would reduce the consumption of metal. However, use of the latter constitutes only 1.5 percent of the overall production of these girders.

Steel pipe, which is gradually replacing the traditional profiles of rolled metal, is considered to be an economic type of metal product in construction. The requirements for such pipe are presently increasing more rapidly than the production. At the same time, the majority of the pipe being produced has a raised metal intensiveness, in some instances by 30-50 percent. This derives from the use of different methods for accounting for pipelines and a lowered evaluation for the resistance of the material. In addition to the need for increasing the production of high strength thin-walled pipe, a requirement also exists for the mass replacement of steel pipe by plastic pipe. According to estimates by specialists, the possibility already exists of replacing more than 360,000 tons of steel pipe in construction, using instead an overall volume of approximately 90,000 tons of plastic pipe.

Capital construction has at its disposal a vast system of norms that is constantly being re-examined by USSR Gosstroy. Nevertheless, available leading experience is still not reflected fully in the normative base.

A reduction in the material intensiveness is greatly dependent upon a sound system for the expenditure of materials and particularly in housing and administrative construction, which are distinguished by a high number of floors. In recent years, an increase has taken place in the number of floors being

installed in industrial construction. Importance is attached to the problem of establishing norms for the expenditure of resources at non-standard and unique installations. All-state norms are not available for them and as a rule supply is not being carried out in conformity with the physical volumes for the work being carried out. This is complicating planning and control over the use of material expenditures. Meanwhile the trend towards expanding the construction of buildings and installations based upon individual plans is intensifying.

Recently, qualitative changes have taken place in the technology and organization for construction production and improvements have been realized in engineering completion work for construction projects. Thus the existing norms for permissible losses during the transporting and storage of materials at construction projects must be further refined. The finding of a solution for this problem is considered to be a task of priority importance, since the attraction of material resources into capital construction does not require new capital investments.

It is believed that a need exists for developing, on an all-state scale, a special purpose overall program for reducing losses and achieving the efficient use of materials. Such experience has already been accumulated. For example, a program has been developed in Glavmosstroy /Main Administration for Housing and Civil Engineering Construction in Moscow City/, Glavmospromstroy and Glavmosinzhstroy for achieving economies in the use of material resources and particularly rolled metal, cement, timber, glass and so forth. Moreover, specific tasks have been outlined for the service subunits. The completion and transport organizations have been tasked with the responsibility for supplying the projects with complete sets of products which do not require additional expenditures for processing at the construction sites. Special attention is being given to issuing incentives for achieving economies in the use of materials, to increasing responsibility for overexpenditures and inefficient use of materials and to disseminating the experience accumulated during the socialist competition. As a result, the expenditures of the more important types of materials are decreasing from year to year in the Moscow construction main administrations. A great deal is being accomplished in this regard at USSR Minpromstroy /Ministry of Industrial Construction/. Special purpose all-round programs have been created here, such as "Economies In and Efficient Use of Material Resources During the 1981-1985 Period," "Industrial Potential," "The Construction Industry" and "An Assembly," which have as their task that of lowering material expenditures and raising the efficiency of construction production.

When developing a special purpose program for reducing material expenditures, it is important for the following circumstances to be taken into account. At the present time, there are no norms for providing construction production with inventory buildings, falsework, scaffolding, staging, enclosures and other items. Approximately 20 percent of the timber, 15 percent of the glass, 10 percent of the roofing materials and 4 percent of the rolled metal are being made available for temporary installations and construction inventory. According to estimates by USSR Gosstroy specialists, almost 3 billion rubles are being expended annually for these purposes and roughly one half of this amount is for material resources. Nor does the situation change when, following the completion of construction, the temporary buildings and installations are dismantled. More than one half of the materials expended

here are lost and can never be retrieved. The use of inventory buildings, prefabricated-sectional installations and resources for the technological equipping of construction operations is making it possible to lower construction expenditures and particularly the material and labor resources diverted from the national-economic turnover. Consolidated estimates by USSR Gosstroy testify to the possibility of saving more than 100,000 tons of rolled metal, 5 million cubic meters of timber and 10 million square meters of glass.

It would seem that there are other less important circumstances which nevertheless are exerting a substantial influence on achieving savings in and ensuring the efficient use of resources. For example, considerable quantities of materials are left over at the end of the year in capital construction. Experience indicates that there are large reserves available for weakening the tense balance existing between the production and consumption of limited materials. A great deal depends upon the departmental and territorial logistical supply services, upon raising the quality of control over the supplies of material resources, upon correctly determining the optimum amounts of internal working capital and upon maintaining a proper ratio between the rates of growth for the supplies and the norms.

The growth in supplies at contractual organizations leads to a situation wherein the working capital increases on the whole 1.5 times faster than the work volume. Thus, in the interest of correcting this situation, the role played by banks in controlling the supplies of contractual organizations should be raised. A large portion of these supplies must be formed by means of credit. In addition, the above normal quantities of materials remaining at the principal construction ministries should ideally be transferred over to the bases of the territorial organs of USSR Gossnab. Obviously, the sale of materials that are not needed to the contractual organizations of other ministries and departments is possible, with arbitration by USSR Gossnab. It would not be out of place, at the ministry, main administration and association levels, to examine the redistribution of materials among subunits of the construction industry and the construction organizations.

Further improvements are required in logistical supply for the construction projects. The principal claim of the builders stems from the fact that they are not being supplied with the required quantities of material resources.

The decree of the CPSU Central Committee and the USSR Council of Ministers concerning improvements in the economic mechanism called for rapid improvements in the completion schedules for converting construction projects included in the state plan over to the system of all-round supply of materials, in conformity with the requirements set forth in the plans and estimates. This assumes that the organizations of USSR Gossnab will be supplied with all of the necessary resources using the funds of the construction ministries. Thus, as the holder of capital, USSR Gossnab must release the builders from unnecessary cares and concerns. This system is carried out by the construction ministries and yet the amount of funds turned over is determined and approved in terms of "millions," whereas the supplying of construction projects must be carried out in conformity with the requirement set forth in the plans and estimates. The territorial administrations of USSR Gossnab are constantly encountering one particular problem: how to find additional resources for

compensating for the difference. Since in the majority of instances no success is realized in this regard, they are forced into asking for more resources than actually required. Thus the work carried out aimed at determining the true requirements for material resources makes no sense whatsoever. At times the proposal is heard to have the territorial organizations of USSR Gossnab guarantee the supplying of the construction projects, through the constant renewal of the "insurance" supplies at the bases and storehouses, in the correct amounts and assortment. It is believed that this can be done without causing harm to capital construction on the whole only in the form of an experiment and for a restricted circle of construction organizations.

Such recommendations by the builders are deserving of attention and thorough discussion. For example, it is believed that the principal supplier should bear primary responsibility for metal deliveries from the standpoint of quantity, quality and timeliness. Emphasis has been placed upon concentrating all non-metallic open pit mines in the USSR Minstroymaterialov /Ministry of the Construction Materials Industry/ system, with the ministry being responsible for the centralized distribution of these materials. This measure must lower the expenditures of cement and raise its quality. The builders insist upon having the deliveries of sand and gravel bulk being carried out not in natural form, as is being done at the present time, but rather in the form of enriched and fractionated sand and gravel.

The solving of these and other capital construction problems will promote the implementation of the tasks advanced by the party and government for achieving economies and ensuring the efficient use of resources.



7026
CSO: 1821/75

## BRIGADES CONSOLIDATED, FOCUSED ON COMPLETION OF OBJECTIVES

Moscow STROITEL'NAYA GAZETA in Russian 12 Feb 84 p 2

[Article by V. Kirillov, economist, in column "Brigade Contract: Point of Reference--Objective"]

[Text] The introduction of indicators oriented to the final result, in particular, those such as "commodity building production" and "normative conditionally net production" makes it compelling to look once again at the brigade contract. Previously, it was possible, without crafty philosophizing, to conclude an agreement on the stage of building construction work (indeed, they are mentioned in many designs and estimates). However, it is obvious now that the effect of such an introduction is not great: the stages were completed, but the completion dates of the facility often were not met.

The experience of the Main Administration for Eastern Siberian Construction shows that within the sphere of a contract, one should include not stages, but facilities, for the entire period up to the point of putting them into use. Naturally, small brigades are not at full strength; therefore, the Main Administration for Eastern Siberian Construction has set out to strengthen the collectives. Prior to concluding an agreement on the contract, a facility or starting complex is selected for the brigade. Then they strengthen the collective to optimal composition in relation to the volume of the Central Trade Union Council, taking into consideration construction productivity norms in accordance with construction norm 440-79.

After concluding the contract, the brigade should be issued all necessary work schedules for production, delivery of materials and construction, assignment of subcontractor work, etc., as well as the piece rate and bonus order. It indicates, in addition to volumes, the normative time for completion, the total of pay earned, and the size of the premium for shortening the construction time in relation to the quality of work. The space calculation according to the piece rate order is done monthly. Each worker is credited a piece rate portion of the earnings in accordance with the KTU and 50 percent of the premium due; the remaining 50 percent is transferred to the so-called reserve fund of the brigade and paid out after completion of the facility in the agreed upon time.

Such a contract, as can be seen, may be an effective device in the battle against unplanned transfers of collectives from facility to facility. In fact, in this case, the brigade may not confine itself to the planned period and lose a bonus of up to 15 percent of the piece rate earnings.

A year of working in the new system is behind us. In the expanded, cost-accounting construction commodity production brigades (such a name has been attached to them) all the indicators have sharply improved and labor discipline has risen. The construction period has shortened, materials are expended more economically, output has increased. In the brigades of A. Ustin and P. Prokopenko, for example, labor productivity has increased by 30 percent and the average wages have increased by 1.2 times and amount to 260-275 rubles per month. It is not accidental that six such brigades of the Novosibirsk Industrial Construction Trust fulfilled 80 percent of building construction work. But, of course, the main thing is that such important facilities as a secondary school, the breeding farm of a hog feeding combine, a broiler plant and a number of other objects were completed on time, with high quality workmanship.

