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SELECTED ECONOMIC TRANSLATIONS ON CZECHOSLOVAKIA

No. 8

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FOREWORD

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No. 8

INTRODUCTION

This is a serial publication containing selected translations on all categories of economic subjects and geography. This report contains translations on the subjects listed in the table of contents below.

TABLE OF CONTENTS

	Page
1. Selected Translations on Cartography in Czechoslovakia	1
I. Fifteen Years of Geodetic and Cartographic Work in the Reconstruction and Development of the Slovak Economy (In Liberated Czechoslovakia)	1
II. Establishment of a Uniform Trigonometric Network in Czechoslovakia	13
III. Cartographic Conference in Budapest	31
2. Tasks of Industrial Power Production in the Third Five-Year Plan	34
3. Development of Meopta National Enterprise in Prerov Since the Liberation	41
4. Economic Analyses in Establishing the New Wage System	46
5. Increased Interest in the Development and Introduction of the New Technology Through Remuneration	66
6. Tasks of Czechoslovak Metallurgy in Automation in the Third Five-Year Plan	72
7. Problems of the Long-Term Development of the Czechoslovak National Economy Through 1975	77
8. Tasks of Transportation in the Third Five-Year Plan	98
9. Material Interest of National Committees in the Results of Their Enterprise Management	109
10. Some Important Economic Information From the Implementation of the New Wage Organization	120
11. The Substance and Importance of the Wage Tariff	133
12. Toward Further Improvement of Workingmen's Bonuses	142
13. Experience With the Utilization of Norms for Material Incentive in the New Organization of the Wages of Labor	153
14. Some Experiences With Wage Reform in the Consumer Industry	159

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SELECTED TRANSLATIONS ON CARTOGRAPHY IN CZECHOSLOVAKIA

[Following are translations of selected articles from the Czechoslovak periodical Geodeticky a kartograficky obzor (Geodetic and Cartographic Review), Prague, Vol. 6/48, No. 3, March 1960. Inclusive page numbers, respective authors, and languages of the original articles are given under individual article headings.]

I. FIFTEEN YEARS OF GEODETIC AND CARTOGRAPHIC WORK IN THE
RECONSTRUCTION AND DEVELOPMENT OF THE SLOVAK ECONOMY
(IN LIBERATED CZECHOSLOVAKIA)

Pages 41-45; original
language: Slovak

Engineer Zoltan Kotzig,
Chairman of the Admin-
istration of Geodesy and
Cartography, Slovakia

At the present time, our happy generation sees daily the ideals of the greatest geniuses of mankind being fulfilled by the surprising victories of socialist science. To the delight of the working people of the entire world, a powerful, invincible camp of peace is growing under the leadership of the Soviet Union.

According to the same ideals which had formed the basis for the creation of an irrepressibly advancing socialist economy, the working people of Czechoslovakia had also been creating the conditions for the overthrow of the hated capitalist oppression and for the transition to socialism.

We live in a period of important fifteenth anniversaries. In all sectors of our national economy, our workers can look back to the memorable days of the years 1944 and 1945, when under the blows of the glorious Soviet Army the fronts of fascist aggression were collapsing, when the foundations were laid for our new life under the leadership of the Communist Party of Czechoslovakia.

Our people, liberated from oppression and exploitation, have developed enormous creative power and achieved splendid results in socialist construction during the past 15 years. The speed of the development of the Czechoslovak national economy exceeds the rate of the advanced capitalist countries.

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While the productive forces of our fatherland are being strongly developed, the less developed areas of the state are advancing at the proper rates of development and are receiving substantial and direct assistance from the more advanced regions. Thus we have obtained important results in socialist construction in Slovakia, which since the time of its liberation by the Soviet Army has experienced a stormy economic and cultural change in its development.

The economic expansion of Slovakia, which in the pre-Munich republic played the role of an agrarian appendage and was known as a country of poverty, emigration, and unemployment, is a happy example to us all of general progress in the socialist social system.

A more glance at the former conditions of the Slovak economy and culture and a comparison with what has been done in Slovakia since the liberation by the Soviet army represent a lesson to our personnel and an effective inspiration for the daring tasks outlined by our party for the coming five-year plans.

A long-prepared Slovak national uprising broke out on 29 August 1944. On that day the Slovak people demonstrated spontaneously their will to rid themselves of the yoke of domestic and foreign fascism and entered resolutely into the common struggle of the Czech and Slovak nation for a new Czechoslovakia, in which the people themselves would be the ruler.

The important political results of the Slovak national uprising were shortly followed by military results, when the military formations recruited in Slovakia to help the fascists were liquidated, railroad and other types of transportation were disrupted, and several divisions tied down when they were needed at the time the front was falling back. All this contributed considerably to the defeat of fascism and to the liberation of our fatherland. The Slovak national uprising which continued in the mountains, and the Prague uprising in May 1945 completed the struggle of our nations. The struggle ended victoriously in the liberation of our fatherland by the glorious Soviet army on 9 May 1945.

The war and its last months resulted in a completely weakened economy in Slovakia. Losses in lives were considerable. Telgart, Tokajik, and many other communities were reduced to ashes.

The retreating enemy and the war operations caused great damage to the country. There were 21,003 homes destroyed in Slovakia, and over 72,000 were badly damaged. A total of 1,504 road bridges were completely destroyed, another 500 being heavily damaged. Out of 3,506 km of railroad lines, 1,249 km were damaged; 70 % of all railroad bridges with a span of more than 5 m were destroyed. A refinery in Dubova was bombarded shortly before the Slovak national uprising broke out, and many establishments were destroyed and damaged when the front passed through.

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Most of the communities destroyed or damaged in the war were located in Eastern Slovakia. The rebuilding of the Slovak communities which had been destroyed in the war was a demanding task of post-war reconstruction work when transportation was resumed, and it required enormous assistance from the state.

In this connection, we can mention with satisfaction the devoted work of members of the state geodetic service, at that time organized according to the original system of cadastral administration with its center in the Office of the Commissioner for Finances.

The basic significance of the work done in 1945-47 to rebuild the Slovak communities which had been destroyed in the war was the fact that groups of geodetic engineers and technicians of the cadastral service quickly prepared regulatory plans for those destroyed urban areas which had a complex ownership system and highly disorganized construction planning. In a short time they released to the new owners lots measured under the new system, and newly-determined land for public buildings and municipal squares was given to communities and to the organs of housing reconstruction.

This work is also instructive for us, because it shows that while doing enthusiastic organizational and technical work for our people, the geodesists managed to control complex arrangements in which they coordinated the interests and findings of all economic groups interested in the problem. The problem was also facilitated because there was a central leadership which continued to follow a line of flexible cooperation between architects and lawyers. This was adapted to the interests of the work and provided a timely protection of the requirements of the State Road and Water Administration and other administrative components.

Since most of the cadastral maps and plans of these communities were destroyed, it was necessary to measure again appropriate parts or even entire areas of the communities. The work was greatly assisted by the 1:2000 photoplans made by the former Photogrammetric Institute for Slovakia after July 1946, when the Institute renewed its activities in aerial photography and prepared the basic outlines for our first large constructions in the fields of transportation, the power industry, and others.

The basic norm used for the rebuilding of communities destroyed in the war was a directive issued by the Board of Slovak Commissioners (No. 128/45 of the journal of orders of the Slovak National Council); and after that, the announcements of the State Planning and Statistical Bureau (No. 90 and 172/46 of the Official Gazette). The regulations of these norms and instructions also contained the basic directives for the planning of all other construction work; they were progressive and operational at the time and for the purposes for which they had been written. According to these regulations, groups of field geodesists worked in 174 communities and helped to create good foundations for building reconstruction under difficult conditions.

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The years 1945 and 1946 represented the period of the first reconstruction, when the damages caused by the war were being repaired. The Slovak people handled with enthusiasm and devotion the difficult tasks entailed in the rebuilding of railroads and industrial establishments and a large portion of the housing fund.

In 1945, the industrial production of Slovakia represented only 59 % of the equivalent production of 1937. The Two-Year Plan provided for a 10 % increase of the industrial production of Slovakia above the prewar level. It foresaw an increase of employment in industry by 47,000 workers, and it aimed to ensure construction work, especially in the power industry and in metallurgy. The problem was to complete the reconstruction and to expand industry primarily by transferring certain industrial installations from the Czech lands to Slovakia.

Under the Two-Year Plan 1947-48, the Communist Party of Czechoslovakia enforced the decision that a permanent foundation for socialist industrialization should be established in Slovakia, and that the economic level of Slovakia should approach the level of the Czech regions. Thus the working people set up for themselves a program which the bourgeoisie had been avoiding for a decade, and laid the foundations for the industrialization of Slovakia, so clearly implemented after the historical February victory of the working class in the purposeful programs of our five-year plans.

Strong capitalist groups, which for some time had controlled the entire economy of the First Republic, dealt with the expansion of the metallurgical industry in Slovakia according to their own interests. It is true that in 1939-45 employment in industry increased due to war production, but it automatically decreased when the war front came closer and the industrial establishments were in large part destroyed and disorganized.

In Slovakia in 1946, out of 80 districts only 23 had at least 6 % of the population employed in industry. These were the districts in Povazie (along the Vah River), some districts in Central Slovakia, and some mining districts of Gemer and Spis. The economically most backward districts which were known for their poverty were the districts of Kysuca and Orava and the entire northeastern area. In these areas, even agricultural production meant misery and overpopulation.

The establishment of the people's democracy, the February military decision, and the following victorious years of rapid economic development were for Slovakia the only way out of a condition of economic poverty and cultural nothingness.

Large labor reserves found suitable conditions in the Czech border areas immediately after the liberation. Other considerable sources of labor kept growing after the organization of cooperative

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socialist agricultural production on a large scale in the new, growing, and systematically located industrial establishments, bringing to Slovakia a new industry which had never existed before.

As early as 1948, the industrial production of Slovakia almost doubled as compared with 1937, and at the same time the chemical, leather, and rubber industries expanded several times. In comparison with the year 1948, the results of the industrial production showed an increase of 62 %. The textile production increased considerably, and there was a continual increase of production in the metal industry, ceramics, the wood-processing industry, etc. Not counting the food industry, the tasks of the Two-Year plan were fulfilled 103.7 % in industry; employment increased 30.7 %, i.e., by more than 43,000 employment openings.

After February 1948, another period of further development began in Slovakia. The IX Congress of the Communist Party of Czechoslovakia established the principle of an accelerated advancement of the Slovak economy. The First Five-Year Plan outlined the development on the basis of basic industrial branches such as machine engineering; the Second Five-Year Plan, drawn up by the All-State Conference of the Communist Party of Czechoslovakia in 1956, provided for a continual industrialization along with a proportionate development of the entire national economy, and also outlined the task of a rapid development of the economy and culture of Slovakia. Industrial production in Slovakia is to increase 61.5 % in 1960 as compared with 1955. We can see already today that those tasks will be exceeded.

The construction of new industrial establishments brought to Slovakia industrial branches never known before: new products could now be made -- ball bearings, steam boilers, aluminum, ferrous alloys, steel highway bridges, lathes and processing machines, surgical instruments and implements, electrometers, washing machines, ice boxes, passenger ships, motor barges, automobile tires, polyvinyl-chloride, antibiotics, etc.

The necessary power installations are growing, dams are being built, the Vah River is being harnessed, thermal plants are under construction. Mineral wealth is being used to expand the production capacity of building-material enterprises, new cement works have been completed. The foundation of the food industry is being strengthened.

New metallurgical works in Mokrad and Istebne, the "Elektropraga" in Dolni Kubin, the Orava dam, the enterprises in Nizna, and other establishments have changed beyond recognition the appearance of the previously poverty-stricken Orava. Kysucko Nove Mesto and Cadca have changed in a similar way. Once a land of poverty, it is now an area of the precision-machine industry. Machine engineering establishments in Presov, Snina; a wood-processing

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combine in Henovce; cement works in Bystre; and other establishments are changing the life of Eastern Slovakia. A powerful combine for manufacturing aluminum has been established in the Hron valley.

The appearance of all villages and cities in Slovakia have changed extraordinarily during recent years. The rise in the economic and cultural level is clearly manifest in the large new combines, enterprises, the large number of new family houses, the state housing construction, schools, the installations of the newly-organized farms of unified agricultural cooperatives, the network of bus lines, etc.

When the tasks of the Five-Year Plan are completed, it will mean extraordinary results in comparison with the conditions existing before the liberation. This is also shown by the results of the 11 years since February 1948.

By 1958, the industrial production of Slovakia had increased almost 4 times in comparison with the year 1948, and almost 8 times in comparison with the year 1937. Compared with 1948, power and thermal production increased particularly rapidly, as did the production of fats and soap (more than 6 times) and machine engineering (almost 7 times). Chemical and rubber production increased almost 5 times, and electric power production more than 4 times.

With the increase in the total volume of industrial production of Slovakia, Slovakia's share in the growing production of Czechoslovakia is increasing significantly. While in 1948 this share amounted to 13.2 %, it increased to 17.5 % in 1959.

The number of workers in industry increased to 360,000 in 1958 as compared with 231,000 in 1948. In the same period, the number of workers in construction increased from 93,000 to 132,000. The volume of the construction and installation work of building enterprises increased more than 3 times. Each year, more and more apartments are being released for use. As compared with almost 11,000 apartments in 1948, more than 32,000 apartments were released for use in 1958, of which 13,000 through individual housing construction. Up to 200,000 apartments were built in Slovakia in the period 1949-1958. In 1958, Slovakia produced more than 60,000 motorcycles, 126,000 radios, and up to 80,000 refrigerators.

In 1948 there were 1,727 electrified communities in Slovakia, while at the end of 1958 there are 3,014 of them. Now 95.1 % of the population in communities and settlements can use electric current.