It should be said that from the very beginning their successful work was assisted by the fact that the composition of the new collectives included not only tower crain mechanics, but also engine fitter's assistants and electricians, after training in one of the construction trades. They are responsible for ensuring uninterrupted operation of the machines, instruments and rigging which are a part of the normal complement of every briagde.

The creation of the enlarged commodity building construction brigades was an important stage in the development of the brigade contract in subdivisions of the Main Administration for Novosibirsk Construction. There is an increased responsibility among the collectives for the course of affairs concerning facilities entrusted to them. Every worker knows that the smallest waste or defect leads to eliminating himself from supplementary payments. In addition, this may reflect badly on the results of the labor of the whole collective. The value of such waste is related to the production cost of the brigade's operation.

The brigade has received new possibilities for organizational maneuvering. Even in the case of forced idleness, say, due to insufficient materials, it has the possibility of assigning people to the project in such a way as to obtain a high return from each one. The inside team specialization, a broad combination of trades, operational control--that which was not in their hands earlier is now a valuable lever for increasing the effectiveness and quality of labor.

However, it would be a mistake to assume that the enlargement of brigades, their transformation to cost-accounting, is proceeding without difficulty. The main difficulty is the absence of a precise perspective in planning, not to speak of a stable five-year plan. At the beginning of the year there are only preliminary building plans which then are corrected up to March or April. Under such conditions, it is impossible to create enlarged commodity building production brigades for facilities in advance. Here is why in the

Main Administration for Eastern Siberian Construction up to now there are only 16 such collectives. For the majority of them, it is difficult to select and guarantee a construction task.

And yet, it seems, there is a future for enlarged brigades. With their organization, the strengths and material resources are concentrated on relatively limited numbers of facilities, sharply increasing in this way the output of the commodity building production. Isn't this the best reason for disseminating the Novosibirsk experience?

12318
CSO: 1821/64

## HOUSING CONSTRUCTION IN TYUMEN OBLAST EXAMINED

Moscow ZHILISHCHNOYE I KOMMUNAL'NOYE KHOZYAYSTVO in Russian No 11, Nov 83 p 4

[Article: "Built to Last"]

[Text] Just so can one define the basic trend of the discussion that unfolded in the course of a session of the State Committee for Civil Construction and Architecture, at which the question of the implementation in Tyumen Oblast of the USSR Council of Ministers resolution of 4 September 1978 "On Measures for the Further Improvement of the Use and Repair of Housing Stock" and the USSR Supreme Soviet decree of 24 June 1981 "On the Development of the Housing Industry and Improvement of the Use and Preservation of Housing Stock" was discussed.

The whole country knows Tyumen Oblast as an area of intensive industrial construction, which is simply unthinkable without the regular powerful influx of a work force from other regions. The doubling and tripling of a town's population in five years--such a pace is not surprising here. This means that after the national economic projects (more accurately, simultaneously with them) come social projects. And first in line is residential housing.

V. A. Ognev, the deputy chief of the oblast administration of housing and municipal services; V. B. Nikol'skiy, deputy chief of the administration for repair of housing stock of the State Committee for Civil Construction and Architecture; and other speakers delivered reports. They presented impressive figures of the scale which the oblast housing industry has achieved. By the beginning of this year, in 13 towns and 30 settlements of the urban type, residential housing comprised 17.4 million square meters in area, of which the share of the collectivized stock was 15.2 million.

The average allotment in the urban settlements of Tyumen Oblast comprises 13.1 square meters per person, and in the rural areas 12.2 square meters. Stone and brick buildings comprise 76 percent of the housing space of the local soviets and 66 percent of that of the ministries and departments. Of the collectivized urban housing stock, 84 percent has running water, 82 percent has sewer hookups, 87 percent has central heating, 72 percent has bathrooms, 43 percent has gas, and 54 percent has hot water.

In implementing of the USSR Council of Ministers resolution of 4 September 1978 "On Measures for the Further Improvement of the Use and Repair of Housing Stock," the oblast administration of housing and municipal services has worked out measures, the realization of which has permitted some improvement in the condition of the housing stock.

Nine combines of communal enterprises, 26 regional production associations of housing and municipal services, and 10 cost-accounting housing administrations of the Tyumen urban housing administration are implementing the operation and current repair of the houses of the local soviets of people's deputies.

The volume of current repair carried out by the industry is increasing each year, and in 1982 comprised 1.9 million rubles, or 0.62 percent of the restoration value of the housing stock, while the average for the RSFSR (without Moscow and Leningrad) is 0.69 percent. The Novosibirsk method, which facilitates the preventive maintainence of houses, is being introduced in the Tyumen housing administrations. An emergency monitoring service is being established in the urban housing administration, as well as an emergency service for elevators.

The production association Tyumen'remstroy, established in 1963, is carrying out major repairs of the residential houses of the local soviets of people's deputies. In 1982 it absorbed 33 million rubles, including 4.6 million rubles for housing repair. Almost all the repair-construction organizations of the association have their own production bases; the production enterprises realize products worth 5.4 million rubles.

The planning office Tyumen'remstroyproyekt, which has five major departments (in Tobol'sk, Khanty-Mansiysk, Ishim, Yalutorovsk, and Surgut), implements the planning of major repairs of the residential houses of the local soviets.

In addition, notes of alarm--and rather insistent ones--resounded in the session. The basic holders of the collectivized stock (more than 87 percent) are the ministries and departments, which have adequate material-technical resources. But department housing is in the least satisfactory condition.

In the 10th Five-Year Plan, fulfillment of the plan comprised 94 percent in expenditures and 90 percent in the putting into operation of housing space, in 1982 91 percent and 89 percent respectively, including 56 percent and 55 percent for ministries and departments. The Ministry of the Automotive Industry (30 percent); the Ministry of Instrument Making, Automation Equipment, and Control Systems (52 percent); the Ministry of Industrial Construction (49 percent); and a number of other ministries do not fulfill the plan of major repairs systematically.

The municipal agencies are also indebted to the townspeople. They have been called upon to establish common services for the operation and repair of housing stock independent of its subordination, to conduct an all-round inspection of houses, and to compile on this basis a prospective plan for their repair.

A system of planned preventative repair has not been introduced. Each year, major repairs are made to 80-90 thousand square meters of housing space of the local soviets, of which 40-50 thousand square meters are complicated repairs, which corresponds to 3.5 and 1.5 times less than the norm.

In the oblast, both the local soviets and the ministries and departments practically lack the bases of residential-operation organizations. Each year 500-600 thousand rubles is expended on the construction and reconstruction of the bases of repair-construction organizations of the local soviets, or two to three times less than the established 10 percent deductions from the volume of major repair.

A serious lag has been allowed in questions of consolidation and specialization of residential-operation and repair-construction organizations and of establishment of common services capable of ensuring the proper technical facilities and current and major repair of state housing stock independent of its departmental jurisdiction. At the same time, only 14 percent of the capabilities of the Tyumen'remstroy association for the repair of housing stock are used.

The preparation of departmental housing stock for transfer to the account of the local soviets is organized unsatisfactorily, and the rate of acceptance of this stock is low (for the years 1968-1982, a total of 671.2 thousand square meters of housing space was accepted. The annual volumes, times, and conditions of acceptance and transfer of housing stock on the whole are lacking for the oblast and for individual ministries and departments.

The session of the State Committee for Civil Construction and Architecture talked about the elimination of the inadequacies noted and the affirmative resolution of urgent problems. This will strengthen the preconditions for transfer to regional planning and facilitate the drawing together of the rates of industrial and social development of Western Siberia.



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## EVALUATING TECHNICAL LEVEL, QUALITY OF MACHINERY

Moscow STROITEL'NYYE I DOROZHNYYE MASHINY in Russian No 2, Feb 84 pp 18-19

[Article by V. I. Polyakov, candidate in technical sciences, TsNIIOMTP [Central Scientific-Research and Experimental-Design Institute on the Organization, Mechanization and Technical Aid to Construction]: "Evaluating Technical Level and Quality of Construction Technology']

[Text] The joint work of consumers and builders of construction machines in evaluating the technical level and quality (TU and K) and certification of machine building products is bringing positive results. Theoretical studies, tests of experimental samples, initial batches and series production under production conditions and generalization of foreign experience serve as the basis for this work. The effective normative document RD22-2-78 and the TU and K production charts regulate the nomenclature of the evaluative indicators, the method of obtaining them, and the comparisons with indicators for the best equivalent domestic and foreign machines. However, due to the complexities of obtaining data on the best equivalent examples and conditionalities and omissions in comparing the indicators for the machine being evaluated and the analogs, the TU and K chart is not an exhaustive document presenting the operational properties of the new or modernized machine.

As we know, the TU and K chart for analogous machines, as a rule, gives only the indicators of function, which are not uniform for all countries. In our country these indicators are formulated under the influence of the GOST [All-Union State Standards], technological regulations and charts, recommendations and norms for labor safety and sanitation, and other specific peculiarities of building production. At the same time, the selection of parameters for foreign technology is greatly influenced by different, often unpredictable factors and reasons, including advertising, business and competitive conditions. Therefore, the use of functional indicators of foreign analogs should be approached rather carefully. As concerns the indicators of reliability, ergonomics, expenditure of operational materials, convenience of technical service, and repairability, these may be used with clarification of the modern level of domestic machines, since foreign companies do not present such indicators in their technical documentation.

Determination of a machine's resource to the first capital repair based on the method of mathematical statistics and sampling of reporting data of

operating organizations does not lead to the desired results. The absence of diagnostic devices makes it impossible to precisely evaluate the remainder of the resource before repair, while the standard questionnaires sent out by the manufacturing plants do not make it possible to objectively determine the work performed by the machine from the start of operation.

Thus, the practice of evaluating the TU and K of analogous machines which has arisen does not further the situation whereby the new technology under existing times for development and operation of series samples will be at the current level.

The organization of broad and systematic studies of foreign technology is necessary in the construction of the BAM [Baykal-Amur Main Line], the Urengoy-Uzhgorod gas pipeline, and territorial-industrial complexes with the participation of scientific-research organizations and specialists in building production.

The ministries have been asked to develop a nomenclature and values of indicators (primarily for reliability, technological efficiency, standardization and unification) on corresponding categories of machine quality for inclusion into the effective and newly developed standards and technical conditions. For the purpose of creating an objective scientific-technical base for regulating standards and technical conditions for indicators of building machine quality categories, it is necessary to work out a nomenclature and value of differentiated indicators according to the basic groups of machines. Experience has shown that this work requires a systemic approach and the presence of extensive initial factual material.

To achieve the predicted TU and K of machines, it is necessary to use corrective factors to the basic operational-technical indicators. A special place in the prediction must belong to indicators for expanding the nomenclature of the operational equipment and the changeable working organs. Since the regulation of this indicator is not provided in foreign practice, it is impossible to determine the advantages or disadvantages of domestic machines by the number of types of interchangeable equipment and working organs. It would be desirable in reviewing the RD 22-2-78 to work out a nomenclature of technologically necessary types of equipment and working organs, which will create additional capacities for evaluating domestic machines.

The TU and K charts contain important indicators which relate to perspective example which must be incorporated into the new or modernized machine. However, the predicted increases in the levels of design and operational parameters do not have a fundamental theoretical basis and are specified by the manufacturing plants from the number of "reserved" machine capacities within the limits of 2-5 percent. This approach does not stimulate progress in the development of technology and creation of new samples, which must encompass all the latest achievements and prospective developments. The research by VNIIstroydormash [All-Union Scientific-Research Institute on Construction and Road Machine Building] on the formulation of realistically possible indicators for prospective machine models is deserving of attention. The inclusion of random, scientifically unsubstantiated parameters for prospective models into the TU and K charts makes no sense.

The times for realization of planned changes in machine indicators are sometimes equal to 3-5 years, i.e., practically by the start of series manufacture of the new machine. Consequently, in order to achieve a new increased technical level of production, the design-technological decisions must be provided in the process of developing the machine. It is expedient to retain the introduction of generally progressive developments which significantly alter the operational properties of the machine or which require the participation of contiguous sectors, as well as new methods of computation and technological in the corresponding section of the TU and K chart. Among such developments we may include, for example, obtaining multi-layer tires of high load capacity for pneumatic tire cranes, creation of transport conditioners, gyroscopic load lifting limiters, octahedral booms, hydraulic equipment with pressure of 25-30 MPa and higher, diesels operating at 50°C, and filters with purification limit to 40 $\mu$m. The accepted differentiated inclusion of ergonomic noise indicators in octave ranges of from 60 to 400 dB at the stage of technical design has no sense and may be limited to a reference to correspondence to GOST 12002-77 and SN-1102-73. In evaluating the machine at the stage of series production, it is preferable to use the changes in ergonomic parameters not during the acceptance testing of the test sample, but rather on a machine which is in operation, when the actual break-in, loss of air tightness and density of the connections may give increased noise and vibration levels at the machine operator's work site or near the machine.

It is timely to introduce clarifications into the existing times for certification. The accepted recertification time is no more than five years, equal to the effective time of the corresponding standard, and is rather conditional, since the effective times of the GOSTs for many groups of machines exceed five years. Moreover, the number of recertifications is associated with the volume and qualitative make-up of changes occurring in the machine in the period between certifications. We might add that the transition to a modernized model and the corresponding new index are also insufficiently defined and are established on the basis of the conclusions of experts, depending on the type of machine and essence of the changes, as well as the anticipated operational effect. In particular, we may easily allow the recertification time for complex machines manufactured in small lots (cranes with load capacity of 100 tons or more, loaders of 25-40 tons, scrapers for 25-40 $m^3$, etc.) to be five years instead of three.

According to RD 22-2-78, the evaluation of the TU and K is performed in two stages: development of the technical documentation and series production of the machine. However, lately an intermediate stage has been added to these two stages, which is associated with the pricing of the machine and is sometimes combined with the second stage. The introduction of the third stage leads to the necessity of working out the TU and K chart and the associated obtaining of data about the work performed by the machine and the responses of the operating organizations. However, by this time the work performed by the machine, as a rule, has not yet reached the required volume (500 moto-hrs), which cannot ensure reliability in determining its operational properties. It is expedient to perform the evaluation associated with determining the price of the machine at the stage of development of the technical documentation with subsequent correction at the stage of series production.

The entire system of evaluation and certification of construction and road machines must rest on factual information and statistical material. A special decision of the joint meeting of the scientific-technical councils of the Minstroydormash and the USSR Gosstroy [State Committee on Construction Affairs] was announced on this question. It is necessary to use all the possible channels of gathering factual data on the reliability and work capacity of machines. These include the study of machines under production conditions according to annual plans of comprehensive mechanization and automation of construction by the USSR Gosstroy, systematic information which should be obtained from the building organizations, including their support points and orgtekhstroys [institutes for organization of technical construction], and testing the machines at proving grounds and machine testing stations (MIS). It is expedient to expand the network and intensify the existing support points, as well as to provide for organization of MIS in the construction ministries according to the type created in the system of the RSFSR Minshosdor [Ministry of Highways]. The activization of an evaluation of building technology by the builders themselves makes it possible to most fully and efficiently define the operational properties of the machines and at the same time to take measures for eliminating any inherent defects. We must note that the capacities for attracting users by manufacturing plants after receiving responses from them on the work capacity of the machines are still being insufficiently utilized. The standard questionnaires in a number of cases bear a general character and are not directed toward determining the shortcomings or aimed at further improvement of the designs. The results of acceptance tests should be more fully utilized and their performance should be properly planned in time and site at the manufacturing plant and under operational conditions.



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# DEPUTY MINISTER LISTS PROBLEMS OF BUILDING MATERIALS INDUSTRY

Leningrad TSEMENT in Russian No 1, Jan 84 pp 1-4

[Article by V. I. Kushchidi, deputy USSR minister of Construction Materials Industry: "Increase Responsibility for Fulfilling Plans and Commitments"]

[Text] In summing up the results of cement-industry operationsand in examining the tasks that face enterprise collectives during 1984, we are obliged to proceed from the instructions that CPSU Central Committee General Secretary, Chairman of the USSR Supreme Soviet Presidium Comrade Yu. V. Andropov expressed at the June 1983 CPSU Central Committee Plenum.

The indoctrination of members of collectives of enterprises, institutes and institutions of our industry in communist consciousness, improvement in labor discipline, and a raising of the responsibility of supervisors at all levels for the assigned task should be the aim of our activity and the method for fulfilling the state plan.

Operating results for the first 9 months of 1983 indicate that enterprise collectives--the initiators of socialist competition, whose initiatives were approved by the USSR Minstroymaterialov [Ministry of Construction Materials Industry] Board and the central-committee presidium of the industry's trade union--met their commitments successfully.

Thus the Spassktsement PO [Production Association] collective, which undertook a commitment to produce 35,000 tons of cement and 10,000 tons of limestone meal above the plan, produced 49,000 tons of cement and 15,000 tons of limestone meal above plan during the first 9 months of the year.

And the straight-through brigade of operators of dry-process rotary kiln No 1 of the Novospassk plant, under B. I. Pipko, which committed itself to produce 1 million tons of clinker in 1983, including 100,000 tons above the plan, coped successfully with its commitments.

Titles of Laureate of Soviet Trade Unions were conferred on rotary-furnace operators N. A. Baryshev (the Topki plant) and Yu. V. Karandashev (the Voskresensktsement PO) for selfless labor.

The initiative, "Promote competition for a worthy greeting to the 25th anniversary of the movement for a communist attitude toward work," received

enthusiastic support in the industry's collectives. The initiator of this movement--rotary-kiln operators' brigade of the Ul'yanovsk Cement Plant, under USSR State Prize winner V. G. Yankin, successfully carried out its commitments, produced 1,800 tons of clinker above the plan, and saved 310 tons of standard fuel equivalent above the plan.

The title, "Communist Labor Collective," was conferred on 369 departments, 294 sections, 256 shifts and 1,733 brigades in the industry, for successes in socialist competition and high work indicators.

The collectives of harmoniously working enterprises of the Topki, Karachayevo-Cherkassy, Korkino, Lipetsk, Teploozero, Podgorenskiy, Ul'yanovsk and Bezmein Cement Plants, the Mikhaylovtsement, Akmyantsementas, Spassktsement and Volkovyssktsementnoshifer associations, the Rybnitsa, Bekabad and Zhigulevsk combines, the Soyuztsementremont and Uralspetsremont repair trusts, the Soyuzspetstsemstroyremont construction-and-repair trust, the Kaztsemremont and Orgproyekttsement enterprises and the experimental plant of NIItsement [State All-Union Scientific-Research Institute for the Cement Industry] are repeated winners in socialist competition.

Thanks to the successes of leading-enterprise collectives, the industry's cement production in 1983 increased by more than 3 million tons over 1982.

Enterprises of Glavzapadtsement [Main Administration for the Cement Industry in the Western Regions], Glavvostoktsement [Main Administration for the Cement Industry in the Eastern Regions] and the building-materials industry ministries of the Lithuanian, Tajik, Belorussian and Moldavian Union republics made a considerable contribution to fulfilling the plan for producing cement.

Unfortunately, the industry's ministries in the Ukraine, Georgia, Azerbaijan, Latvia, Kirghizia, Armenia and Estonia were not able to provide for plan fulfillment.