In comparison with the year 1948, the consumption of meat per inhabitant in Slovakia increased in 1958 from 17.8 to 42.2 kg, milk consumption from 111.0 to 132.7 liters, sugar consumption from 18.7 to 32.7 kg. Similar improvements can be seen in the consumption of other food products. The retail-trade turnover reached an index of 216 % in 1958 as compared with 1949.

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During the years 1948 to 1958, the number of bus lines increased 5 times, the length of the lines more than 4 times. The CSAD [Ceskoslovenska Automobilova Doprava -- Czechoslovak Automobile Transportation] carried in 1958 a total of almost 275 million persons, i.e., almost 8 times as many as in 1948.

A total of 15,400 students attended professional schools in Slovakia in 1948, and as many as 54,600 in 1958. During the same period, the number of students attending institutions of higher learning in Slovakia increased from 9,000 to 23,000.

Investments in the national economy gradually continued to increase. For example, 2.4 billion Kcs were invested in Slovakia in 1948, and as much as 9.3 billion in 1958. Industry, housing, and agriculture took the largest share of investments.

Geodesists and cartographers took part in this construction work. The expansion of our national economy also brought about a change in the content of our geodetic work and provided an incentive for the happy, creative initiative of our geodesists and cartographers in various specialized assignments.

First of all, the members of our geodetic service have acquired considerable experience in determining the positions and elevations of areas used for building the new combines, industrial establishments, and other constructions of the extraordinarily developed state and individual housing program. The Slovak geodetic service spent on this work on the average up to 160,000 working hours annually. In Bratislava the first large housing settlements, consisting of multi-story panel constructions, required a precise determination of the basic elevation data for each block of the expanding streamlined construction work.

In building the Duslo industrial enterprise in Sala, the geodetic service is carrying out the necessary measurements of vertical shifts, and is assisting in a similar way in the construction of other industrial establishments.

In connection with a substantial expansion of industrial enterprises, new 1:1000 basic maps were prepared in the appropriate areas of Oslany, Trnava, and Sladkovicovo, and also in connection with the expanding construction of Novaky and other places.

The building of dams and power plants on the Vah River and the preparation of new water works on the Danube River confronted the geodetic service with new and exacting tasks. Our geodesists have helped and are now effectively helping in the construction of dams and in making special measurements of the deformations of construction bodies. Such work was carried out on the Orava Dam, the Mladez Dam, on the water works in Krpelany, Nosice, Kostolna, Kockovce, Dobsina, etc.

In 1953-1959 the planned water works on the Danube required topographic measurements of the Zitny Ostrov at a scale of 1:5000 to determine the area of the lateral canal. In planning the

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Wolfsthal -- Bratislava works, the relationship between Czechoslovak and Austrian geodetic points were determined. The coordinates of the matching points in the Austrian geodetic system were also supplied. With the assistance of the Regional Institutes of Geodesy and Cartography, particularly those of Brno and Prague, extensive measurements were made on the Nitra River, the Maly Dunaj [Little Danube] River, etc., mostly with regard to the river profiles.

Special benchmark work was carried out in the construction of an airport near Bratislava. Industrial construction work required special work in the field of industrial geodesy, such as determining the positions of cable railways and bridges for the establishments of Martin, Zavadka nad Hronom, etc.

In enumerating the special geodetic tasks carried out for the benefit of industry, we must not leave out the special work done within the framework of the International Geophysical Year and earlier. The Geodetic Institute cooperated with the geodesy department of the Slovak College of Technology [Slovenska vysoka skola technicka] in determining the geographic coordinates and time data of the Astronomical-Geodetic Observatory of the College. This observatory was ranked among the first 10 stations in the world with regard to the quality of results obtained.

Along with the substantial development of industry after the liberation, Slovak agriculture also developed rapidly.

Capitalist development left the Slovak agriculture in a poor state with regard to distribution by size, equipment, and the general level of the peasants. A little over 3 % of agricultural enterprises of over 20 ha and large estates had two fifths of the entire land; 70 % of agricultural enterprises were farms with up to 5 ha of land, and these had only one fifth of the land. During the entire period of the pre-Munich republic, only 93 cadastral areas were commassated.

A total of 2,862 million ha of agricultural land in Slovakia was divided among 453,000 agricultural enterprises and cut into more than 12 million parcels. Due to the low productivity of agriculture, the Slovak agricultural population emigrated in large numbers. Each year 8,000 to 10,000 people emigrated abroad to remain there permanently. A total of 14,000 to 18,000 people went abroad for seasonal work. In 1946 agricultural population still accounted for half of the population of Slovakia.

Foundations for the mechanization of agriculture were laid down as early as in the Two-Year Plan, first by means of machine cooperatives. In comparison with 1937, in 1948 the supplies of artificial fertilizers doubled and the consumption of approved sowing grains increased several times. The agricultural population obtained cheaper credit, the land tax was reduced to a minimum, employment opportunities in industry increased, differences between the technical equipment of agriculture in the Czech lands and in Slovakia decreased, and revenue from farmlands mounted.

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Up to February 1948, reactionary representatives of the former Democratic Party had kept thwarting the land reform. Out of a total 580,000 ha of agricultural and forest land subject to the reform, they confiscated less than 80,000 ha and issued only 363 decrees of ownership. The accelerated reform carried out after February 1948 resulted in far-reaching class changes in rural Slovakia. The land shares of small and medium peasants increased. The number of agricultural workers and day-laborers decreased from 119,000 in 1946 to 26,000 in 1948. The capitalist class of landowners was liquidated. Half of the land fell to the share of medium peasants. The acreage of state agricultural properties showed a sharp increase.

After the victory over the reactionary forces in February 1948, the foundations were laid for a reorganization of individual agricultural cooperatives. Machine-tractor stations were organized in early 1949. The transition of rural areas to a socialist basis started in earnest after the IX Congress of the Communist Party of Czechoslovakia in May 1949.

The following years constituted a period in which new cooperatives were created. The party and the government made daily efforts to strengthen them organizationally and economically. A total of 1.6 billion Kcs was invested in Slovak agriculture during the First Five-Year Plan, and as much as 2.4 billion Kcs during the next 5 years. New production centers of the unified agricultural cooperatives were established in the outskirts of communities and near villages.

The growing foundations of the cooperatives are reflected in the rapidly increasing general level of equipment, in the increase of production and productivity, and in the increase of the standard of living of the members of cooperatives.

For example, in 1930 there were 1,034 tractors in all of Slovakia. There were more than 4,000 of them at the end of the Two-Year Plan, and many more in 1959. The consumption of artificial fertilizers increased during the 10 years following 1948 as follows: nitrates from 3.8 to 14.2 kg, sulphuric acid from 5.9 to 16.0 kg, and potash from 3.3 to 29.1 kg per hectare of agricultural land.

The relative acreages of basic agricultural crops have gradually changed on the cultivated and commassated land. Grain crops were reduced, industrial crops were expanded. Fodder acreages are being considerably increased, particularly on arable lands. Pastures and meadows, which had been neglected in Slovakia for many decades, have been improved, irrigation has been established, and the first fertilizing farms are now being established. In comparison with the prewar years, beef production has increased more than 3 times.

With the advancing mechanization, the number of people permanently active in agriculture in Slovakia is decreasing. Of the 902,000 people working in agriculture in 1948, only 667,000 remained in 1959. This represents considerable labor reserves for other

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branches of the national economy in view of the present equipment of agriculture. Productivity per hectare of agricultural land increased by one third in comparison with 1936, and productivity per permanent agricultural worker doubled in the same period. Market production doubled in comparison with 1936. During the years 1948-1958, the Slovak share of the market production in Czechoslovakia increased from 21.2 to 29.3 %.

Ten years after the Victorious February, the IX Congress of the Communist Party of Czechoslovakia is outlining the program for completing socialist construction in our fatherland, for completing the transition to socialism in the rural areas in the near future.

As of the end of 1959 the socialist sector cultivated in Slovakia a total of 76.3 % of the agricultural land. We now face the task of completing the organization of cooperatives, especially in the mountainous areas.

The geodetic service participated actively in the changing process of agricultural reconstruction under comparatively difficult circumstances, while experiencing constant changes in its own organization and administrative subordination to different departments. There were 3,644 cadastral areas in Slovakia. In 1945, technicians of the land-surveying service had at their disposal cadastral maps and written material which was hardly satisfactory and covered only up to 65.5 % of cadastral areas. Old commassation maps and sketches were available in 24.4 % of the areas. One tenth of all communities had no land-surveying material at all.

Immediately after the liberation, groups of the land-cadastral service began to work on a revision of the first land reform and also prepared a new land reform. Great efforts were made in preparing settlement plans and resettlement programs for the population of Southern Slovakia.

In the period 1950-53, up to 70 % of the members of the land-surveying service worked on economiotechnical delimitations of agricultural land, in order to provide for the continuously growing agricultural cooperatives basic plans for crop assignments and also to provide maps of field roads and boundaries. The work for the agricultural cooperatives continues, a new organization of the land-surveying service in 1954 made better use of the labor force, and each year we are exceeding our plans with regard to the economic-technical delimitation of agricultural land. According to the government resolution No. 923/1957, regional institutes of geodesy and cartography carried out in 1958 measurements of land in 377 cadastral areas representing 359,000 ha, and in 1959 carried out measurements in 715 cadastral areas representing 324,000 ha. This work has always had priority over other work. About 65 % of all measurements in the years 1950-1959 were carried out by organs of the geodetic and cartographic service.

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In addition to other work, the geodetic service also managed to take care of the heavy work involved in establishing a unified land registration. When land registration records were prepared in accordance with government resolution No. 1646/54, a unified registration of land was established in 1956-1958 in accordance with government resolutions No. 192/56 and No. 2674/56. The task required more than 3 million work-hours. New maps were prepared by photogrammetric methods for 368 cadastral areas for which there was no mapping material. Thus the first foundations were laid for the planned production and delivery of agricultural products. In 1959 the data of the unified registration were reviewed and corrected in 208 cadastral areas and permanent registration records were established.

Organs of the geodetic and cartographic service participated purposefully and actively in 1957-58 in extending the measurements of arable land prescribed by the government. In establishing a unified land registration they searched for land suitable for plow-land and determined its exact location.

In late 1959, the proposals filed by organs of the geodetic and cartographic service with regard to 3,604 cadastral areas indicated a total of 34,882 ha of arable land. Thus they offered to the district national committee survey material in connection with expanding the availability of arable land.

Cartography became a new branch of our service in Slovakia. After a modest start in issuing maps for the public on the basis of the old material, we have gradually trained a specialized cadre which today is capable of even more exacting work. The training was considerably improved by our participation in preparing a 1:25,000 topographic map and through the direct assistance of the Cartographic and Reprinting Institute of Prague. Gradually we proceeded to publish tourist and sport maps, maps and atlases for schools, orientation plans for cities, and occasional maps in connection with political and historical subjects. Today the Cartographic and Reprinting Institute in Modra-Harmonia takes a large share in the cultural reconstruction of Slovakia.

The rapid development of the national economy of Slovakia, just as in the entire country, required the speedy setting up of geodetic establishments for geographical and elevation measurements. Triangulation bases, which were established in Slovakia with some delay, were completed with the assistance of the Geodetic and Topographic Institute of Prague. The average length of the sides of these bases was 2.5-3.5 km. A leveling network of the first and second orders was also established. Work on a leveling network of the third order continues. Work has started and is continuing on transferring geodetic bases to new systems of coordinates and to a new leveling horizon.

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The increased requirements for mapping material make it necessary to proceed rapidly with the preparation of a preliminary state map on a 1:5,000 scale. This project, even though it shows deficiencies with regard to accuracy, particularly with regard to the determination of elevations, and is comparatively obsolete, was and remains valid and is widely used.

A state economic map was prepared for areas in which more accurate material is required for purposes of economic development. The requirements refer mainly to ore and mineral prospecting, geological research, and water economy. After the geodetic bases had been changed, we began to prepare a new map which is to replace the state economic map in accordance with the all-state mapping program. The new map is a topographic one on a 1:10,000 scale (in economically important areas on a 1:5,000 scale).

In fulfilling the demanding tasks of the last year of the Second Five-Year Plan, we are encouraged as well as obligated by the achievements thus far obtained in Slovakia. The fact that we have brought some areas of Slovakia to the present level proves the magnitude of the ideas of Lenin's nationality policy.

The Third Five-Year Plan will mean another convincing victory of socialist construction. The economic development of Slovakia in the Third Five-Year Plan, as determined by the developmental trends of the over-all national economy of Czechoslovakia, will contribute to the strengthening of the economic base of the Republic. In 1965 the volume of industrial production in Slovakia will reach the 1948 level of the entire Republic.

Agriculture in Slovakia is to achieve results such that in 1965 the production intensity, in the presence of the similar natural conditions existing in other regions, will be generally the same. Investments will increase considerably in water economy, land improvement, and water drainage.

Geodetic and cartographic workers are proud of the tasks being carried out by their people and their Party. They remember their country of 15 years ago, they compare it with the conditions of today. They will devotedly make organized efforts to fulfill the tasks of the Third Five-Year Plan for the happiness of their people and for the peace of the entire world.

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II. ESTABLISHMENT OF A UNIFORM TRIGONOMETRIC NETWORK

IN CZECHOSLOVAKIA

Pages 45-50; original
language: Czech

Otakar Charvat,
engineer

(Completion of the building of a uniform trigonometric network in the territory of the Czechoslovak Republic. Internal and international significance of this task. Some historical data concerning the problems connected with the completion of this task. Principles for establishing a uniform trigonometric network. Preparatory work. Reconnaissance and signalization. Measurements of horizontal and vertical angles. Stabilization. Topography. Concentration points. Our state's concern for the workers who build a uniform trigonometric network. State award "For meritorious service in building work" to the Geodetic and Topographic Institute in Prague.)