The most important cause of unsatisfactory operation of some of the industry's enterprises was the large amount of above-plan idle time of the basic industrial equipment because of violation of the equipment-operation rules, low industrial discipline and incomplete manning by servicing and repair personnel.

As before, in some parts of the country deliveries of railroad cars for shipping cement fell short, as a result of which about 700,000 tons of above-plan surpluses of cement accumulated, which caused the equipment to be stopped at various plants (Sebryakovsk, Belgorod, Topki and other plants) and cement silos to be overfilled at the Mikhaylovtsement and Voskresensktsement PO's and other enterprises).

The plan for cement production failed at the Bryansktsement PO because of a shortfall in the delivery of railroad cars for shipping diatomaceous earth, and the Brotseny combine and the Riga plant underfulfilled the plan for cement production because of a shortage of this component.

Twice in 1983 the power supply for the Chimkent Cement Plant was switched off, which led to deformation of the body of rotating kilns and unplanned idle time for repair and to three high-voltage electric motors for the mills going out of commission. This seriously affected the operating results of this advanced enterprise.

The industry's plants received less than planned amounts of pyrite cinder (about 25 percent), gypsum rock (almost 8 percent) and granulated slag (about 3 percent). The most stressful situation occurred with regard to cinder deliveries. Some cement plants of the Baltic area and central oblasts work without carryover reserves of this additive.

Chronically lagging enterprises include the Slantsy, Kamenets-Podolsk, Gornozavodsk, Yashkino, Olshanskiy, Semipalatinsk, Rustavi, Razdan and "Punane-Kunda" plants, and the Kant and Nikolayev combines.

Serious violations of the rules for technical operation of the equipment and of industrial and production discipline and work without the standard reserves of raw material and fuel are typical of these enterprises. Malfunctions of the basic equipment occur here often.

Moreover, the Akhangarantsement PO and the Nizhniy Tagil, Katav-Ivanovsk, Krasnoyarsk, Novokuznetsk, Krivoy Rog, Yenakiyevo, Kramatorsk, Karadag and other plants operated with interruptions for various reasons.

Those same deficiencies, which are characteristic for the previously mentioned enterprises, are characteristic also for enterprises of this group, although to a lesser degree. For this group of plants, aside from the internal causes, a substantial influence is exerted also by external factors, which have already been mentioned (shortfalls in deliveries of cinder, gypsum rock, granulated slag, freight cars, and so on).

A substantial lag behind the plan for producing clinker was allowed by four Glavzapadtsement enterprises and by five of Glavvostoktsement, and also by a number of plants of the building-materials industry ministries of the Ukrainian, Estonian, Georgian, Armenian, Azerbaijan and Kirghiz republics.

Union-republic building-materials industry ministers and chiefs of main administrations must analyze closely the state of affairs at the lagging enterprises and take effective measures to insure fulfillment of the 1984 plan.

The chief reserves for increasing clinker and cement output are a rise in the production-capacity utilization factor and regularity in operation of the enterprises. However, these factors do not always get proper attention.

An especially low capacity-utilization factor is observed at the Chechen-Ingush (40.8 percent), Krivoy Rog (60.3 percent), Slantsy (71.7 percent), Yashino (75.8 percent), Razdan (75.2 percent) and Navoi (73.3 percent) plants.

If the lagging enterprises would increase their capacity-utilization factor to the industrywide average, that would be equivalent to an increase of 2.5 million tons in cement production.

Data that reflect irregularity in fulfilling plan tasks for various republics are shown in the table.

| Construction-materials industry ministries of the Union republics of: | Plan fulfillment (percent) by 10-day period | | |
|---|---|---|---|
| | I | II | III |
| Moldavian..... | 30.5 | 32.7 | 36.8 |
| Kazakh..... | 30.8 | 32.1 | 37.1 |
| Latvian..... | 30.4 | 33.0 | 36.6 |
| Tajik..... | 29.4 | 32.2 | 38.0 |
| Armenian..... | 26.4 | 32.9 | 40.7 |

As before, above-plan idle time for the basic operating equipment is great. For the first half of 1982 alone, it amounted to 23,500 machine-hours for rotary kilns, exceeding the plan by 37 percent, 49 percent of the above-plan idle time occuring because of breakdowns and malfunctions of the equipment.

Clinker production losses that resulted from unplanned idle time reached 840,000 tons, including 473,000 tons at Union-republic enterprises.

The total number of breakdowns during the first half of the year that were mentioned in reports was 86, but it must be said that these data are far from complete, since many enterprises do not report breakdowns that have occurred. Thus, during the first half of the year, 7 Glavzapadtsement enterprises, 7 Glavvostoktsement enterprises and 25 out of 37 Union-republic enterprises did not make reports.

The basic causes continue to be violations of the rules for operating the production equipment and of the planned-preventive maintenance system.

At the Belogorod plant, for example, on the shifts of foremen Yu. A. Grachiyev and V. S. Soshenko, the housing and carrying roller went out of operation as a result of a lack of oil in the bearings of the rotary kiln's support. Thirty hours of idle time were incurred in eliminating the malfunction, and 750 tons of clinker output were lost.

At the Staryy Oskol plant, through the fault of rotary-kiln operator V. N. Luchin, the furnace body was allowed to overheat, as a result of which two cracks formed in the areas of supports Nos 3 and 7, causing the furnace to be idle for repair for 76 hours and clinker output to fall short by 5,168 tons.

At the Katav-Ivanovsk plant, when the installation for drying slag in a pseudoliquefied layer was being heated up, an explosion occurred in the gas-and-air mix in the dust chamber because of violation of the Rules for Technical Operation of Gas Facilities. Those to blame for the accident proved to be fitter-mechanic brigade leader of the drying division G. K. Cherkashin, senior foreman of the drying department A. N. Pokhlebayev, former chief of the grinding department V. N. Kiselev, and foreman of the power department's gas service N. S. Degtyarev.

The most typical cause of breakdowns at grinding departments is melting of the babbitt of the bushings for the trunnion bearings. This was the reason for five breakdowns at Glavvostoktsement plants, four at Glavzapadtsement plants and five at Union-republic plants.

Breakdowns often occur because of poor-quality of the toothed rings of the second unit of reduction gears of the 3.0x14 meter mills that are supplied by the Volgotsemmash plant. The Slantsy, Katav-Ivanovsk, Chernorechenskiy, Kamenets-Podolsk, Semipalatinsk, Chimkent and Razdan plants, the Karagandatsement, Bryansktsement and Mordovtsement PO's and the Kant combine have high equipment breakdown rates.

A disturbing trend toward increased time spent on planned maintenance and emergency repairs is being observed, and cases of poor quality in making repairs are frequent.

In order to insure fulfillment of the cement-production plan for 1984, quick action must be taken to man the various cement plants with servicing personnel, to eliminate unplanned idle time of rotary kilns and mills, to raise exactingness in regard to the observance of technological and production discipline, to improve the technical training of personnel, to bring the number of repair workers at plants up to the required manning levels, and to prevent even one case of breakdown to occur without serious investigation and punishment of the guilty.

The November 1982 CPSU Central Committee Plenum emphasized that the pace of the work on updating equipment during the 11th Five-Year Plan should grow 1.5-fold over the 10th Five-Year Plan.

During the first 3 years of the current five-year plan, the industry has replaced 300 cement and raw-materials mills and about 70 compressors with more productive ones, rolled armored lining has been introduced at more than 200 grinding units, and other equipment has been updated. The supports for more than 100 kilns have been converted to rolling-contact bearings, and more than 10 welded-in strips have been installed, enabling the utilization factor and the stability of the units' linings to be increased. Shaft kilns at the Amvrosiyevka combine and rotary kilns that are short and uneconomical in regard to fuel consumption at the Bekabad, Krivoy Rog and other plants have been taken out of operation.

However, there are still many kilns (except for wet-process kilns 170 and 185 meters long and dry kilns 75-90 meters long) and grinding units and much crushing equipment, quarry-transport equipment and intradepartment and interdepartment transport that is greatly worn and on which the amortization life has long since expired. Therefore, it is extremely important to speed up greatly the replacement and modernization of worn and obsolete equipment.

A most important area of our production activity is the economical consumption of fuel, power and material resources. But, unfortunately, this main task of the 11th Five-Year Plan still has not been given proper attention by enterprise managers.

According to data for the first 8 months of 1983, 65,000 tons of standard fuel equivalent were expended on roasting clinker. In so doing, 15 enterprises did not stay within the established norms. The Razdan, Dushanbe, Kuvasay, Slantsy, Katav-Ivanovsk, Krivoy Rog and Olshanskiy plants and the Nikolayev combine especially did not expend fuel satisfactorily.

Much overconsumption of electricity also occurred, especially at the Slantsy plant and Bryansktsement PO, and also at the Katav-Ivanovsk, Kuznetsk, Krivoy Rog and Kuvasay plants and at the Amvrosiyevka and Nikolayev combines.

The main causes for overconsumption of fuel and electricity are unplanned idle equipment time, violations of industrial and labor discipline, high moisture content of the slurry, and interruptions in providing kilns with raw material.

In order to insure a saving of resources, it is necessary primarily to indoctrinate enterprise workers daily in the spirit of being thrifty in every possible way and to introduce measures aimed at cutting fuel, electricity and materials consumption.

The question of producing high-quality output is posed especially severely during the current five-year plan. Industrywide, the average grade of cement meets the plan, but this still does not mean that everything is going well with regard to quality. At some enterprises the guaranteed grade is not delivered, current monitoring has been weakened, violations of the requirements of the enterprises' standards and the process sheets occur, and in some cases there are violations of GOST's [All-Union State Standards] and TU's [Specifications]. This relates primarily to the Kamenets-Podolsk plant, the Nikolayev combine and the Karagandatsement and Mordovtsement PO's.

In 1982-1983 nine types and grades of cement produced at eight enterprises (the Oktyabr, Proletariy, Kuznetsk, Olshanskiy, Pervomaysk and Nizhniy Tagil plants and the Angara and Kant combines lost the Emblem of Quality).

At some enterprises a trend toward a reduction in clinker activeness and, accordingly, a reduction in the amount of additive introduced during grinding, was observed, causing an increase in the consumption of fuel and power resources per ton of output (the Yenakiyevo, Staryy Oskol, Ararat, Semipalatinsk and Magnitogorsk plants and the Brontsensk combine).

Therefore, the personal responsibility of chief engineers and OTK [technical inspection office] chiefs for the state of technological discipline and the quality of the products shipped must be increased, violation of the standards requirements must not be allowed, and those guilty of such violations must be called to account.

It is also necessary to adopt a rule that Union-republic main administrations and building-materials industry ministries regularly hold seminars for chief engineers and OTK chiefs on matters of production discipline and product quality.

Guided by 26th CPSU Congress and May 1982 CPSU Central Committee decisions on the USSR Foodstuffs Program, cementmakers are simultaneously providing agricultural construction projects with cement, increasing the output of limestone meal, and working to create agricultural departments at enterprises and to strengthen and develop existing subsidiary farms.

For example, the Spassktsement PO collective committed itself to produce 740,000 tons of limestone meal, 10,000 tons of it above the plan, in 1983. The

association planned the following for its subsidary farm: to bring the number of hogs up to 1,200 head and to realize 30 tons of pork products; to build up the apiary to 150 bee colonies; to raise at least 60 tons of vegetables in hothouses; and to build a department for vitamin meal, as well as a department for slaughtering hogs and a cubicle for repairing agricultural equipment. The association's collective successfully fulfilled the adopted commitments.

From year to year the production of meat, dairy products, vegetables and potatoes has been increasing at the subsidiary farms of the Gornozavodsk, Korkino, Vorkuta, Topki and Teploozero plants, the Voskresensktsement PO and the Zhigulevsk combine. However, the Gornozavodsk and Slantsy plants are not meeting the plan for producing limestone meal.

Cement industry workers should eliminate existing deficiencies and make a meaningful contribution to realization of the USSR Foodstuffs program.

In promoting new tasks for the country's economic and social development, the CPSU attributes enormous importance to strengthening party, state and labor discipline. These questions are very urgent also for the cement industry.

The execution of a number of measures in this area has enabled positive results to be achieved. Worker turnover in the industry has been reduced by about 20 percent, labor discipline has been strengthened and worktime losses have been cut.

Much work is being done to strengthen labor and production discipline at the Bezmein, Novotroitsk, Lipetsk, Ul'yanovsk, Sebryakovsk, Teploozero, Podgorenskiy, Vorkuta and Ivano-Frankovsk Cement Plants, the Angara Cement and Quarrying Combine, and the Voskresensktsement, Vol'sktsement and Akmyantsementas associations.

As a result of this, these enterprises have not only high work discipline and low personnel turnover but also high production indicators, an absence of accidents, and effective equipment utilization, all of which promote a stable work collective.

At enterprises that are not meeting production plans, work to strengthen labor discipline is not up to par. As a result, major worktime losses and unplanned idle-equipment time and high personnel turnover are observed here.

Therefore, it is necessary to eradicate decisively cases of a routine attitude toward idlers and absentees, using social and administrative measures effectively for these purposes.

The decisions of the November 1982 and June 1983 Central Committee Plenums require a drastic increase in labor productivity, based upon wide and speedy introduction of scientific and technological achievements and advanced experience into practice.

Conversion of the industry's institutes to work on specific integrated scientific and technical programs has enabled a rise in the level of scientific

research, and a concentration of scientific workers' efforts on qualitatively new directions for developing the chemistry and technology of cement and for accelerating scientific and technical developments.

Under development at present are a basically new low-temperature (saline) and radiation-chemical technology for roasting clinker; a technology for producing high-strength and prestressing cements with the use of sulfo-aluminate additives and superplasticizers; a technology for obtaining colored cements with the use of bleaches fixed in the kiln; and other technologies.

As a result of developments by the industry's institutes, more than 60 rotary kilns have been modernized with change in their profile and a conversion to rolling contact bearings, 6 mills for wet grinding of raw materials have been erected, about 200 sets of effective armored lining made of rolled members have been installed in cement and raw-materials mills, lining made of wear-resistant rubbers has been applied at more than 60 raw-materials mills, and more than 100 sets of effective heat-exchange and burner installations have been introduced. At 16 enterprises, 23 automated systems for controlling industrial processes are in operation.

Examples of newly introduced developments:

enhanced combustion of fuel in a shaft-type cyclone heat-exchanger at the Katav-Ivanovsk plant, which has enabled kiln productivity to be raised from 32.5 to 47.8 tons per hours;

construction of an original shaft-cyclone heat-exchanger at kilns of the Pobeda Oktyabrya plant;

a gas-burner installation with remote ignition at the Proletariy plant;

a suspended-module lining at the burning end of rotating kilns at the Sukholozhsktsement combine;

lining of industry-process tanks and components with plates made of composites based on polyolefins (this method of lining has passed industrial tests at many plants and shown good results, so its wide introduction must be organized); and

a method for warming raw materials at quarries with the use of polymer coatings that is being used successfully at the Teploozero plant, Angara combine and Spasstsement PO. Such a coating prevents freezing and facilitates the quarrying of raw material during the winter.

It should be noted, at the same time, that the pace of introducing many useful and effective developments is extremely slow.

For example, the highly effective R-roasting is still being used only at the Lipetsk plant and the Akmyantsementas PO. The managers of other enterprises have not displayed initiative in introducing it.

Work has stopped on the realization of certain tasks without the achievement of final results, namely, the production of krents at the Amvrosiyevka combine and a system for enhanced fuel combustion at the Slantsy plant. The design of the ASUTP [automated system for the control of industrial processes] of the Novospassk plant lags behind the planned deadlines.

The assimilation of NTS [low-temperature separation] technology at the Akhangaran combine and the Sas-Tyubinsk plant is proceeding slowly. Until now Giprotsement [All-Union State Design and Scientific-Research Institute for the Cement Industry] and NIIstromproyekt [Scientific-Research Institute for the Design of Building-Materials Industry Enterprises] have not issued calculations for the conversion of the Gornozavodsk plant to NTS technology.

The question about increasing funds for KS-35 resin for producing the LSTM-2 superplasticizer has not been resolved.

The LSTM-1 grinding intensifier and the SDB slurry diluter are being introduced slowly. Blaming the lack of capital investment, enterprises are not building the necessary receiving and batching arrangements, although no more than 150,000 rubles are required for erecting them, and any plant, even the smallest, has such means at its disposal.

A negative attitude of certain enterprise managers toward questions of introducing scientific developments is a symptom of their inadequate technical maturity.

The relatively low proportion of dry-process cement production in the country stems from the fact that new capacity was built mainly during the Eighth and Ninth Five-Year Plans by expanding existing wet-process enterprises.

In recent years we have taken definite steps to develop this progressive method for making cement. Five new process lines with a total productivity of more than 5 million tons per year are being operated. A new industrial line with a reactor-decarbonizer has gone into operation at the Krivoy Rog plant. A second dry-process production line for 1 million tons is being built and will be introduced this year at the Novokaraganda plant.

USSR Minstroymaterialov has developed, jointly with the industry's institutes, a program for rebuilding the cement industry during the period up to 1995, under which many enterprises are to be converted to the dry and semidry production methods, low-temperature energy-saving technology is to be introduced and other measures to reduce specific fuel consumption at existing enterprises are to be taken.

For the period up to 1995 as a whole, it is planned to convert 18 wet-process plants to the dry method, to rebuild and expand four existing dry-process plants, to dewater slurry mechanically with the installation of filter presses at a number of plants and later conversion thereof to the dry process, and to introduce NTS technology at 6 plants. However, this will be possible during the Twelfth Five-Year Plan if USSR Gosplan calls for the necessary capital investment.

As capacity that uses energy-saving technology increases, some old enterprises with worn and energy-intensive equipment are to be shut down.

It is planned to update industrial production capital of existing plants and to replace obsolete equipment with modern equipment. These steps should insure a sharp reduction in the amount of repair work and, correspondingly, a rise in the equipment-utilization factor.

Calculations indicate that, with the execution of this program, which was developed to take into consideration the natural peculiarities of the raw-material deposits, it will be possible to bring the proportion of dry-process and other energy-saving technologies in the overall cement production volume up to 40 percent by 1995 and to reduce specific fuel consumption for roasting clinker by 10 percent by 1990, 20 percent by 1995.

The 1984 plan calls for a 2.5-million ton increase in cement production over 1983. Taking into account the assimilation of newly introduced capacity and improvement in the use of existing capacity, this plan is completely realistic.

There is no doubt that cement-industry workers will radically improve the industry's operation, labor persistently, insure fulfillment of the state plan and socialist commitments by 1984, and make a meritorious contribution to the successful fulfillment of 26th CPSU Congress plans.



11409
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## NEW ROOFING PROCESS SAVES MATERIALS, LABOR

Kishinev SOVETSKAYA MOLDAVIA in Russian 14 Mar 84 p 2

[Article by V. Nartsissov, chief of the technical administration, Moldavian SSR Minstroy [Ministry of Construction] and V. Zalmanov, section chief of the Orgstroy Trust: "Faster and Cheaper"]

[Text] As we know, the effectiveness of capital construction depends greatly on the comprehensive mechanization of construction-installation work and the widespread introduction of progressive materials and modern technology.

The interesting experience in the development and introduction of new technology and mechanization of one of the most labor-consumptive construction jobs -- building roof installation -- is related in the material published below.

Until recently, only the technology of building roof installation comprised the exception in the overall improvement of construction-installation work. This technology, much as two or three decades ago, recommended the installation of a multi-layer "cake" comprised of an insulating layer, cement or asphalt binder and rolled materials laminated together with bitumen mastic.