In 1957 one of the most important stages of the geodetic work in Czechoslovakia was completed. A trigonometric network was set up forming the foundations of systematic mapping and all types of measurements. More than 47,000 first-to fifth-order trigonometric points of this network cover the entire territory of the Republic. The average length of the sides of the triangles is 2 km. The points are located in plains, on hills, in valleys, and on mountains. They represent a reliable geodetic basis for technical enterprises, for mapping work, and for construction plans and projects of all kinds.

Two generations of geodesists-triangulators, technicians, construction foremen, and workers took part in this task, which required persistent physically- and mentally-strong workers, good specialists, and independent workmen. What great efforts these modest and unassuming men had to make! What great strain, self-sacrifice, bitter struggles with weather and the hostility of nature, lack of understanding, these men had to face! Fog, rain, frost, storms, hurricanes, dangerous and difficult mountainous terrain made their task difficult, but in spite of all these obstacles they completed their assignment successfully.

The establishment of a trigonometric network over the entire territory of the Republic has great international significance. Czechoslovakia thus becomes one of the few states of the world whose territories are completely covered by a dense trigonometric network of good quality. The quality of this network places Czechoslovak geodesy in a leading position among European states. The purpose of the following is to describe the development of individual triangulation disciplines from the beginnings up to the present and to summarize the results.

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It is certainly an achievement of Czechoslovak geodesists to have built in the years 1920 to 1957 a uniform trigonometric network with triangle sides 2 km long over the entire territory of the Republic, a network of such quality that it satisfies all the demanding requirements of contemporary geodesy.

The establishment of a uniform trigonometric network within the territory of the Republic was started in 1920 with the signalization and observation of first-order trigonometric points in Moravia. In the following years the work continued eastward toward Slovakia. Observations of first-order trigonometric points were completed in 1926. This first-order trigonometric network was then mutually adjusted. A series of new first-order trigonometric points was established in Bohemia in the following years for the purpose of making the network denser. The concentration of trigonometric points was carried out in 1928 in Northwestern Bohemia, in 1929 to 1930 in Eastern Bohemia, in 1931 to 1932 in Southern Bohemia, and in 1936 in Western Bohemia. The concentration of first-order trigonometric points was completed in 1949 to 1950, when the first-order trigonometric network was extended along the Czechoslovak-Hungarian boundary by some 20 additional trigonometric points. After the years 1926-27, when observations at first-order trigonometric points were completed, the triangulation work continued in the form of determining trigonometric points of the complementary networks of the second, third, fourth, and fifth order. This work was completed in 1957.

A first-order trigonometric network was established systematically from the west to the east. However, the same thing cannot be said about the complementary trigonometric network, i.e., about trigonometric points of the second to fifth order. Triangulation work in the years 1927 to 1957 on this network was carried out according to the needs of individual departments of the state administration. The annual tasks of the triangulation work were decided by interministerial consultations. Depending on the requirements, the work was dispersed over the entire territory of the Republic and divided into several larger or smaller work areas. This system of establishing the complementary trigonometric networks was not proper. It resulted in repetitions in the geodetic work and observations along borderline points, which were not always determined according to regulations, i.e., in the manner in which they could have been determined had the triangulation work been carried out systematically. Thus in the course of time, gaps formed in the trigonometric network -- "holes" surrounded by marginal trigonometric points established in different years. These areas were filled out later, but the work was often very difficult. However, in view of the requirements of the state administration and the organization of the work at that time, no other procedure was possible. The procedure described above was not economical, but

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the deviations and mean errors in adjusting the coordinates of the trigonometric points have shown that this method of establishing a complementary network did not affect the quality of the results. The results indeed correspond to the prescribed criteria.

According to the principles of the establishment of a uniform trigonometric network announced by the Ministry of Finances in its order of 1934 (No. 102 313/34-III/6), it was necessary to carry out triangulation work according to the given directives supplemented by directives for the fifth order. See Table 1.

TABLE 1

Order of triangulation point	Length of a side in km	Method of measurement	Permissible deviation in closure of triangle
I	25	Schreiber 24-36	1"
II	13	Groups 12	1.5"
III	7	Groups 9	2.5"
IV	4	Groups 6	3.5"
V	2	Groups 3	4.5"
Weight for direction in Schreiber's method 24 to 36			In exceptional cases only a treble of these values at the most could be permitted.

These principles show clearly that the triangulation work was planned for the future, when a trigonometric network -- all orders would be established throughout the entire territory of the state.

The accuracy of angular measurements was confirmed by the arithmetic mean of the absolute values of the deviations of angular closures of all triangles under consideration. Unless there were good reasons to the contrary, there was to be no quadrangle or polygon not filled out by triangles of the same or lower order. This applied to trigonometric networks of all orders, including those with triangle sides of more than 4 km. As a rule, the triangles were not supposed to have angles of less than 30'. The sides of triangles were not supposed to be longer than an average of 4 km and had to be measurable from both ends.

The work related to the establishment of trigonometric networks was divided into the following phases: preparation for field work, exploratory work, reconnaissance, construction of geodetic signals, signalization, permanent marking, stabilization, angle measurements, observation, preparation of plans, topography.

Computations were made in Prague, only in urgent cases were computations made in the field. This usually applied to the computation of approximate coordinates.

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Preparation

The preparatory work in the first years was limited to a plan for a first-order trigonometric network. The plan was worked out on a 1:200,000 map. Verifications with regard to the feasibility of obtaining uncertain directions were carried out on a 1:75,000 map. In view of the length of triangle sides (20-30 km), the curvature of the earth and the refraction had to be taken into consideration, so that the projected directions could be determined without costly geodetic constructions (for example, the earth curvature over 20 km is 31.4 m, and by deducting the curvature from the refraction of 4.1 m, we still have 27.3 m left). Special care was given to the preparation of a first-order trigonometric network in the Slovak lowlands of the "Velky zitny ostrov" [Great Rye Island] in the area Bratislava -- Trnava -- Nitra -- Levice -- Sturovo -- Komarno -- Bratislava. The planning for the second-to fifth-order trigonometric networks which were constructed later was easier but more extensive. It was necessary to draw the given points on a map, usually on 1:75,000 scale. This applied to the trigonometric points of the unified network as well as to the trigonometric points of previous triangulations. The trigonometric points of previous triangulations were necessary in order to facilitate the future transformation of other old trigonometric points. We also had to prepare copies of topographic plans or extracts from the operational drafts of the given topographic points. This preparatory work was done in Prague. The plan for the trigonometric network was prepared by the chief of the triangulation section to which the triangulation work was assigned. It was not until 1954 that we established a planning section which prepared proposals for all trigonometric networks to be established in all assignments during the year. The section also prepared all necessary drawings on maps, copies, and extracts. Then the planning section gave the prepared plans to the appropriate section chiefs, who carried them out in the field.

Exploratory Work and Reconnaissance

The preparatory work formed the basis for exploration, which was the first operation in the field. The exploration was the most important and the most responsible part of the triangulation work. A good development of further trigonometric networks depends on proper reconnaissance of the terrain, on a good selection of the location of new trigonometric points. Efforts were made during the reconnaissance to select locations for trigonometric points where it would not be necessary to build tall constructions and where an undisturbed use of the trigonometric points would also be guaranteed for the future. The results of the reconnaissance

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were recorded in notebooks and transmitted together with sketches of the position of the point on the map to the men in charge of the construction work. Thus the records were used in building or stabilizing the geodetic signals. During the reconnaissance it was necessary to establish all the data necessary for future work at the trigonometric points, specifically:

-- access to the point, the elevation of the trigonometric construction, the type of construction, the availability of wood, the transportation of construction and stabilization material, description of the surrounding terrain, geological conditions at the trigonometric point and in the surrounding area which are important as regards digging ditches, the directions established, obstacles as regards getting the necessary directions, the owner of the land, etc.

Construction of Trigonometric Signals and Signalization

The costliest and most difficult part of the triangulation work was the construction of geodetic signals at the trigonometric points. In establishing a uniform trigonometric network, we used for signals of the trigonometric points the following:

1. Artificial signals, which had to be built on foundations;
2. Natural signals, permanently determined in the open (church towers, chapels, castles, tourist look-out towers, transformers, masts, etc.);
3. Signals which could be used as geodetic signals only after additional adaptation (e. g. ruins of castles, monuments, towers without suitable roofs, etc.).

The following types of geodetic construction were used in building artificial signals:

-- single triangular or quadrangular pyramids, pyramids with an elevated stand (central pillar 2-3 m high), single triangular or quadrangular geodetic signals, geodetic towers with a central pillar, geodetic towers with a built-in central pillar, and signals placed on trees.

During the first years of triangulation work, natural signals (towers, churches, etc.) were used for second- and third-order trigonometric points, if they could be used as observation points. The complexity of measurements made at several eccentric positions in a tower, the difficulties in determining centering elements, and other combined calculations and measurements led to the decision to stop using natural signals for trigonometric points of a higher order. Such a method was recommended only for fifth-order trigonometric points determined by intersection "forward". Similarly, the use of trigonometric towers with a built-in central pillar was reserved only for the fifth order and very exceptionally for

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the fourth order. Tree signals were used only for fifth-order trigonometric points and for concentration points. According to statistical data examined in technical reports, the proportions in the total number of trigonometric signals were as follows:

Pyramids	46.3 %
Trigonometric towers	39.6 %
Trigonometric signals.	13.8 %
Other (towers, churches, tree signals)	0.3 %

Trigonometric signals were built by construction squads. During the first years there were no permanent construction squads or foremen. The work was done by a triangulator-engineer with four to six workers. When the construction work was completed in one area, the triangulator moved to another place of work, where he hired new workers. This procedure was repeated several times each year during the field work. The system was not economical. It delayed the work and made it more difficult. Thus in the course of time able workers formed a cadre of construction foremen who were employed only during the period of field triangulation work, i.e., from May through October. Only after 1945 did they become permanent employees. Thus we established a permanent staff of reliable and experienced specialists-construction foremen to direct the building of trigonometric signals.

At the beginning of the triangulation work the building instruments and implements were very modest. Usually a cable with a pulley was used, and sometimes a shovel and a pickaxe. That was the entire building equipment for one squad. In the course of time and on the basis of the experience acquired, the number of building implements increased. These were placed in wooden boxes, and we thus formed sets of building equipment. The composition of the sets kept increasing, and today they include many kinds of instruments and materials needed for the construction of trigonometric signals. The set of building equipment was placed in two wooden boxes and assigned to one building squad. It contained the following tools: 3 hemp ropes (10 m, 25 m, 50 m), 10 binders, 7 axes of various kinds, 3 belts (1 steel, 2 linen, each 25 m long), 2 pulleys, 1 water scale, 3 protective belts, 1 plummet, 5 saws (3 arch saws, 1 carpenter saw, 1 joiner's saw), 2 shovels, 2 pickaxes, 2 water buckets, 1 first-aid kit, 1 petroleum lamp, and other less important items.

The digging of ditches in connection with the construction and stabilization of signals was done during the first years by pickaxes. Such work was difficult in rocky terrain. Sometimes professional dynamiting specialists were hired to make excavations or the work was given under contract to quarries, etc. In the years 1946-48, building foremen and triangulators were given the

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opportunity to be trained on the job by taking courses as dynamiting specialists. When they completed the course and passed practical examinations in quarries, the successful candidates received certificates as dynamiting experts. Since then most excavating has been done by means of explosives, so that signalization and stabilization work has been speeded up.

Angle Measurements and Observations

Angles in first-order triangulation networks were measured in the years 1920-1922 by means of repeating theodolites made by the J. and J. Fric firm and the Neuhofer firm. These theodolites were a heritage of the collapsed Austrian-Hungarian empire. Later on we bought better and more modern theodolites made specially for triangulation work on higher-order networks. Among these, the theodolites made by the Fennel firm and the Breithaupt firm proved to be best suited. We also used other older instruments made by the Starke-Kammerer, Heyde, and Hildebrant firms. These were mostly single-axis instruments with a push limb. The telescopes of these theodolites were reversible. In addition to an alidade level, they also had a setting level on the revolving axis of the telescope. Two microscopes were used to read the angle measurements. New Wild theodolites, manufactured by the Wild firm in Heerbrugg, Switzerland, were used in triangulation work for the first time in 1927. During recent years only these theodolites have been used for triangulation measurements in Czechoslovakia.

More detailed data on the theodolites used in triangulation work within the territory of the Czechoslovak Republic are given in Table 2.

TABLE 2

<u>Theodolite firm</u>	<u>Limb dia- meter</u>	<u>Type</u>	<u>Magni- fying telescope</u>	<u>Micro- scope reading</u>	<u>Order measured</u>	<u>Remarks</u>
J. and J.						
Fric	18 cm	Repeating	30-40	2"	I-II	Moravia
Neuhofer	21 cm	Repeating	36	2"	I-II	Moravia
Hildebrant	--	Repeating	22	--	I	Moravia
Heyde	25 cm	Direction	--	2"	I-II	Moravia
Fennel						
large	25 cm	Direction	44	1"	I	Slovakia
Breithaupt	23.5 cm	Direction	40	1"	I	Slovakia
Starke-						
Kammerer	20 cm	Direction	--	2"	I	Slovakia

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Table 2 continued

Fennel small	16 cm	Direction	25	2.5"	III-V	Czecho- slovakia
Wild T 3	14 cm	Direction	40-30 20	0.2"	I-V	Czecho- slovakia
Wild T 2	10 cm	Direction	30	1"	III-V	Czecho- slovakia

For the sake of completeness, Table 2 also includes theodolites used for measuring complementary networks of lower orders. The remarks in Table 2 show what types of theodolites were used and where.