By its technical-economic and operational indicators, this type of roof is significantly inferior to the other design elements of buildings and structures. At the same time, due to the low level of mechanization and potentially dangerous conditions of working with hot mastic, the labor consumption of roof installation in some cases is up to 10 percent of the overall labor expenditure for erecting the building and comprises up to 3-5 percent of its overall cost.

Its operational properties are also low. The service life of a rolled roof to its first repair does not exceed three to five years. Moreover, repair work is even less mechanized and more labor consumptive. Finally, we must remember that the preparation of bitumen mastics is associated with serious pollution of the environment.

In connection with this, the experience of the Tiraspol Construction Trust takes on particular interest. Here, for the first time in Moldavia, a progressive

technology has been developed and introduced for the installation of non-rolled mastic roofs.

The trust specialists, working in close cooperation with the Scientific-Research Institute of Building Production of the UkSSR Gosstroy [State Committee on Construction Affairs], the Orgstroy Trust, and the Small-Scale Mechanization Administration of the MSSR Ministry of Construction, have developed, built and introduced into operation a specialized and highly mechanized shop for preparing bitumen-emulsion paste and mastic with capacity of 15 tons per shift.

We must note the comprehensive character of solving this problem. Simultaneously with the construction of the shop for making the emulsion materials, special container cisterns were developed for transporting these materials to the sites. These cisterns are equipped with mixing devices, pumps and nozzles for feeding and application of the paste and mastic to the roof surface.

The new roofing design, unlike the former rolled roof, is comprised of a combination of paste and mastic layers reinforced with thin fiberglass matting, which has significant resistance against the action of water and bitumen, and is also lightweight.

There has also been a principle change in the organization of the roofing work. Whereas before each construction administration had a team of roofers who, as a rule, performed insignificant volumes of work with low labor productivity, now there is a single sector in the trust which is comprised of a team of roofers, a shop for making the paste and mastic, and a full assortment of mechanisms, attachments and instruments. The total number of workers in this specialized sector is small -- only 13 people, i.e., almost one-third the number previously engaged in roofing work. The centralization of this work has made it possible to more efficiently and effectively maneuver the technical equipment and to provide a 2-2.5-time increase in labor productivity. This has significantly reduced the time needed for performing roofing and hydroinsulation work.

Another important aspect is the fact that the builders save up to five kilograms of bitumen, which is in short supply, on each square meter of a mastic roof. If we consider that the areas of roofs on industrial enterprises are figured in many tens of thousands of square meters, it is easy to see what a great savings of this material the widespread introduction of the new technology will yield.

The following data also confirm the advantages of mastic coverings on such roofs. Due to the application of bentonite clay and entrainment ash from the Moldavian GRES [State Regional Electric Power Station], whose reserves are huge in the republic, according to the data of the NIISP [Scientific-Research Institute on Building Production] of the UkSSR Gosstroy, such roofs do not lose their elasticity and strength properties for 15 or more years. The bitumen-emulsion mastic is resistant against the effects of high temperatures and ultraviolet radiation.

One other very important fact is that the technology of mastic roof installation creates conditions for mechanizing practically all the production processes, improving the working conditions of the roofers and adhering to safety technology, since the paste and mastic are used cold, without heating.

In the second half of 1982 and the first half of 1983 alone, over 90,000 square meters of the new type of roof have been installed in the construction and reconstruction of a number of industrial sites in Tiraspol. As a result, the overall economic effect comprised around 150,000 rubles. Tiraspol builders also applied this technology at certain facilities of the Moldavian Metallurgical Plant.

The All-Union School on Modern Methods of Roofing and Hydroinsulation Installation, which was conducted at the trust's facilities, has also convincingly confirmed the importance and effectiveness of the work performed by the Tiraspol builders. Representatives from most of the USSR Minstroy [Ministry of Construction] organizations and specialists from project design and scientific-research institutes participated in these workshops. The experience of the Tiraspol Trust has been recommended for widespread application at construction sites throughout the country.

However, we believe that the problem of introducing this progressive technology should not be limited merely to the framework of the republic's construction organizations. It opens up broad possibilities in performing repair work. Specialized sectors for the production of bitumen-emulsion mastics and repair work, supplied with the necessary equipment and transport means, must be created, in our opinion, within the system of the MSSR Ministry of Housing and Municipal Services.

The benefits of such a decision are obvious. Even approximate computations show that this would make it possible to save up to half of the amount of bitumen used for repair work in the republic, to economize on thousands of tons of liquid fuel, and to free considerable labor resources.

This decision is also expedient because the new roofing work technology continues to be improved. Moldavian builders are planning to utilize the experience of their Belorussian colleagues, who have begun using perforated ruberoid instead of the fiberglass matting which is short supply. Moreover, the very same Tiraspol Construction Trust has begun the development of all-weather bitumen-free mastic (the bitumen-emulsion mastic is used only during the warm time of the year) using the by-products of butyl rubber, kukersol-lacquer and other components which are in plentiful supply.

Obviously, the solution of the problem of increasing the effectiveness of roofing work cannot be reduced solely to the introduction of mastic non-rolled roofs. Prior experience illustrates the expediency of installing non-rolled roofs made of high-strength reinforced concrete with increased indicators for water impermeability. In a roof of this type, the mastic covering is done in the form of a protective painted-on layer. Its application is most effective in large panel house building. We must note that the relative share of roofs of this type within the system of the MSSR Minstroy already comprises 22 percent.

Specialists of the Kishinev House Building Combine No 2, the Orgstroy Trust and the Kishinev Integrated KB [design bureau] section on Reinforced Concrete of the RSFSR Gosstroy have developed a roof design whose elements were first produced in the republic by the ZhBI-1 Plant and used in the construction of large-panel 135-series houses. This roof makes it possible to start finishing work immediately after completion of the installation of its elements. Experience has shown that the operational expenditures for maintaining these types of roofs are one-fourth the amount of expenditures for maintaining roofs with rolled coverings. At the present time, the Kishinev Experimental-Test Mechanical Plant is planning to manufacture molds for the production of improved elements for non-rolled roofs.

The widespread application of progressive technology in roofing work will create real conditions for a significant reduction in capital expenditures on construction.

12322
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## COSTS OF USING VARIOUS BUILDING MATERIALS COMPARED

Moscow BETON I ZHELEZOBETON in Russian No 2, Feb 84 pp 6, 7

[Article by V. V. Ustimenko, candidate of economic sciences of Mosgiproniisel'stroy [Moscow State Planning and Scientific-Research Institute for Rural Construction] in the column "For Rural Construction": "The Economic Efficiency of Concrete Structures for Farmstead Type Residences"]

[Text] Until recently rural farmstead type residences were built mainly of brick and wood. In recent years prefabricated reinforced concrete and concrete structures have been widely used for this purpose. Because of the sharp increase in farmstead building, a production base for rural home construction must be developed.

The rural farmstead house designs provide for the utilization of construction components made out of different materials. The wall structures, which represent on the average 26 percent [of the total cost], are made of keramzit, porous arbolit, gas silicate concrete, gypsum concrete, and also slab concrete. The minimum final costs--that is, the production cost and the annual capital investments--are taken as the criterion of economic efficiency. If the cost of one square meter of a keramzit wall is taken as 100 percent, then the cost of one square meter of a wall made from porous arbolit is 60 percent and one square meter of a gas silicate wall is 57 percent. The estimate of the final costs per square meter of the total area of a house indicates the same tendency. The decrease in the production cost of articles made from porous arbolit is attained as a result of some decrease in the metal input, but it is mainly due to the utilization of by-products of the woodworking industry instead of keramzit. In this case the production cost of plant production of one cubic meter of structures decreases by more than one-half [without the utilization of by-products]. In addition, the saving is shown in related sectors: A significant amount of the energy consumed in keramzit production is saved. The operating costs are decreased because of the fact that the heat conductivity of porous arbolit is lower than that of keramzit.

Gas silicate blocks are more economical than structures made of porous arbolit in cost and final outlays. However, under building conditions, they are inferior to large-size structures with regard to labor input. If the labor

input per square meter of the total area of a farmstead house with keramzit walls is taken as 100 percent, then the labor-intensiveness of erecting walls amounts to 92 percent for porous arbolit structures and 105 percent for gas silicate structures. Therefore, it is necessary to develop efficient, large-size gas silicate structures. However, it is also advisable to develop widely the production of gas silicate blocks because they are convenient when individual builders are erecting houses.

The production of wall structures from slab concrete and gypsum concrete is in the process of being mastered. A house made of slab concrete has been designed and constructed in the Belorussian SSR. The cost per square meter of the wall proved to be lower than in houses made of prefabricated structures. The know-how in the use of slab concrete in rural building has been acquired in Omsk Oblast. A preplan design implemented in Moscow Oblast for a farmstead house's basement made of slab concrete reduces the cost by almost 30 percent in comparison with prefabricated structures. The preplan designs for a farmstead house made of slab concrete are even more efficient with regard to final costs because with them the output-capital ratio for production is reduced to almost one-third the level of prefabricated reinforced concrete.

A house made of gypsum concrete has also been constructed in Tula Oblast. The cost of the gypsum concrete walls is lower than keramzit panels. The gypsum must be high-strength and water resistant to be used as a material for blocks of the outer walls. In Krasnoufimsk, Sverdlovsk Oblast, a plant for gypsum concrete panels and large blocks has been constructed to produce complete sets of prefabricated structures and articles for the construction of one-story and two-story houses. The actual proportionate capital investments to develop capacities for the production of one square meter of gypsum concrete panels amount to 50 rubles. The plant produces not only gypsum concrete structures but also high-strength gypsum as well as a binder made of gypsum with a supplement of slag. Since gypsum concrete structures do not contain cement, more than 100 kg of cement are saved per square meter of panels compared to keramzit panels. In Sverdlovsk Oblast, approximately 600 houses made of gypsum concrete structures have already been constructed; several of them have already been in use for 10 years. The wall materials meet the requirements for strength, water resistance, and biostability.