Measurements of the directions of first-order trigonometric points were very difficult because of the long distances involved. The work depends on good visibility, which in turn depends on favorable weather conditions. When long distances were involved, a slight fog or a so-called haze made observations impossible, and the work was protracted for many weeks. For example, observations at the trigonometric point Lomnický štít (in the High Tatras) took 8 weeks; at Dumbier in the Low Tatra 7 weeks; at Bradlo near Abelova not far from Lucenec, on a plain, 6 weeks. These were first-order directions, there were seven at the most, and the measurements were made by Schreiber's method -- yet the observations took this long precisely because of unfavorable weather conditions. In order to reduce this dependence on the weather, we used artificial light or sunlight for signalization. Such signalization by light beams was used in measuring trigonometric points of lower orders over a terrain where the measured directions passed through a smoky or foggy atmosphere in the vicinity of large cities, factories, industrial centers, or through the foggy air over large water areas (the regions of Ostrava, Most, Kladno, Southern Bohemia, where there are many ponds, etc.). In signalization by means of sun rays we used a heliotrope made by the Neuhoefer firm, particularly at the beginning of triangulation work. Using this heliotrope is rather difficult, because it requires constant adjustments according to the sun's progress. The use of this heliotrope depended completely on sunlight, which was one of the reasons why it was used on a very limited scale. Instead, we introduced signalization by artificial light. We bought reflectors made by the J. and J. Fric firm, which are designed for both artificial and natural light.

In 1948 we developed a so-called flash heliotrope on the basis of a proposal by Eng. Dr. Kucera, at present a scientific research worker of the Geodetic, Topographic, and Cartographic Research Institute of Prague. Its principle is based on a combination of several specially-adjusted undulated mirrors placed on a vertical axis. The axis turns by the wind.

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The flash heliotrope proved to be very suitable for triangulation work, as demonstrated by the fact that at the request of Polish geodesists five flash heliotropes were loaned to a Polish expedition which made observations on the Spitzbergen Islands in 1957-59 in accordance with a program of the International Geophysical Year. The flash heliotrope proved itself in the triangulation work in the High Tatra, in the Beskids, in the Ostrava and Sokolov regions.

Measurements of first-order trigonometric points were carried out only in Moravia and Slovakia. The first-order trigonometric network within the territory of Bohemia was taken over from the grade measurements of 1960-1998, which had been carried out at that time by the Military Geographic Institute of Vienna. In Bohemia we took over 42 points of the grade measurements. These trigonometric points, established at an average distance of 40 km, formed triangles which were too large in the given areas. The average length of sides of first-order trigonometric points in the rest of the territory was only 25 km. This great difference in the length of the sides of the first-order triangles created considerable difficulties in establishing trigonometric networks of lower orders. For that reason the first-order trigonometric network in Bohemia was concentrated so that the average length of the sides of triangles throughout the entire territory of the Republic would be 25 km. This was done by including an additional 93 first-order trigonometric points. These points were measured at the same time that we were establishing triangulation networks of lower orders in the years 1928-1957. In the years 1949-1950, this trigonometric network was supplemented by an additional 20 first-order points along the Czechoslovak-Hungarian border. Thus we completed a first-order triangulation network which is uniform. The directions on the first-order trigonometric points were measured mostly by Schreiber's method. The weight of the measured direction for the first-order points determined in the years 1921-1924 was 24, for points determined in the years 1925-1926 it was increased to 36. When completing the first-order trigonometric network in the years 1928-1933, the measurements were also made by Schreiber's method, the weight of the measured direction being 36. In the years 1936-1937, the measurements were made by the culmination method (weight of the measured direction 36 and higher). In the triangulation work along the Hungarian border, the original Schreiber method was used with a weight of 24 without closure to the original direction of the combination. In measuring complementary first-order trigonometric networks, we used modern type T3 theodolites made by the Wild firm.

In measuring angles at trigonometric points of lower orders, we used exclusively the method of measurement in groups and rows. The number of groups was determined according to the "Principles for establishing a uniform trigonometric cadastral network" and

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also according to "Instruction A." The Sohreiber method was also used for measuring lower orders but only in exceptional cases in areas where visibility was poor and all the measured directions were difficult to see at the same time. See Table 3.

TABLE 3

Order of triangles:	Deviations obtained in closures of triangles						Remarks
	I	II	III	IV	V	Sa	
Number of triangles	121	1,424	3,639	11,764	16,570	33,518	
% of triangles used	0.36	4.25	10.86	35.10	49.43	100.0	
% of total number	52.16	52.87	44.55	37.97	29.86	30.64	
Permissible deviation	1.00"	1.50"	2.50"	3.50"	4.50"	--	
Obtained deviation	0.91"	1.05"	1.48"	1.61"	2.29"	--	

About one third of the results of the total number of triangulation points was available for the evaluation.

The number of first-order triangles refers only to first-order trigonometric points included in the first-order trigonometric network in Bohemia. The inclusion of those 93 trigonometric points is described in the introduction and beginning of this article. The obtained deviations in the closures of triangles, especially those of the fourth and fifth order, are very favorable. This may be explained by the fact that even the lower orders were measured by accurate Wild T 3 triangulation theodolites.

Permanent Marking and Stabilization

Trigonometric points form the basis for all technical undertakings and geodetic and mapping work at present and in the future. Therefore it is necessary to mark them adequately, because when a signal is sooner or later destroyed, only a permanent mark remains. According to the principles for establishing a uniform trigonometric network (1934), each trigonometric point is to be stabilized by two underground marks and one surface mark. As to the stabilization of the trigonometric points of former trigonometric networks (paragraph 9 of the principles mentioned above), we were able to leave unchanged the original marks or to supplement or renew them centrically, i.e., restabilize them by means of underground and surface marks.

The stabilization of trigonometric points was not uniform at the beginning of the work. It developed as follows: first-order trigonometric points which were not identical with the points of previous triangulations were stabilized by means of stone prisms measuring 26 x 26 x 100 cm. The letters "K. V." [katastrální vymerování -- cadastral measuring] and the year of triangulation

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were carved out on opposite sides of the prism, the upper part of which had the form of a cube measuring 26 x 26 x 26 cm. The upper surface of the prism had a cross cut diagonally. This cross indicated the actual trigonometric point relative to the calculated rectangular coordinates X and Y. Below the prism (surface mark), a stone slab measuring 50 x 50 x 15 cm was buried 120-150 cm in the ground. This was the first underground mark. The second underground mark was a whole bottle or the neck of a bottle set in cement and walled in by bricks. A cross was cut diagonally again in the center of the stone slab. The center of the cross intersected a perpendicular line passing through the center of the cross on the stone prism and through the center of the neck of the bottle, i.e., the surface mark and the second underground mark. The marking of stone prisms was not always the same and changed frequently. On some prisms, the marking also contained the letter "T" [triangulation] and a triangle. Sometimes the initials of the triangulator were cut on the prism. Some prisms were cemented in concrete blocks, and sometimes the same was done with all the underground marks.

The stabilization of first-order trigonometric points which were threatened with destruction or damage had three to four stones. These stones measured 10 x 10 x 65 cm or 18 x 18 x 70 to 20 x 20 x 85 cm. Their position was measured both in relation to the stone prism of the trigonometric point and to the position of the surrounding fixed points, as well as in relation to each other. The measurement was made longitudinally and angularly and, where possible, the orientation direction was measured from at least one stone prism to a minimum of one trigonometric point. In addition to these measures, it was possible to buy the land or to expropriate it. The maximum area subject to expropriation was 40 m² (paragraph 77 of Cadastral Law No. 177/27).

The stabilization of the points of former trigonometric networks were left unchanged if they were found undamaged. Damaged surface marks were replaced by new prisms, or underground marks were changed or supplemented. This was always done centrally, so that the identity of the point would be preserved.

The stabilization of second- to fifth-order points was more unified, primarily with regard to the size of surface and underground marks. Only the markings on the prisms were different. The "Principles" of 1934 definitely specified the stabilization method. Each trigonometric point had to be stabilized permanently and as a rule centrally not later than at the end of the observation. The stabilization had to be done by means of two underground marks and one surface mark. Stone prisms measuring 20 x 20 x 80 cm were used for surface marks, the first underground mark being a stone slab measuring 40 x 40 x 15 cm and the second underground mark a glass slab measuring 16 x 16 x 3 cm. Both slabs and the stone prism

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had a cross cut diagonally in their centers. At one end the stone prism had the form of a cube with sides measuring 20 cm. The opposite sides of the cube were marked with the letters "KV" and the year. Later the letters were replaced by a triangle cut in the stone. It happened sometimes that the year cut in the stone did not correspond to the year the triangulation was carried out, because sometimes prisms were left over, to be used again in the following years. For that reason, marking the year on the prism was discontinued, only triangles being used. In the triangulation work carried out for purposes of delimitating geodetic work along state boundary lines, the prisms were marked with the letters "TSH" [triangulace statni hranice -- triangulation of state boundary line].

On inaccessible mountainous or rocky terrain, we used smaller stone slabs for the first underground mark (size 30 x 30 x 10), and for the second underground mark we used a small glass plate in the form of a disk 5 cm in diameter with a cross engraved in it. The plate was usually cemented into a rock. For trigonometric points located on rocks, we used metal cones (usually brass ones; these were fixed in the rock by means of melted lead. Instead of stone or glass underground marks, a small polished surface of a certain size was cut in a solid rock. A cross was carved in the surface in a position centrical with the cross of the cone. In mountains, especially in the High Tatra, Liptovske Hole, and Low Tatra, we used strong metal pipes; these were hammered into the ground down to the terrain level, cement or lead then being poured over them. The pipes were 8-10 cm in diameter, 80-100 cm long, split at the end so that they could not be pulled out, and filled in and covered up to the rim with cement or lead.

The experience of recent years accumulated in the economical-technical adaptation of the land and the socialization of rural areas after 1948 required protective measures for preserving the trigonometric points. In order to make the points easily visible, especially in fields and meadows, and to prevent them from being plowed out during field work, during the plowing of field boundaries, and other agricultural work, we introduced protective marks which we classified into several types:

Type I -- protective mark in the form of a stake; Type II -- protective ditch; Type III -- protective hill.

Type I is used in fields, meadows, etc.; Type II in pastures, forests, on barren land, etc. Type III is used mainly in forests. These marks serve to protect trigonometric points against destruction or damage and facilitate locating the point in the open.

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Local Plans and Topography

Trigonometric points will be used for technical purposes for decades. In order to make it easier to locate a point in the open, a local map was made for each point. Topography has also undergone changes since 1920.

In the course of time, new data were needed for describing trigonometric points. For this reason a new printed form was prepared in connection with making local topographic maps. The old form consisted of only one sheet, but the new one consists of two sheets (four pages). The heading contains the number and name of the basic triangulation sheet and of the regular triangulation sheet, the number of the special and topographic map, and data on the administrative division. The number and name of the point in the uniform trigonometric network, or other names of the point, are prominently marked on the sheet. Below these data, the sheet contains a topographic description of the trigonometric point. A special column is reserved for marking the point's position on the map, its geographic latitude () and longitude (). There is also a situational chart and a ground-plan. There is also space for a map clipping or for a photograph. The lower third of the page has space for a detailed description of signalization and stabilization, composition of the soil, the date and the name of the geodesist who did the work. The next page contains columns for verification of the point's name; notification of the landowner regarding the establishment of the trigonometric point; cost of signalization and stabilization; indemnification, servitude, expropriation, or redemption as regards the land used for the trigonometric point. There is also a column identification of the point, data concerning the land's registration and administrative notes. The third page has a column for the trigonometric altitude, additional topographic data, data on changes at the trigonometric point; and space for certified verifications, the name assigned to the point, a description of the establishment of the trigonometric point and certification by the district national committee that has taken the trigonometric point under its protection.

The above indicates that the printed form for topographical descriptions has been expanded to cover the many data made necessary by the increasing need of technical enterprises for trigonometric points and by the increasing number of new points. This has required the establishment of a proper recording system. This last printed form remained unchanged up to the end of triangulation work throughout the entire territory of the Republic.

With the increasing number of new trigonometric points, preparations for field work also increased. It was necessary to make copies of the topographic descriptions of the given points. Frequently several copies had to be made, depending on the needs of

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the given task. The number of parties from other institutions interested in trigonometric data also increased considerably. In addition, it was necessary to supply all the regional institutes of geodesy and cartography with data on the trigonometric points located in their areas. Thus the documentation service was subjected to unprecedented requirements. The requirements could be satisfied only by increasing the number of workers and by greatly intensifying the work. Errors and other shortcomings occurred in making copies. For these reasons a new form was introduced in 1951. The form was made on transparent paper, and was called "Triangulaoni udaje" [Triangulation Data]. Ozalid copies can be made from this form quickly and in any amount. In addition to the normal topographic data, this form also includes the rectangular coordinates, the southern ends of the surrounding fifth-order trigonometric points, lengths of triangulation sides, corrections from projections and compensations. A similar transparent form was also introduced for concentration points.

Calculations of rectangular coordinates in trigonometric networks were made by means of compensation of coordinates, using the method of least squares. Depending on the configuration of the given points, the coordinates of new points were calculated either individually ("solo points") or for several points at the same time ("multi-points"). Before the computations were made, all angular measurements were corrected in notes concerning directions by the deviations resulting from the eccentricity of the stabilized or signalized points. These centered directions were transferred through projection corrections to the pictorial plane. The accuracy of angular measurements was determined by the arithmetic mean of the deviations of the angular closures of the triangles.

The accuracy of the adjusted rectangular coordinates of each trigonometric point was determined by the mean error of the observed direction and by the mean error of the coordinates. The mean error of the measured directions was calculated by means of the Ferrer formula.

Calculating Machines

Calculating machines have been used from the beginning for computing the rectangular coordinates of trigonometric points. The first types used were "Times" manual computing machines. These machines had 16 to 20 figures and were very practical for those days. A disadvantage was that they did not have a decimal conversion for division and multiplication. They were made of good quality material, which is confirmed by the fact that they are used even today. Later on we used several machines of the "Archimedes" make; these were electrical and had 24 figures. They were used for special computations. Among the electrical calculating machines made more

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recently, the "Madas" machines are used most. Very efficient and reliable, they are semi-automatic or fully automatic. The figures are assembled on a keyboard and the machine has 20 figures. Manual "Brunswig" calculating machines proved to be the best. They have only 12 figures, are single or double (combined) and small in size, but very practical.

Calculating machines were and are used for all kinds of geodetic computations. Thanks to their use, the computations of triangulation work have been easier, faster, and more economical, and the work has been completed on schedule.

Trigonometric Elevations

Trigonometric measurements of elevations have been carried out since 1930 for the purpose of establishing the relative position of individual trigonometric points in the vertical direction. The measurements were made for trigonometric points of all orders, and were carried out simultaneously with detailed triangulation work. The trigonometric measuring of elevations was carried out systematically in the years when the triangulation work was done as far as the fifth-order. Elevations were not determined for trigonometric points established before 1930 or for those in the case of which detailed triangulation had not been carried out. These measurements will have to be completed as needed. The elevation triangulation network was always connected to several elevation marks, depending on the density of the leveling network of the Czechoslovak Republic, or it was connected to points the elevations of which had been determined previously and the altitudes of which were known. The elevations were determined with an accuracy of one point (mean error) up to 10 centimeters.

Concentration Points

In addition to first- to fifth-order trigonometric points, the so-called concentration points were determined according to need, usually simultaneously with the detailed trigonometric network (fifth-order). These included church towers, castles and manors, tourist look-out towers, and other convenient objects (transformers, masts, electric power lines, etc.). If such points were not determined permanently in a natural way, they were signalized by single pyramids, pole pyramids, or trees. The concentration points were stabilized. Permanently-marked concentration points (church towers, castles, etc.) were secured by one eccentrically located mark in such a way that its coordinates could be computed. A stone prism 16 x 16 x 75 cm having a cross on its upper surface was used for stabilization as a surface mark, and a stone or glass mark was used to establish one underground mark.

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Metal cones, bars, or pipes proved suitable for marks on rocks. Concentration points which were not marked by permanent signals were stabilized centrically below the signal in a manner similar to concentration points marked permanently in the open.

In the course of time the development of triangulation work, increasing technical undertakings and construction work, and socialization of the land in the rural areas and the economic-technical arrangements of real estate required measures for protecting the trigonometric points, securing them, locating and identifying them. Protective marks are discussed in this report in the paragraphs on stabilization. In addition to these marks, for the purposes stated above, the following points were established at the trigonometric points: orientation points, security points, and identification points.

An orientation point serves for the orientation of the trigonometric point. A security point has the same value as a trigonometric point. It is established at trigonometric points which are in danger of destruction or at points permanently signalized in the open (church towers, castles, etc.). An identification point serves as a fixed point in the open, from which it is possible to find the underground mark of a trigonometric point.

Organization of Field Work

Field work began during the first days of May and ended in late October at the latest. During the last years (1953-1956), we had difficulties because of a shortage of workers, especially in building geodetic signals. To hire these workers each year and then to dismiss them again when the work ended in the autumn proved uneconomical; therefore the field triangulation work, particularly signalization, was carried on even during the winter months. This measure was necessary in view of the time specified for the completion of the triangulation work throughout the entire territory of the Republic. Even though the difficulties increased in the winter -- snow, frost, and the short days making the signalization work more difficult, particularly with regard to the preparation of lumber and the transportation of construction and stabilization material -- the triangulation work was completed faster. As an example of the difficulties in cold weather, mention should be made of the digging of ditches for signalization and stabilization. The frozen ground first had to be soaked with gasoline, and the gasoline set afire; only then could we dig the necessary ditches in unfrozen soil. Signalization work carried out in the winter made it possible for the triangulators to do stabilization and observation work at the trigonometric points during the first months of spring. Only in this way could we make full use of experienced auxiliary workers and be sure that the triangulation work throughout the territory of the Republic would be completed within the prescribed time.

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Even though the ministry and the names of the offices and institutions which did the work changed, the staff of triangulators, technicians, and building foremen remained. In the course of time, older workers were assigned to other places or were given supervisory positions, and the staff of triangulators was replenished by younger geodesists who proved fully capable after they had completed their training. This rejuvenated staff of triangulators of the Geodetic and Topographic Institute of Prague, led by older and experienced workers, completed the work in 1957 throughout the territory of the Czechoslovak Republic thanks to its purposeful efforts and its high working morale.

In conclusion, it is certainly worthwhile to remind the young engineering-technical staff of geodesists who have entered or will in the future enter the geodetic service of our Republic, that they should value the work of those who established a uniform trigonometric network throughout the territory of the state. They should take care of it and maintain it systematically, so that it may remain a reliable and good geodetic foundation for all technical undertakings and as a symbol of peaceful construction work.

The work of establishing the trigonometric network was very difficult and exhausting. But the concern given the workers under the difficult circumstances mentioned above was minimal. It was not until after the year 1945, after the liberation of the Czechoslovak Republic by the Soviet Army, and especially after the year 1948, when the government of the Republic passed into the hands of the working people, that the concern given the men doing triangulation work increased significantly. Working conditions improved, meals were provided, transportation and some jobs were mechanized. Technicians and workers were equipped with shoes, rubber and leather boots, padded clothing for snow and frost protection, waterproof raincoats, and fur coats. Special tents, blankets, fur-lined sleeping bags and field kitchens were provided for overnight field trips. In order to speed up and facilitate the work, motorcycles, cars, trucks, and tractors were assigned to the triangulation units. All these measures made it possible to complete the triangulation work on schedule.

We must thank all those geodesists and technicians who took part in the successful triangulation work. At the same time, we must not forget the important work of the thousands of workers from Cheb as far as to the Soviet border, without whose cooperation the task would not have been completed. Our sincere thanks to them, too.

The building of a Czechoslovak uniform trigonometric network throughout the territory of the Republic is now completed. Thus we have finished one of the basic stages of Czechoslovak geodetic work. This was done at the time when all the people of the Republic were progressing on the road to socialism. The socialist

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reconstruction of our Republic meant a tremendous building task which became an issue of honor and devotion to all the working people and, therewith, our geodetic workers as well. The completed triangulation work takes an honored place in the construction work of Czechoslovak geodesists. The government of the Republic and the president recognized this work. In recognition of the establishment of a uniform trigonometric network throughout the territory of the Republic, they awarded on 30 April 1958 to the Geodetic and Cartographic Institute of Prague, as the principal and last recipient of this all-state task, the prize "For meritorious service in building work" in recognition of the exceptional results of the building work in our fatherland.

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III. CARTOGRAPHIC CONFERENCE IN BUDAPEST

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Czech

Kouba and Goetz

The Scientific-Technical Society of Hungarian Geodesists and Cartographers held a cartographic conference in Budapest on 7-10 October 1959. Almost 100 cartographers from Hungary and more than 50 foreign participants from 10 states attended the conference. Local and foreign participants presented a number of very valuable and interesting reports.

The introductory report of S. Rado on the present situation in the field of cartography provided the general theme for the conference. It was the first time in Hungary that a scientific conference dealt with cartography as an independent scientific field. Cartography is often incorrectly considered as an auxiliary branch of geography, at other times as a part of geodesy. A similarly erroneous view is that making maps is a common job for several different fields. The report defines the concept of cartography according to K. A. Salishchev and E. Imhof, and the relationship between cartography and other scientific disciplines. S. Rado classifies the cartographic science into three basic sectors, viz., the science of map-making, mathematical cartography, and map editing. The varied aspects of cartography require a certain system in map-making, which facilitates their use, study, cataloguing, and maintenance. The classification is done according to various criteria, most frequently according to the content or scale. The varied aspects of a modern map are derived from the most complex requirements of our society, economy, science, and technology, because maps are used in almost all areas of human activity. Since the cartographic science has developed only in recent years as an independent science in relation to geodesy and geography, it is not surprising that its international scientific organizational category has not been established. The speaker expressed his conviction that the next congress of the International Geographic Union will solve the problem in such a way that both socialist and capitalist states will be represented in the proposed international cartographic organization. Through the international cooperation of cartographers it will be possible to create important common cartographic works which can be used for the benefit of all peoples and for their better mutual understanding.

Subsequent reports gave information about the organization and the present and future tasks of Hungarian cartography (Gy. Meszaros); about topographic maps on scales of 1:25,000 to 1:50,000 (T. Szekely); about the history of Hungarian cartography (A. Borbely); about the terminology used on maps (J. Takacs); about school maps

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(T. Dudar); about the problems of municipal plans (A. Ajtay-Szendro); about aerial maps (Gy. Erdi-Krausz); about the use of colored aerial pictures in cartography (I. Rabi); about technological processes in cartographic production (F. Tallian, F. Nemeth); and about other subjects.

Foreign participants presented a study of methods of presenting realities on maps (Dylgerov, Bulgaria); information about ICAO maps (H. Meine, German Federal Republic); a report on the activities of the Pan-American Institute for Geography and History (A. Burt, U. S. A.); information about the present status of cartographic work in Czechoslovakia and its further qualitative development (Kouba); and experience in editing economic maps (Goetz).

The reports presented at the conference offered a series of themes for expanding mutual cooperation in the field of cartography; they also offered valuable practical experiences and theoretical findings in cartography with regard to map contents and new working methods. Some of the specific problems of interest were the question of map cataloguing, principles for establishing a map terminology, and experiences accumulated in making maps for the general public. We welcome the promise that the reports will be published in a special almanac.

A cartographic exhibition organized within the framework of the conference provided graphic information on the development of cartography in Hungary. The first section contained various maps -- from the Austro-Hungarian monarchy to the latest cartographic achievements. There were exhibitions of map sheets from a world atlas, size A4, and about 50 sheets of political maps with a great many details. The cartographic service also presented a rich collection of city plans of which about 15 have been published. The second section contained material from all phases of cartographic production, (composition originals, publication originals, prints, etc.). The last section had a collection of various foreign maps. Also included were our automap, small world atlas, moon map and the 1:750,000 map of Czechoslovakia. Other items worthy of mention were an American plastic map of the world and an Italian plastic topographic map.

A trip to the Cartographic Institute was arranged for the people attending the conference. The Institute makes maps for schools and for the public. It is organizationally divided into a composition operational unit and a drafting unit. Reproduction work and printing is done in an external offset printing plant. An interesting aspect of the editorial work is the fact that the editors prepare their editorial plans and compose their maps at the same time. Transparent plastics (astralons) are used almost exclusively in the composition work and in drafting. Maps are composed and drawn mostly at the printing scale. Rich documentation has the advantage that the basic material can be studied

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directly in the rooms of the documentation service. Changes in all cartographic elements are recorded on detachable sheets in editions of Atlas mira [World Atlas]. The Institute is also successfully using a photoprinting machine ("Typofot"), as can be seen by the high quality of the print used on Hungarian maps.

The cartographic conference in Budapest offered a good opportunity for a mutual exchange of findings and experience. It was arranged thanks to a great initiative, concern, and attention of Hungarian cartographers. The proceedings of the conference, the exhibition, and the excursions provided a perfect review of the work of the Hungarian cartographic service and of its contribution to the development of socialist economy, science, and culture in Hungary. We must continue to strive, according to the spirit of the conference proceedings, to promote creative cartographic activities in individual states so that they can be correlated and developed in the spirit of the principles of sincere peaceful cooperation.

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5668

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TASKS OF INDUSTRIAL POWER PRODUCTION IN THE THIRD FIVE-YEAR PLAN

[Following is a translation of an article by Engr. Rudolf Fahrner, chairman of the body of experts for industrial energetics of the CS. VTS (Ceskoslovenska vedecko-technicka spolecnost -- Czechslovak Society for Science and Technology), in Energetika (Energetics), Prague, Vol. X, No. 3, March 1960, Pages 105-107.]

Industrial power production constitutes an important element in the consumption part of our balance sheet in energetics. It determines the necessary amount of primary energy with regard to sources of power, i.e., up to now primarily with regard to coal mining. The consumption character of industrial energetics is not affected by the fact that industrial establishments also have their industrial electric power plants, gasworks, and other plants producing power. Even these power-producing plants are power-consuming installations from the point of view of primary power energy. They transform this energy into another type of energy which is required by a particular technological process, and thus they create conditions favorable to the fulfillment of tasks of our industrial production.

If in the past we provided mainly for an increased rate of growth of production and paid less attention to the problem of how to use our sources of power in the most economical way, during the Third Five-Year Plan we must make a qualitative change in this respect. We are obligated to do so not only because the opportunities to increase the extraction of fuels and the imports of fuels and energy are limited, but above all because we have to satisfy the requirements of maximum economy and the tasks of educating the socialist man, which are contained in the concepts of technical and cultural revolution as outlined in an important part of the directives for our Third Five-Year Plan. The economy of power energy cannot be merely a question of interest and initiative of energeticists. It must become a self-evident directive for the activity of every worker, regardless of whether he is an engineer building new installations, a technologist in production or in planning of technological processes, a worker whose energy is multiplied by a machine, a director of an establishment who is systematically training his co-workers in this spirit, or an energeticist who prepares a survey of the entire use of energy in an establishment, makes proposals, and takes measures to improve the use of energy in harmony with the production increase.

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The great tasks of our Third Five-Year Plan count on a substantial development of production forces. These are projected in the tasks concerning the increase of labor productivity and the increase only of legitimate costs. A worker in industrial production will produce 75 % more in 1965 than he did in 1957. Man's work efforts permeate all industrial production. The rate of speed, volume, and quality of production depend above all on man's efforts. Of course we want to reach gradually the stage when man's ingenuity will direct machines and mechanisms which will perform the difficult jobs for him, by using the same energy which permeates our entire life and production cycle in the same way as this life and cycle are permeated by efforts of man himself.

Therefore, it is not mere chance that we are beginning to study seriously the interrelationship between the increase of power production equipment and the increase of labor productivity, and that in our economic calculations we must consider the use of various types of power and production and power installations as one of the decisive indexes of the growth of production and labor productivity. To some extent this is a new task for us. We have to control it above all methodologically, so that on the basis of the results obtained we can arrange our work plans effectively.