New wall materials in the form of composite structures are being developed. For example, Mosgiproniisel'stroy [Moscow State Planning and Scientific-Research Institute for Rural Construction] has proposed a new preplan design for a farmstead house with walls made of gas silicate and a frame with asbestos cement siding panels; the slag cotton is used to insulate air space. The production cost per square meter of such panels is approximately 20 percent higher than for gas silicate blocks; however, the labor-intensiveness for erecting walls is reduced. Such a 3-layer composite wall is 3 times better than a keramzit structure from the standpoint of heat loss; this produces a significant saving in operational costs.

The large volume of construction forthcoming and already underway to reorganize rural settlements requires the development of a production base for manufacturing industrial structures. At the present time, the production

of keramzit panels is developing the most. Scarce materials (there is an adequate amount of lime, gypsum, slag, ashes, and wood scraps available) are not necessary to increase the output of more economical structures. An organization for the production of economical materials is already underway in several regions. For example, the output of panels made of porous arbolit has been organized at the Domodedovo Plant in Moscow Oblast. By-products from the sawmill operation originating in the Zhukovskiy, Radovitskiy, Balashikhinskiy, and Stupino woodworking plants are sufficient for the plant to produce 36,000 cubic meters of arbolit per year. The equipment for keramzit output can be used to organize the production of porous arbolit. Thus, with the same capital investments, it is possible to manufacture structures with a production cost less than half that of the keramzit structures. The production of gas silicate blocks is being completed at the Stupino Plant.

Foundations are almost as important in the cost of farmstead type houses as wall structures. Reinforced concrete blocks have come to take the place of brick in foundations. Recently, shallow foundations, which are 2/3 to 1/2 as expensive as the strip type, have been widely used. During their installation, the reinforced concrete structures are laid on a filling made of nonwarping materials. The recesses of the dug-out areas are filled with this material. The structural features of the farmstead type houses make it possible not to make deep foundations. Shallow foundations were used in the construction of houses on the Nara Sovkhoz in Moscow Oblast and also in Bryansk, Kalinin, Kaluga, Ryazan, Saratov, Tyumen, and Yaroslavl oblasts. Experience indicates that they are subject to warping; however, after the ground thaws out, they revert to the previous position and no deformations of the structures are observed. A reduction in the size of the reinforced concrete blocks when installing shallow foundations produces a saving of cement and metal and considerably reduces the amount of earth-moving work.

The partitions in the houses are made of gypsum concrete, slag concrete, and reinforced concrete. If the cost per square meter of partitions made of reinforced concrete is taken as 100 percent, then the cost of slag concrete partitions is 74 percent and gypsum cement partitions is 53 percent.

In flooring, reinforced concrete structures are used more often than wooden ones. Recently, the know-how has been acquired for using slabs made of porous arbolit for basement and house flooring. They are 10 percent less expensive per square meter of flooring than reinforced concrete slabs.

Thus, there are considerable reserves for reducing the prices of rural construction through using the most efficient reinforced concrete and concrete structures. Estimates show that the cost per square meter of a farmstead type house using the most economical structures is reduced by approximately 20 percent.



12478
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## RADIATION USED IN MAKING DECORATIVE CONCRETE POLYMER

Moscow STROITEL'NAYA GAZETA in Russian 1 Feb 84 p 3

[Article by P. Burak, TASS correspondent, Minsk: "Electrons Bombard the Concrete"]

[Text] "Isn't that granite?" B. Borisov, a worker of the Minsk Construction Materials Academic Research Institute, indicates a beautiful polished slab. "And isn't this really marble? And they got it not from the other end of the world, but in the center of Minsk."

I smiled at these words. I knew that Belorrusian granite is obtained in Mikashevichi, which is in Brest Oblast, where the largest combine of nonmetallic materials is located, and that the majority of other facing stones is imported into the republic. This, of course, could not be so in Minsk.

"We are obtaining new materials," explains my interlocutor, "in cooperation with the workers of the Institute of Nuclear Energy of the BSSR Academy of Sciences and with the All-Union Academic Research Institute of Construction Polymers. They are made from cement, marble dust, granite chips, paints, sand, and soot. These are decorative concrete polymers, which differ from natural stones only by the fact that they are in fact created from production wastes. However, they will last considerably longer, and they are much cheaper. They owe this to radio-chemical action."

Concrete is a porous material. In order to improve its properties, researchers attempted to fill its pores with bitumens and epoxy compounds, but the saturation depth was not increased even to 2 centimeters, and the strength was practically not augmented. Then was born the idea of processing the concrete with polymers. The products are dried, then treated under vacuum in closed containers in order to draw off remnants of moisture. After this they are saturated with liquid monomers, styrene for example. As a result, the material's properties change sharply.

During the testing of salt-resistant concrete polymers in the Beloruskaliy production association, it was ascertained that the thin polymer layer reliably protects the product from the destructive action of aggressive salts, and the reinforcement from corrosion. The service life of reinforced concrete constructions is more than doubled.

When the workers of the Institute of Nuclear Energy of the BSSR Academy of Sciences joined in the research, yet another technique for making substitutes for facing stones was worked out. In the water-filled reservoir of the chamber of a gamma-ray unit, at a depth of 6 meters, there glows a radiation source--steel ampules with a preparation of cobalt. As long as the source is under water, it is possible to place the slabs without fear of the radiation. The massive door is closed, at a command from the supervisor's desk the cobalt containers are raised to the surface, and the radiation treatment begins. Some time later, from the chamber are carried slabs of prepared concrete polymers--materials that have acquired properties valued by builders and architects.

In this same building there is a small electron accelerator. Opposite a narrow apperture, through which there just about pours an accelerated stream of electrons, there is placed a concrete slab, and the accelerator is switched on. In a few moments, the process is finished. Such a technique virtually begs for a production conveyor. In addition, it is absolutely safe for man's health. The residual radiation has been eliminated, and the technological conditions for the new materials have been coordinated with scholars and medical men.

There are many arguments in favor of the innovation. The specialists have drawn the conclusion that in their mechanical and decorative qualities these slabs correspond to marble and granite. In choosing the composition of the decorative layer, it is possible to obtain the complete color spectrum. And tests for cleaning, stability in atmospheric conditions, and durability have shown that artificial materials appreciably surpass the natural ones, and are two to three times cheaper. The innovation can be employed in the facing of underground passageways and socoles, in the interior finishing of buildings, in small architectural forms, and for decorative panels.

The smart-looking and cheap material obtained by Belorussian scholars has merited a passage into life. It has been decided to build a plant for decorative concrete polymers in the republic.

12462
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## WIDER USE OF DRY GYPSUM PLASTER ADVOCATED

Moscow STROITEL'NAYA GAZETA in Russian 11 Dec 83 p 3

[Article by V. Prokopenko, group chief, Department for Introduction of New Technology, Rosorggrazhdanstroy Trust, RSFSR Ministry of Housing and Municipal Services: "Cheaper, But in Itself More Expensive"]

[Text] Model constructions of partitions for residential, public and industrial buildings have been worked out and approved for wide use in construction of high-quality dry gypsum plaster, and technological charts and recommendations have been worked out for the lining of brick walls with gypsum-board sheets.

The use of gypsum plaster permits a reduction of labor-intensive operations and the conduct of construction by more industrial methods than with the building of constructions out of small-size elements. In addition, plastering processes are eliminated.

The head engineers and the chiefs of the building assembly administrations and of the subunits of the trusts of the RSFSR Ministry of Housing and Municipal Services understand all this. But it is being introduced with great difficulties. The question of why is being asked.

The fact is that the planning documentation and the planners' estimates, as in the past, hypothesize the finishing of brick walls and partitions with wet plaster. And this despite the fact that the RSFSR State Committee for Construction Affairs addressed a letter to RSFSR ministries, to the planning institutes of the RSFSR State Committee for Construction Affairs, and to civilian projects which gave the instruction: "With a view toward the wider use of high-quality dry gypsum plaster, it is necessary to envisage, where this is expedient in the working out of model and individual plans and the adjustment of model plans to the construction of residential, public and industrial buildings, the use of high-quality dry gypsum plaster in partitions and for lining brick walls.

A barrier in the path of its introduction also arises in the agreement with the client. As a rule, he is rejecting the use of dry gypsum plaster: They say it will be more expensive....

And the trusts and construction administrations subordinate to our ministry also, as a rule, are not accepting a rise in the estimated cost. This is understandable: Who wants to take upon himself unforeseen increases in expense?

In order for a matter that promises an evident economic effect finally to be set in motion, it is necessary to resolve a number of questions. First, with the planners. In working out model plans, they must put in their estimates the use of dry gypsum plaster, in accordance with the instruction of the RSFSR State Committee for Construction Affairs. Second, in the examination of plans, it is necessary to obtain the use of dry gypsum plaster.

Finally, one must ensure the interest of the client and the subcontractor. But in the meantime, conservatism in this question is unavoidable.