The tasks of industrial power production were fully discussed last year in Olomouc at a conference of the Czechoslovak Society for Science and Technology. The results of the conference were presented in the Supplement to Energetika, No. 8. Naturally this does not refer to the tasks connected with the establishment of all-State power networks and basic sources of power. The ways of adjusting the power production of industrial establishments to the conditions existing in these all-State power networks and to the development of the absolute magnitude and structure of our balance sheet of power production are divided into many sectional tasks of technical, methodological, and organizational character. These tasks may often seem less important in individual cases, but in view of the number of similar cases in the entire state they are important; when we solve such a problem systematically, we make it easier to remove a deficiency and often we do remove a deficiency which many workers were trying to eliminate at the same time with varying degrees of success but without any effective mutual assistance and information.

In the Third Five-Year Plan, the greatest increase is indicated with regard to gas consumption. As compared to the present conditions, in the overwhelming majority of cases we expect to supply industrial establishments with gas from long-distance networks, for which gas is provided from pressure gasworks and coke ovens. We plan hardly any individual power generating stations, even though it has been generally established that they are efficient. Their power efficiency is greater than that of pressure gasworks. This involves a complex problem of generator construction, types of fuel,

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use of tar, neutralization of phenol waters, automation of operational processes, availability of supplies of installations, and amount of metallurgical material, which cannot very well be handled by a factory energeticist alone. In connection with fuel supply through a long-distance distribution network, the construction of furnaces acquires special significance, with regard to the automatic regulation of combustion, the use of residual heat which provides the most economical consumption of gas, and the possibility of using liquid fuels. Liquid fuels can be used as basic fuel, or as replacement for gas in cases when industrial production requirements are greater than the available amount of gas, when the supply of gas through a long-distance network has to be regulated during periods of maximum use in the winter, or under exceptional circumstances. Naturally, an additional requirement is accurate planning of consumption and control, which means a sufficient amount of measuring instruments and a knowledge of the interdependence of consumption and production.

In order to get closer to such a state of affairs, we must complete the equipment in almost every industrial establishment and modernize it to a great extent by the endeavors of the establishment itself.

Serious tasks await us also with regard to the supply of thermal energy. The problem of modernizing our obsolete boilerhouses cannot be solved merely by adjusting them to some extent to the type of fuel, but by solving problems connected with the construction of boilerhouses for new industrial establishments, and by renovating the boilers in some cases where the boilerhouses are obsolete. This must be done in a progressive manner on the local or regional scale. The question of local or regional cooperation assumes special significance in these cases. In discussions which were a follow-up of the Olomouc conference, we came to the conclusion that it is necessary to form thermal power committees composed of representatives of consumers of thermal power who are interested in the problem. With effective support from professional and higher administrative organs, these committees would ensure a really socialist development of our power industry in this sector.

Of course, from the point of view of the planners and producers it is necessary to arrive at some purposeful typization of small and medium boilerhouses, and from the point of view of the organs of the Ministry of Power and Water Economy it is necessary to expand requirements for using the thermal potential for steam motors and for further conversion into electric power, air pressure, etc., especially in counter-pressure machinery. The narrow scope due to a lack of planning brings difficulties in the winter, when for the time being we will not be able to avoid regulations concerning electric power consumption, not even in the future.

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The opportunities for using gas and liquid fuels on a larger scale create conditions for a whole series of new solutions, the mutual advantages of which are not quite clear yet. Even though during the Third Five-Year Plan we will actually be only preparing to get on this road, cases of new solutions will be decisive for further development. One such promising solution is a combustion turbine which uses completely the heat generated by fuels in technology and uses it for production of thermal energy.

Machinery with diesel motors which use exhaustion heat is currently in production, and its application in concrete cases is awaited. We are waiting for diesel-compressors with single handle cylinder and for compressors with free pistons, which we cannot yet produce.

In the distribution of thermal energy, we have to succeed in making construction less expensive, to specify conditions favorable for the distribution of hot water and steam, and at the same time to see to it that the shortcomings of both of these systems are eliminated. Even here the measuring and control of consumption is not up-to-date, and it is perhaps precisely here that the biggest losses of power could be eliminated.

Electric power involves many problems in connection with a common electric power network. With regard to the sources of power, the problems are in the counter-pressure thermal plants mentioned above, which can improve the situation at the place of consumption during the winter period of maximum consumption, in cooperation with industrial electric power plants, in the use and construction of diesel aggregates, in organizing, arranging, and maintaining consumption diagrams. This involves a whole set of questions with regard to equal distribution of the regulated production load among individual industrial establishments; it involves the possibility of exceeding the economic indexes of electric power plants and enterprises, and maintaining a balance in the network. On the other hand, it also involves the question of creating optimum conditions for the technology of production in industrial enterprises and exceeding production tasks. In no case should a specific technology be hampered by the lack of electric power supply, because even if the cost of production of electricity is higher (e.g., because of a diesel aggregate), in many cases the higher cost pays off, if it makes it possible to maintain a technological process without interruption in periods of high electricity consumption. We will have to expand further the present system of management and cooperation in this field by eliminating through unprejudiced common efforts those difficulties which appear in the maintenance of a balance of the power network and in providing for a purposeful production of the industrial enterprise.

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In the field of electric power consumption, we will have to determine proper criteria for the construction of electric heating equipment, particularly electric stoves, as compared to stoves using various kinds of gas. We will have to make greater use of transformer stations than using them only for one industrial enterprise, to make sure that the voltage at the boundaries of an industrial enterprise does not exceed a certain value (probably 400 MVA), and to keep improving the compensation of wattless current.

The tasks described, which represent only a certain selection of tasks for industrial power production, compel us now not only to consider but to provide for immediately and to continue to improve the conditions under which such problems can be solved successfully. Not much has happened since the Olomouc conference, which brought a number of specific proposals, although some projects are beginning to be put into effect.

If we are to say how to proceed most effectively, we could recommend several ways. The main item probably is to influence effectively the development of power production in industrial enterprises. It means on the one hand synchronizing the efforts to suppress the significance of energeticians in industrial enterprises which are based on various, often not pertinent reasons, and on the other hand achieving the best implementation possible of the tasks concerning the power economy of the industrial enterprise through a close cooperation of energeticians, especially with technological workers, and through the implementation of tasks in the area of measuring and regulatory installations. It means educating energeticians into workers who will present to the management of the industrial enterprise objective reports concerning the use and exploitation of basic funds in production, and who will use the means of the enterprise itself to put into effect arrangements which will lead to the automation of production and to the control of its development. Work according to the PPO [?] system for repairs and maintenance of power installations remains of course the first operational prerequisite.

Last but not least, we must increase the qualifications of energeticians. Indeed, in this sector of activity of the industrial establishment, where work performance cannot be controlled only by determining whether there was or was not enough power energy available for production, the qualification level of the respective workers is a decisive factor affecting the correct development of the enterprise.

The total significance of the power economy described above requires that an industrial enterprise be effectively controlled to determine what amount of power it uses and what measures it plans to take in order to increase its performance.

With regard to the question of improved controls which was asked at the Olomouc conference, no progress has been made so far.

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A system of administering the power economy in the entire state should become an experimental task of some institute, which could collect the basic data which we now lack for determining our goals in this sector.

Also, our research plants should carry out analyses on a much wider scale of typical technological processes from the point of view of power energy, and to determine the efficiency of using various types of power energy and power installations. Such conclusions are not available either to energeticists working in industrial establishments or to workers of the State Planning Commission. Nor are they available to workers who make decisions on problems of technological development of machinery and installations.

Only from the point of view of such justified needs is it possible to enforce an effective typization in projects and in the manufacturing of installations. We cannot propose today who should make the assignments and who should solve the problems so that we might encompass fully all the possibilities of systematic action with regard to our power balance sheet, but by determining the system of administration such questions will also be clarified.

Economic proposals should be one of the most important means of influencing decisions made by industrial enterprises. The system of tariffs for delivering power and of fuel prices should therefore be examined very carefully, because it is an important methodological element of administration and control of the power economy. This control must concentrate on the analysis of several principal and also decisive indexes. Indeed, one of the principal methods of socialist management -- competition -- depends on the reality and accuracy of these indexes. In order to increase substantially its efficiency, it will be necessary to introduce appropriate indexes in the field of power economy and to evaluate competition on the basis of these indexes.

In conclusion, we must stress particularly the necessity of taking new measures to develop measuring techniques. We cannot talk only about the importance of mechanization, but we must establish power laboratories in our industrial establishments on the Soviet pattern. Soviet industrial establishments carry out the necessary measurements and analyses and maintain the necessary quality level of the measuring techniques, maintenance and modernization of regulatory and other installations, which release men from mechanical physical and mental labor.

The problems of industrial power production include also questions connected with clean air and water utilization. Both these problems concern most industrial establishments. Of course, the problems of water economy are more pressing and force us to change seriously our views on the use of water within enterprises and the purification of sewage water.

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Not even in the Third Five-Year Plan shall we be able to measure the fulfillment of tasks in the power economy as easily as we can in the construction and in the manufacturing of producer and consumer goods. However, by creating good conditions for the development of the power economy through systematic elimination and solution of shortcomings which we find in this sector, we will contribute substantially to the fulfillment and overfulfillment of the Third Five-Year Plan goals. This is a task for all workers who influence our industrial power production, a real task which we must begin to solve as early as this year.

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5668

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DEVELOPMENT OF MEOPTA NATIONAL ENTERPRISE IN PREROV SINCE THE LIBERATION

[Following is a translation of an article by J. Mikulasek, of the Meopta National Enterprise in Prerov, in Jemna mechanika a optika (Fine Mechanics and Optics), Prague, No. 2, February 1960, Pages 41-43.]

The foundations of the present Meopta optical establishment in Prerov, the largest enterprise of the optical industry in Czechoslovakia, were laid 27 years ago. The original establishment, Optikotechna, was small and its production program was also very modest. It made magnifying glasses, Belar lenses, and condensers. At the end of 1933 the production program was expanded to include enlarging instruments. The beginnings were very difficult for employees in both workshops and offices, because they had no experience in this new field. Through their own application, the employees gained both practical and theoretical experience.

At the beginning, the establishment had seven employees. In 1934, when the production program was expanded to include additional products, trichinoscopes, the number of employees increased to 35. In the next year, production was expanded further to include telescopes, and the establishment made its first export sale to Italy. The export of optical products gradually increased, and in 1936 production was expanded again to include diaprojectors and later projectors for 16 mm and 8 mm films. In 1935, the establishment was taken over by the Brno "Zbrojovka" and thus production in the Prerov establishment gradually acquired the character of industrial production. The new owner assigned to the establishment its main task: to secure the military defense of the state, i.e., to supply the army with observation and measuring optical instruments. To accomplish these tasks, a new plant was built and then twice expanded in the following years.

Because of high-quality products for civilian use, the firm Optikotechna slowly joined the ranks of foreign firms with a worldwide reputation and a great tradition. However, the creative and working energy of the employees began to fall under the shadow of the dark cloud of fascism which swept over our country. The Munich treason came and then the occupation period. When the establishment was taken over by the occupying power, civilian instruments were gradually eliminated from the production program and a new production was organized to expand the war potential. The establishment stood up honorably during the occupation. It lost several good

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workers, who paid with their lives for their opposition to fascism. Fortunately, the plant's buildings were not damaged by the war, although bombs fell only a few dozen meters from their walls.

In 1945, after the liberation of our fatherland by the glorious Soviet army, the employees got a big assignment: to rebuild the production program from the foundations and to replace the war production with products for civilian use.

Workers and technicians, having become free men in the new people's democratic state, started with enthusiasm to do work which served peaceful purposes. The building efforts were not limited to a few individuals, but spread among the broad masses, thus both guaranteeing and implementing the resolutions of the party and government to build socialism. The results of the building efforts soon became apparent, for in a short time the establishment not only began to deliver its high-quality products to the domestic market, but also penetrated world markets. Photographic and enlarging instruments began to be exported all over the world. This rapid expansion was due to the factory organization of the Communist Party of Czechoslovakia and the ROH organization [Rada Odporoveho Hnuti -- Trade Union Movement Council], which always worked relentlessly and continued to organize the building efforts. This is confirmed by many acknowledgments which the establishment has received.

On the 15th anniversary of the liberation of our republic, we survey with pride the results of our work which has brought recognition to our nationalized enterprise throughout the world. The name Optikotechna was changed in 1946 to Meopta n.p. (National Enterprise) Prerov. Since the field of fine mechanics and optics affects perhaps all industrial and scientific fields, the technicians were faced with a whole series of entirely new tasks and problems. It was evident that technical development in the field of optics and fine mechanics had to be put on solid scientific foundations. Consequently, in 1949 we began to build a research laboratory. The party and the government, aware of the needs for technical progress in order to build socialism rapidly in our fatherland, established on 7 July 1953 the UVOJM ["Ustav pro vyzkum optiky a jemne mechaniky" -- Institute for Optical and Fine Mechanics Research] in Prerov. In 1956 the UVOJM moved to its own building constructed next to the plant. But the development and modernization of instruments continues in the plant itself.

The Meopta National Enterprise in Prerov gradually put in production the following instruments:

In the field of photographic instruments, the double-lens reflex camera Flexaret II was reconstructed from Flexaret I. At customers' requests the production included Flexaret III and Flexaret IV. Also, Flexaret IVa, which can use both 6 x 9 cm roll films to make 6 x 6 cm pictures, and 35 mm movie camera films to make

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24 x 36 mm pictures, was developed into the fully automatic instruments Flexaret V and Flexaret Va. Both these types are of world-level quality.

Among other types of photographic instruments, we have developed the collapsible camera Milona I for 6 x 6 cm pictures and later on Milona II and then Milona III, which has a telemeter, a fast-action winder, and a picture-counting device. After the liberation, there was an urgent need for a technical photographic camera. This need was satisfied by developing the Magnola camera for 13 x 18 cm plate negatives and flat films. It has a shutter of domestic construction and production and includes accessories.

We have developed an automatic photo camera Opema I and Opema II for 35 mm movie film. It is built for pictures size 24 x 32 mm. Recently we developed an automatic camera Optineta for 35 mm film, making pictures size 24 x 36 mm. The instrument has a shutter of domestic production and construction. It is fully comparable to foreign products.

For a narrow 16 mm film, we developed the photographic camera Mikroma I and Mikroma II. This instrument was awarded the Gold Medal at the Brussels World Fair in 1958. It takes 50 pictures size 11 x 14 mm. At present, we are putting on the market a new Stereo-Mikroma camera. It is the first camera made in Czechoslovakia for plastic photography. A Meoskop viewer is manufactured as an accessory to the Stereo-Mikroma.

We have developed photographic shutters for our own needs: Magnitax for the photo camera Magnola and Metax for Flexaret, Milona, and Optina.

In the field of enlarging instruments, which are of world-level quality, we developed after the liberation a semiautomatic instrument Axomat for negatives size 24 x 36 mm, then Opemus II, Magnifax II, Mikromax, and a portable instrument Proximus. The newly developed supplementary equipment Meokolor can be used for work with color photographic material.

Among movie cameras, we have developed Meopton I, Meopton II for 16 mm film, a projector 2 x 16 and a camera for an "ambulatory cinema." Movie cameras Meopton III, Meopton IIIa, and Meopton IV are made for 35 mm film. The last type, for which the Institute for Optical and Fine Mechanics Research developed wide-angle projection equipment and equipment for optical and magnetic sound recording, received in Brussels the "Grand Prize Expo 58." In addition to these professional projectors, we have developed 16 mm film projectors for home and club use, namely, Opefon and Optilux.

With regard to slide projectors, immediately after the liberation we developed a 5 x 5 cm diaprojector with an adjuster for 35 mm film. A new instrument in this field is a 3 x 3 cm diaprojector for pictures taken by the Mikroma camera.

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To provide equipment for film laboratories, we developed special instruments such as a cutting table for cutting the sound tape and pictures, a four-reel tightening table and a rewinding table operated both manually and by a motor. All instruments named above are made for 35 mm film. Also developed were a mechanical cutter for films of various sizes, a mechanical perforator for film and paper of different sizes, instruments for magnetic sound recording on tape with hydraulic motor for State broadcast purposes, an instrument for magnetic sound recording on wire with crystal headphone.

In cooperation with the Institute for Optical and Fine Mechanics Research, a great deal of work has been done in the development and production of lenses with which the manufactured cameras are equipped, or which are delivered separately. We have developed photographic lenses, enlarging lenses, reproduction lenses, range finder lenses, lenses for photographic and projection instruments for 35 mm, 16 mm and 8 mm films for slide projectors, and various kinds of camera lenses. A large number of accessories for these lenses was also put on the market, such as lens attachments and color filters.

By developing various measuring instruments, the Meopta National Enterprise at Prerov contributes also to a faster development of the food, chemical, and other industries. These products are refractometric instruments, which were manufactured in our country for the first time in 1948. They include manual refractometers, submersible, universal, and sugar-refinery refractometers. A three-chamber medical interferential refractometer has been developed for medical purposes. In the field of spectral instruments, we have developed a manual spectroscope for demonstrating a visible spectrum, a manual spectrometer, and a quartz spectrograph.

There is a very rich selection of binoculars and telescopes. In addition to the currently known 6 x 30 binoculars with ocular and central adjustment, the group includes also the following binoculars: 8 x 30, 7 x 50, 10 x 50, 12 x 60 and 4 x 20 with only ocular adjustment, and small opera-glasses 4 x 15 for theatergoers. The instruments named above have a good picture quality, are in great demand, and are exported all over the world. For people who like hunting, we have developed telescopic gunsights with various degrees of enlargement. The best-known gunsights are Jelov, Lesar, gunsights for air guns, rifles, etc. In addition to these, there are special control telescopes, pocket and wrist compasses, quadrants, and instruments for measuring the relative distance of eyes.

Many instruments and installations have been developed which were for a specific purpose only. These were made according to customer's specifications, such as periscopes for the control of pipes, telescopes for measuring the level of railroad tracks, railroad signal reflectors, small microscopes for quick observations outside of laboratories and for stamp collectors, stereoscopes for current use and for training in stereoscopic perception.

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The plant has developed a rich variety of accessories of all kinds, for photographic and enlarging instruments as well as for cinematographic projectors and instruments. We cannot give in this article a detailed list of these accessories. There are about 80 kinds of accessories for photographic cameras, about 80 items for enlarging instruments and dark rooms, and 20 items for cinematographic projectors.

Today, on the 15th anniversary of the liberation and nationalization of our industry, we can survey with pride the results of our building efforts and of our work which has been carried out well. The balance sheet of this work obligates us to keep it up, indeed, to make greater efforts yet, and to learn from past shortcomings how to solve tasks in the future. The efforts of our workers, technicians, and other employees and the good cooperation within the enterprise were the main factors which helped us to succeed and to penetrate world markets. We have to keep this constantly in mind, if we are to fulfill the task which the proclamation of the party and of the government imposes upon us and which we impose upon ourselves, i.e., that with regard to the quality of our products and our further production we must keep pace with modern technology and thus maintain a position of honor on world markets in comparison with foreign products. This purposeful and honest work will help us to complete the building of socialism in our fatherland and at the same time it will give us good support in our struggle for a permanent and just peace in the world.

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5668

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ECONOMIC ANALYSES IN ESTABLISHING THE NEW WAGE SYSTEM

[Following is a translation of an article by Josef Raba in the Czech-language periodical Podnikova organizace (Industrial-Plant Organization), Prague, Vol. XIV, No. 2, 17 February 1960, Pages 55-61.]

(Some engineering enterprises are still facing the task of reorganizing successfully the wage system. For that reason the method of economic analyses applied to such reorganizations remains a timely subject. The author of this article discusses his own experiences and describes the methods of his work. The part of his discussion concerning the analysis of the results of such a reconstruction with regard to wages and their relationship to an increase in labor productivity may prove particularly instructive for our enterprises.)

The establishment of a wage system is a highly political problem. Its purpose is to create the prerequisites for a further and even faster increase in labor productivity which would also result in a further production increase in the next Five-Year Plan. This will make it possible to catch up with and surpass the most advanced capitalist countries. The establishment of a new wage system is not only a problem of wages, as some workers erroneously believe. The new wage system has other goals which cannot be separated from wage problems, viz., to create prerequisites for a further increase of labor productivity through norms which are technically justified.

Finding Labor-Productivity Reserves in Establishing a New Wage System

Is it necessary to find out about further reserves of labor productivity in establishing a new wage system? Finding reserves is always useful not only from the point of view of the entire national economy, but also for the workers, because with an increase in labor productivity, personal material interests and average wages also increase according to the norms. But in establishing a new wage system, the necessity of finding reserves is based on additional reasons. The norms applicable in our machine engineering establishments are not made at the same level, and therefore it is necessary to find and to use other reserves of labor productivity in establishing a new wage system, so that average earnings can be increased in harmony with an increase in labor productivity. At

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the same time, we must say quite openly that an increase in average earnings cannot apply to all workers, because those who worked under softer norms cannot get the same increase in average earnings as those workers who worked according to correct norms.

In the new wage system, skilled labor offers more incentives as regards stimulating interest in increasing the workers' qualifications. This increase in qualifications is necessary for a further and quicker development of our machine engineering industry. Highly-skilled workers must operate new and more perfected machinery. Therefore the difference between the first and the eighth grade, which in the old wage system was 1:2 (the first-grade remuneration rate for technically justified norms is 2.34 Kcs, and the eighth-grade rate is 4.70 Kcs), in the new wage system is 1:2.4 (the first-grade remuneration rate is 3.65 Kcs and the eighth-grade rate is 8.80 Kcs). This increased difference will require an increase in average wages, which also must be covered by a corresponding increase in labor productivity.

If new reserves of labor productivity were not found when a new wage system is introduced, a large number of workers would gain with regard to their average wages, but the average wages of about the same number of workers would decrease, and that would not be right. Therefore during the preparatory work it is necessary to discover further reserves of labor productivity through the verification of constructions, technology, and norms, thus making it possible to increase average wages.

Collective Premiums

In the past years, increases in average wages were planned in harmony with increases in labor productivity. How did we obtain an increase in average wages? Through a better use of the time schedule (decreased absenteeism) on the one hand, and through an increase in norm fulfillment on the other. But could we assure in this way the planned increase in average wages while maintaining the correct technical norms? We could not, because while through increased experience, qualifications, and socialist competition the fulfillment of norms did increase, this increase could not cover the planned increase in average wages. Therefore the working-time schedule was being increased quite incorrectly through overtime work. But even overtime work could not cover the planned wage increase. The result was that the norms were artificially softened through additional working time -- secretly at first, but quite openly later -- so that the norms lost their technical character and became only a measure of work remuneration instead of a measure of labor productivity and an instrument for its increase.

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Under the new wage system, the greatest part of the average wage increase with regard to manual workers will be assured through a collective premium which will be paid to manual workers according to the fulfillment of those indices which are directly influenced by the manual workers of a specific workshop, for example, the fulfillment of the individual items of a plan, etc. Through the collective premium the manual workers will be also directly interested in accepting and fulfilling higher tasks of labor productivity in harmony with the principles of the norms of material interest.

As soon as the new wage system is introduced, a portion of the manual worker's wages will form a collective premium. What should be the principles for distributing such premiums? They should be the same as the principles of wage remuneration, i.e., the premium's amount should depend on the amount of work performed, its quality and social significance. For example, it is possible to establish a higher collective premium for workers using machines, in order to create an interest in switching from shops with manual labor to machine-operated shops. In no case should the collective premiums be used to "cover up" present undeserved wages, because then the collective premium and the new wage system itself would not fulfill their purpose: to put the norms and wage policy in order.

TABLE 1

WAGE INVENTORY OF MANUAL WORKERS

	<u>Novak</u>	<u>Svoboda</u>	<u>Total</u>
Old Wage System (OWS)			
Stamp number			500
Personnel grade	5	5	5.2
Average work grade	4.72	4.80	5.4
Average task tariff	3.25	3.28	3.47
% of norm fulfillment	230	240	228.3
Average wage per hour	7.48	7.87	7.91
New Wage System (NWS)			
Qualification class	5	5	5.11
Time tariff	5.50	5.50	5.93
Average tariff	5.14	5.23	5.72
Average task tariff	6.08	6.14	6.38
% of norm fulfillment	112.8	117.6	111.3
Average task wage	6.86	7.22	7.10
Additional payment			
Type	--	c	--
Kcs	--	0.80	0.07

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	<u>Novak</u>	<u>Svoboda</u>	<u>Total</u>
Average hourly wages	6.86	8.08	7.17
Average Wages in OWS in percent to Average Wages in NWS	109.0	97.0	110.2

Tasks of the Economic Analysis in Establishing the New Wage System

The economic analysis used in establishing the new wage system concerns primarily the relationship between labor productivity and average wages. In this analysis we not only study the problem of wages, i.e., how the new wage system will affect the increase or decrease in individual workers' average wages, we also examine how labor productivity will develop when the new wage system is established. Therefore the main task of the analysis is not to determine how many manual workers will gain by the new wage system, how many manual workers will keep their present wages, and how many manual workers will lose with regard to their average wages. The main task will be to find out how much labor productivity has to increase during the preparatory period, so that average earnings can increase in harmony therewith, and how many manual workers would suffer losses, so that their number can be kept to a minimum. Consequently the tasks which we have outlined for ourselves in the economic analysis are as follows:

- a) To determine the effect of the new wage system on the average wages of manual workers.
- b) If the number of manual workers who may suffer losses because of the new wage system is excessive, to determine the necessary percent increase of labor productivity so that the number of manual workers suffering losses would not exceed 15 to 20%.
- c) When reviewing the norms, to check whether the proposed increase in labor productivity is covered by technical-organizational measures and whether it is projected in the norms.
- d) To determine the influence of the new wage system on the labor plan (requirements of norm-hours, wages, etc.) and other plans, but particularly on the costs plan (to express changes in additional charges for working expenses, with regard to items included in the calculation formula, etc.).
- e) To determine the average amount of the collective premium.

Wage Inventory in Establishing the New Wage System

Through a wage inventory we determine the effect of the new wage system on the average earnings of individual manual workers. This is done on forms (see Table 1), in which data are entered

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for individual manual workers. Subtotals are prepared for individual occupations, so that we can determine the influence of the wage system within individual groups of manual workers.

Columns 3 to 7 of the wage inventory form concern data on wages under the old wage system. These are filled out according to actual results for the last 3 months. To determine these data is not difficult. We only have to assure that the data for all manual workers who work for assignment wages correspond to the data established on the basis of general analyses of manufacturing establishments or operational shops.

It is more difficult to determine correctly the amounts which the manual workers will get under the new wage system. For example, the tariff grade under the new system will as a rule differ from the average work grade under the old wage system. In establishing the new wage system we change not only the tariffs but also the work grade. Therefore we determine first of all for every profession and for every work grade within a profession how much the tariff grade has changed (as a rule how much it has increased) as compared to the work grade under the old wage system. In the same way we estimate and express the influence of the change in technically justified norms under the new and the old wage systems in determining the average assignment tariff.