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## BRIEFS

GYPSUM BINDER FOR FLOORS--Gypsum binder that is combined with a number of components acquires properties similar to those of liquids. It easily fills any shape and its surface does not need leveling when it hardens. These properties, in combination with the alpha-gypsum's high strength indicators, enable it to be used as the heat-insulating material that is laid under the ceiling floors of multiple-story housing and social buildings that operate under dry conditions. The mix is laid by means of an SB-150 mortar pump, without vibrating mechanisms. The floor can be walked on in 2 hours. The use of alpha-gypsum instead of cement-and-sand adhesive in self-leveling poured floor foundations raises labor productivity 5-fold to 8-fold, saves 10-15 kilograms of cement per 1 square meter of floor, eliminates the operations of leveling the material and grinding the surface, and provides for high strength and adhesion to the adjacent floor members. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 27 Jan 84 p 3] 11409

COMPOSITE-CONCRETE BARN FLOORS--The most rational materials for laying the floors of livestock facilities is a composite concrete that is based upon a thermoplastic binder--polyethylene--and a grainy filler: sand, gravel, crushed rock, keramzit or perlite (patent No 239547). It is marked by high resistance to chemicals, nontoxicity and good physical and mechanical properties. Its use greatly reduces heat losses, enables the morbidity rate to be reduced, increases livestock productivity by 12-20 percent, and partially or completely dispenses with the need for litter. Composite concretes of various structural types can be used in floor structure in industrial and nonindustrial premises as heat-insulating, soundproofing and finishing materials and in some other structural members that are subjected to the actions of a corrosive environment. The material is obtained by mixing heated filler of a prescribed fractional content with unheated binder, which are made up in definite ratios. Articles are obtained by compacting the mixtures in a mold and then cooling them. An experimental installation for producing articles made from the heat-insulating structural composite concrete (patent 321506) has been built and is operating. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 27 Jan 84 p 3] 11409

NEW TYPE TUNNEL KILNS--Yuzhgiprostroy [Southern All-Union State Institute for the Design of Building Materials Industry Enterprises], with the participation of NIIZhB [Scientific-Research Institute for Concrete and Reinforced Concrete], has developed tunnel kilns made of prefabricated fire-resistant reinforced concrete, for kilning brick, keramzit blocks and drainpipe. The load-bearing structure of these kilns is a framework made of prefabricated

reinforced-concrete columns 300x300 millimeters in cross-section, which are installed at 6-meter intervals, and crossbars of 250-x585 cross-section, which are made of ordinary concrete with the use of serially produced formwork. The kiln's channel is covered with panels made of fire-resistant reinforced concrete. The channel's walls are made of prefabricated concrete blocks--in two layers in the roasting area: the layer that faces the kiln's working space is made of lightweight flame-resistant concrete based on aluminiferous gypsum-clay cement with fireclay filler, while the second layer is made of lightweight fire-resistant keramzit concrete with a bulk density of 800 kilograms per cubic meter. Stitched rock wool mats were adopted as thermal insulation for the walls. Such kilns have been erected at the Karaganda, Burunday and Bogorodskoye Ceramic Wall-Materials Plants. In comparison with brick walls, the amount of masonry is reduced 2.5-fold and labor expenditure for erecting the furnaces is reduced almost 8-fold. Questions of introduction should be addressed to: 109389, Moscow, 2-ya Institutskaya Ulitsa, d. 6, Office for Introduction of NIIZhB. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 20 Jan 84 p 3] 11409

CLINKER FROM METALLURGICAL PROCESSES--An integrated technology for obtaining cement clinker and metal has been developed by Uralniistromproyekt [Urals Scientific-Research Institute for the Design of Building-Materials Enterprises] specialists in creative collaboration with metallurgists. Clinker can be obtained directly during the metallurgical process or after its completion. This is done by adjusting the charge and by changing the procedure for charging: certain amounts of lime are added to the charge at various stages of the smelting. At the Klyuchev Ferrous Alloys Plant an integrated technology is being used to produce highly aluminiferous cement and certain ferrous alloys (chromium and ferrotitanium) that are smelted by the aluminothermic method. Such a cement scarcely differs in its properties from cement that is obtained from commercial-grade alumina, and its cost is 4-fold to 6-fold less than the cost of ordinary cement because of savings of scarce raw material, fuel and capital investment. Questions should be addressed to 454000, Chelyabinsk, Ulitsa Lenin, '89, Uralniistromproyekt. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 16 Dec 83 p 3] 11409

CONDUITFREE ASBESTOS-CEMENT HEATING GRIDS--The construction of conduitfree heating grids made of asbestos-cement pipe at USSR Minsel'stroy [Ministry of Rural Construction] jobs and other construction organizations has shown their great advantages over traditional pipe. The necessity for arranging for conduits is done away with completely, special compensators for linear deformations are precluded, and the heating line in this case becomes rectilinear (without ⊓-shaped protrusions in the layout). Nor are anticorrosion coatings required, thickness is reduced, and designing structure for thermal insulation is simplified. Laying 50 kilometers of conduitfree asbestos-cement heating grids at RSFSR Minsel'stroy Glavspetssel'stroy [Main Special Administration for Rural Construction] jobs alone has enabled more than 800,000 rubles and about 750 tons of steel pipe to be saved. Requests for additional information should be sent to: Moscow, Zh-29, Ulitsa Sr. Kalitnikovskaya, 30, VZISI [All-Union Construction-Engineering Correspondence Institute]. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 6 Jan 84 p 3] 11409

FOAM-CONCRETE HEATING LINES--Experience in the operation of underground conduitfree heating lines with monolithic insulation made of reinforced foam concrete and other materials shows that the protection of thermal insulation from moisture and protection of pipe from corrosion are possible only where the outer water-repellant coating has been applied carefully. The Scientific-Research Institute for Construction Materials and Articles has developed methods for the water-repellant treatment and the manufacture of powders with a high degree of water-repellency (patent No 543849). The powdered compositions obtained can be used to insulate heating lines where heat-carrier temperatures reach: from 90 to 150 degrees for water, and 200 degrees for steam. Limestone, chalk-production waste and other substances are used as the mineral base. A new methodology for determining the degree of water repellency and losses of repellency by carbonate water-repellant treated powders has been proposed and developed. For additional information address requests to: Kiev-25, Ulitsa B. Zhitomirskaya, 32, Ukrorgtekhsel'stroy [Ukrainian State Trust for Industrialized Rural Construction]. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 6 Jan 84 p 3] 11409

NEW DURABLE MORTAR MATERIAL--Cherkassy--A new finishing material has been developed at the Cherkassy Section of the GIISP [expansion unknown] Project Design Bureau of the UkSSR Gosstroy [State Committee for Construction Affairs]. The basis for this material is cement-koalin mortar. As we know, walls "breathe". Therefore, the surfacing on them does not last long. It cracks and crumbles. Cherkassy residents have proposed coating the walls with clay, but not ordinary clay. This clay contains an admixture of koalin and cement. Standard concrete mixers and an ordinary stucco application pump have been adapted for making this mortar. According to preliminary computations, the durability of the finish is extended up to 25 years, the labor productivity increases by a factor of 1.5, and only 1/6 to 1/8 the cost of materials is required. [by G. Dolzhenko] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 16 Jan 84 p 3] 12322

ASH USED IN CONSTRUCTION--Angarsk (TASS)--The Angarsk Cement Mining Combine in Irkutsk Oblast was able to do without the construction of a quarry and shop for making clay. This traditional raw material has been replaced by ash, which previously accumulated at the dump sites of the nearby TETs [thermoelectrical station]. The utilization of the by-products has made it possible to use only one-fourth the expenditure of fuel necessary for firing the cement, and also provides a savings on water, electrical energy and refractory materials as well. The substitution of the raw material has not been reflected in the quality of production -- it is, as before, of the highest grades. Even the most bitter Siberian cold cannot hinder the development of the TETs dump sites. With the aid of scientists, the combine has solved the problem of protecting the ash against freezing. Before the onset of the cold season, it is covered with a polymer foam. This covering also "works" in the summertime, protecting the dump sites against wind erosion. The air has also become cleaner, and labor conditions have improved. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 29 Feb 84 p 3] 12322

NEW SILICATE GLASS PANELS--Kerch--Construction has begun at the glass-ceramic shop of the Kerch Inter-Kolkhoz Glass Combine on a technological line for producing a new type of product--silicate glass facing panels. The main unit, a tunnel furnace, is currently being built. The efforts of all the services and shops participating in the construction are directed toward providing technologists with the capacity for working out the technological conditions in the shortest possible time, so that the industrial production may already be realized by the end of the first quarter. At first these will be rectangular panels which will be used in facing inside and outside wall surfaces and for laying floors in public and production buildings. In the future, artistic-decorative panels will be manufactured, which may be used for external finishing of structures. [By B. Sluchanko] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 11 Mar 84 p 3] 12322

IRRIGATION CHANNEL FACING SLABS--Kakhovka--A new packet technology for making irrigation channel facing slabs has been introduced in the fifth bay of the First Molding Shop of the Kakhovka Reinforced Concrete Products Plant imeni 50th Anniversary of the USSR. The new method was developed by the Ukrainian Scientific-Research Institute on Hydraulic Engineering and Land Reclamation. The chief project engineer of the Stroydetal' Specialized Technological Design Bureau of the Soyuzvodstroyindustriya Production Association under the USSR Ministry of Land Reclamation and Water Resources, A. Koz'ko, tells us: "The only technological line in the country for making facing slabs by the packet method is presently operating at the Kakhovka plant. Its introduction into production has made it possible to increase labor productivity in the shop by 30 percent, and to significantly reduce labor expenditures, metal consumption, and use of thermal energy. It provides an economic effect of over 180,000 rubles per year. [by RABOCHAYA GAZETA correspondent] [Text] [Kiev RABOCHAYA GAZETA in Russian 7 Feb 84 p 2] 12322

ANTI-CORROSION PIPE COATING--Kharkov--Half a million rubles annually -- that is the savings provided by the full capacity operational introduction of the shop making anti-corrosion coatings out of bitumen-perlite at the asphalt-concrete plant of the Khar'kovspetsstroymekhanizatsiya Trust. The new technology not only increases the service life of the pipes, but in principle also changes the very practice of on-line work. Until now, the pipes were laid in special reinforced concrete troughs, thermoinsulation was performed, and then they were covered with slabs. Now the pipes are delivered to the line in a state of full plant readiness. Moreover, no additional coverings are required. [by RABOCHAYA GAZETA correspondent] [Text] [Kiev RABOCHAYA GAZETA in Russian 3 Feb 84 p 2] 12322

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