However, the most difficult thing to do is to estimate correctly the norm fulfillment after the new wage system has been established. We can make this estimate in several ways:

a) In serial and wholesale production, the correct way to do it is to calculate the norm fulfillment as follows: before establishing the new wage system, we determine technically correct norms without the superstructure. Then we follow the norm fulfillment both with superstructure (old wage system) and without superstructure (new wage system). However, we project into the norm fulfillment the influence of other draft measures which are predominantly organizational (elimination of work stoppages, etc.).

b) This method of determining whether the norms are practicable is the most correct one, but it cannot be used in piece-rate production, because here the number of norms is so great that it is impossible to study the norm fulfillment under the old and the new wage systems. For that reason, in piece-rate production we use mostly estimates, which are made directly by the foreman of the specific sector. This method is simple but very inaccurate, because we do not know the exact value of the norm fulfillment capacity, not even for one single manual worker.

c) We can determine the norm fulfillment capacity much more accurately if we combine both systems. For each profession, we determine the norm fulfillment by at least three manual workers both according to the old norms (with superstructure) and according to the norms which will come into effect after the new wage system

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has been established. We shall select at random three manual workers, of whom one is average, the second below average, and the third above average. On the basis of the work cards handed in by these workers for the previous month, we determine the amount of work which they have performed during that month. For all work, we determine the norms according to the principles and normative provisions applicable when the new wage system is established. In this manner we calculate the norm fulfillment by these three workers both under the old wage system and under the future new wage system. At the same time, we determine whether high earnings are obtained because the norms are soft, or inversely, whether low earnings are caused by the fact that the norms are too hard.

If the trade in question is larger, or if it includes a greater number of manual workers, we examine the norm-fulfillment capacity with regard to several workers. For example, we classify the trade of turner in three groups according to the amount of work or the character of the production, and then we study the norm-fulfillment capacity in each group. Then we determine the norm fulfillment for other workers by comparison. At the same time, we take into consideration the reduction of stoppages just as we have done in previous cases, and also other proposed technical-organizational measures which will help to increase norm fulfillment.

When we determine the norm fulfillment for each manual worker, and therewith the earnings which a manual worker will receive under the new wage system, we add the additional remuneration workers will receive for difficult working conditions and for supervising squads of workers. Thus we calculate the expected earnings of every manual workers, not including the collective premium (column 16).

Then we compare the new earnings (column 16) with the previous earnings (column 7), and determine the amount of the collective premium and the difference between both earnings. We can express the difference either in absolute values, i.e., we determine how many Kcs a manual workers gains or loses under the new wage system, or we express the difference of average earnings in percentages. In making the analysis we use percentages, by which we compare earnings under the old wage system with earnings under the new wage system (without the collective premium). Thus we determine what percent of the collective premium a manual worker should get so that his average earnings will not be lower under the new wage system. For example, if a manual worker earned 6.60 Kcs per hour on the average under the old wage system but receives only 6.00 Kcs (not including collective premium) under the new wage system, the ratio is 110 %. This means that this manual worker needs only 10 % of the collective premium to get the same amount of money as before. If we compared the data in an economic analysis in absolute figures, we could not add these

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differences. Indeed, if, for example, a manual worker loses 40 hellers under the new wage system, this represents 10 % in case he earns 4.00 Kcs per hour, but only 5 % in case he earns 8.00 Kcs per hour.

TABLE 2

DISPERSION OF AVERAGE WAGES UNDER THE OLD WAGE SYSTEM

Line	Average hourly wages of all manual workers	Average OWS wages Average NWS wages ·100	Personnel grade of manual worker under OWS			
			1	2	3	4
1	2	3	4	5	6	7
1	--	92				
2	--	93				
3	--	94				
4	--	95				
5	--	96				
6	--	97				
7	--	98				
8	--	99				
9	7.17	100				
10	7.24	101				
11	7.31	102				
12	7.39	103				
13	7.46	104				
14	7.53	105	1			
Average	15 7.60	106	-			
hourly wages	16 7.67	107	1			
under OWS	17 7.74	108	1	1	1	
(actual	18 7.82	109	1	1	2	
wages)	19 7.89	110	2	1	2	gain
	20 7.96	111	2	1	3	
OWS-Plan	21 8.03	112	2	2	4	loss
	22 8.10	113	3	2	5	
	23 8.17	114	2	2	6	
	24 8.25	115	2	4	7	
Average	25 8.32	116	2	4	7	
hourly	26 8.39	117	-	4	8	
wages in	27 8.46	118	1	5	7	gain
NWS Plan	28 8.53	119	1	4	7	
	29 8.60	120	-	4	6	
	30 8.68	121	1	3	5	loss

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Table 2 continued

Line	Average hourly wages of all manual workers	Average OWS wages Average NWS wages	•100	Personnel grade of manual worker under OWS			
				1	2	3	4
				4	5	6	7
31	8.75	122		-	2	4	loss
32	8.82	123		1	2	3	
33	8.89	124			1	1	
34	8.96	125			1	1	
35	9.03	126			1	1	
36	9.11	127			1	1	
37	9.18	128				1	
38	Total			23	47	81	
39	Of which	Number		2	16	22	
40	Loss	%		8.7	34.0	27.2	

Table 2 continued

Personnel grade of manual worker under OWS				Total number of manual workers	Progressive total of manual workers	Progressive % of manual workers
8	9	10	11	12	13	14
			1	1	500	100
		1	1	2	499	99.8
		2	1	3	497	99.4
		2	1	3	494	98.8
		3	1	4	491	98.2
		4	2	6	487	97.4
		5	2	7	481	96.2
		6	2	8	474	94.8
	1	7	3	11	466	93.2
	2	7	3	12	455	91.0
	3	8	3	14	443	88.6
	4	8	2	14	429	85.8
	4	7	2	13	415	83.0
	6	6	2	15	402	80.4
1	7	5	1	14	387	77.4
1	9	4	1	16	373	74.6
2	10	3	1	19	357	71.4
3	11	2	1	21	338	67.6

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Table 2 continued

	Personnel grade of manual worker under OWS				Total number of manual workers	Progressive total of manual workers	Progressive % of manual workers	
	8	9	10	11	12	13	14	
Average hourly wages under OWS (actual wages)	4	12	2	1	24	317	63.4	gain
OWS-Plan	5	11	-		22	293	58.6	
	6	11	1		26	271	54.2	loss
	8	9			27	245	49.0	
	9	7			26	218	43.6	
	10	6			29	192	38.4	
Average	10	5			28	163	32.6	
hourly wages	11	4			27	135	27.0	
in NWS	10	3			26	108	21.6	gain
Plan	9	2			23	82	16.4	
	7	1			18	59	11.8	
	6				15	41	8.2	loss
	3				9	26	5.2	
	2				8	17	3.4	
					2	9	1.8	
					2	7	1.4	
					2	5	1.0	
					2	3	0.6	
					1	1	0.2	
	107	128	83	31	500			
	18	1	--	--	59			
	16.8	0.8	--	--	11.8			

The ratio between average assignment earnings under the old wage system and earnings under the new wage system actually represents a balance of the norms. We can prove this, if we analyze the formula used for calculating this ratio:

$$\frac{\text{Average assignment wages OWS}}{\text{Average assignment wages NWS}} = \frac{\text{a.t.OWS.c.Cnf}}{\text{a.t.NWS.Cnf}}$$

where:

OWS is the old wage system,

NWS is the new wage system,

a.t. is the assignment tariff,

Cnf is the coefficient of norm-fulfillment capacity (expressing the actual norm fulfillment under both systems),

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c is the coefficient expressing the extent of the superstructure and time losses included in the OWS norms.

In calculating the coefficient of norm fulfillment, which is the same in both systems and represents a measure of the manual workers' practice and activity, we obtain the assignment tariff per working hour under the old and the new wage systems. If all the norms were equally hard and if the superstructure corresponded to the tariff increase, the product of the assignment tariff under the old wage system and of the coefficient expressing the superstructure's size would be equal to the assignment tariff under the new wage system, and the ratio of both earnings would be constant for all manual workers (e.g., 110 %).

Since the old norms are not of an equal level, this ratio differs for every manual worker. The variation range of the earning ratio shows the magnitude of dispersion of norms under the old wage system as compared with technically justified norms. Of course the requirement is that the coefficient of norm-fulfillment capacity under the new wage system be determined correctly, and that it be determined by the most accurate method insofar as possible.

Analysis of Wage Inventory

The wage inventory analysis is presented in Table 2. In this analysis we determine both the number of manual workers who gain and the number of manual workers who lose, with regard to their average earnings because of the new wage system. This is done not only for manual workers as a whole, but in detail according to personnel grades or according to trades. We also deduct from the table the extent of the additional increase in labor productivity which we must provide during the preparatory stage in establishing the new wage system, so that the number of manual workers suffering losses can be kept to a minimum.

In column 2, we give the average wage scale for all manual workers. The average earnings given in this column do not correspond to the average earnings of the manual workers of the respective line. They refer to the average earnings of all manual workers and represent a supplement to the scale given in column 3 (100 % = average earnings under the new wage system, including additional remunerations but excluding the collective premium).

Column 3 gives the ratio of earnings under the old wage system to earnings under the new wage system. In columns 4 to 11, manual workers are classified according to the percent ratio of average earnings and according to personnel grades or individual trades. It is useful to do the classification by both methods, because in this way we determine the effect of the new wage system with regard to both personnel grades and trades.

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Column 12 gives the total number of manual workers on the respective line. In order to deduct directly from the table the number of manual workers who suffer losses with regard to their average earnings at a certain level of the total average earnings given in Column 2 and the corresponding collective premium given in Column 3, we calculate in column 13 the progressive total of manual workers (from the bottom of the table). Similarly, Column 14 gives the percentage of manual workers suffering losses.

Example of the analysis:

On line 15 (where the ratio of wages under the old wage system to wages under the new wage system is 106 %), there is one manual worker in grade 5, seven manual workers in grade 6, five manual workers in grade 7, and one manual worker in grade 8. The total number is 14. If the collective premium were set at 6 % of the obtained earnings, these 14 manual workers would get the same average earnings under the new wage system as they did under the old. The manual workers included on lines 1 to 14 would gain through the establishment of the new wage system: the manual workers on line 14 would gain 1 % in the average earnings; those on line 13, 2 % in average earnings; on line 12, 3 %; etc. On the other hand, the manual workers on lines 15 to 37 would lose: 16 manual workers included on line 16 would lose 1 % of their average earnings; 19 manual workers on line 17, 2 % of their average earnings; 21 manual workers on line 18, 3 % of their average earnings; etc.

We also derive from the table on the appropriate line what the average earnings of all manual workers would be if a specific collective premium were applied. In our example (collective premium of 6 %), the average earnings of all manual workers is 7.60 Kcs per hour.

In this preliminary analysis we assume that the collective premium is distributed only according to the quantity and quality of the work performed. We do not take into consideration the possibility that the collective premium may be distributed according to the social significance of the work, i.e., according to the importance of individual working places in the workshop's production process.

In the table we mark an arrow showing the actual average wages under the old wage system. In our case it is 7.91 Kcs per hour (see line 19) and the corresponding collective premium is 10 % (collective premium I). If labor productivity and average wages were not to increase after the new wage system is established, and if the collective premium is distributed only according to the quantity and quality of the work, 293 manual workers would suffer

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losses because of the new wage system (we find the data below the line which gives the average wages and the amount of collective premium), i.e., 58.6 % of all manual workers (see column 14).

We also mark in the table the planned average earnings under the old wage system, which in our example is 8.03 Kcs per hour (see line 21). The collective premium would be 12 %, and the number of manual workers suffering losses would still be excessive: 245, i.e., 49 %.

That is why it is necessary to provide in the preparatory period, through the verification of drafts, technology, and the organization of production and norms for such an increase in labor productivity as would assure keeping to the minimum the number of manual workers suffering losses. For example, if the collective premium amounts to 10 % [sic] (see line 28), the number of manual workers who suffer losses because of the new wage system is only 59, i.e., 11.6 % [sic]. If we are to be able to pay this higher collective premium, we must provide for a higher labor productivity.

On lines 39 and 40 we calculate the effect of the new wage system on the average earnings of manual workers in individual grades or trades. We see in the table, for example, that in the 4th grade 27.2 % of manual workers suffer losses with regard to their average earnings, 16.8 % in the 5th grade, and only 0.8 % in the 6th grade.

If we distribute the collective premium according to the significance of individual trades, the line indicating the amount of the collective premium will be broken.

The analysis of the wage inventory presented in Table 2 is converted into a graph (Table 3) [see Figure Appendix]. The upper graph represents the number of manual workers by groups according to earnings. The method of analysis and reading from the graph is the same as with regard to the table. For example, if the collective premium is 7 %, all the manual workers to the left of the vertical line gain in average earnings under the new wage system, while the manual workers to the right suffer losses. The graph includes also data concerning real and planned wages under the old wage system, as well as planned wages under the new wage system. We also indicate in the graph the task of an additional increase in labor productivity per hour in establishing the new wage system. We determine the number of manual workers who gain or lose by measuring the area of the chart (one small rectangle represents one manual worker).

In the lower graph we give the percent sums of manual workers who suffer losses in average earnings at a certain ratio of wages under the old wage system to wages under the new wage system. We convert the data from Table 2, column 14. We do not need to measure the surface of the chart to determine the number

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of manual workers who suffer losses. Instead, we deduct the percentage of manual workers directly from the graph. The method of deduction is indicated by arrows.

For example:

-- if the collective premium is 10.2 % [sic] (I.), 58.6 % of manual workers suffer losses;

-- if the collective premium is 12.0 % (II.), 49.0 % of manual workers suffer losses;

-- if the collective premium is 19.0 % (III.), 11.8 % of manual workers suffer losses in average earnings.

The more balanced the norms under the old wage system, the steeper the curve in the lower graph. In such a case, it will be necessary to provide for a small increase with regard to labor productivity in order to establish the new wage system, because for each percent of increased productivity there will be a high percentage of manual workers who will gain with regard to their average wages. On the other hand, if there is a great dispersion of norms under the old wage system, the curve will be flat, and for each percent of increased labor productivity there will be only a small percentage of workers who will gain with regard to their average wages.

Observing Labor Productivity during the Preparatory Work

In order to make correct provisions for the reconstruction of wages and labor productivity, we have to maintain a systematic control during the revision of norms to see that labor productivity is ensured through technical-organizational measures. For this reason, prior to the preparatory work we determine the coefficients expressing the decrease in norm-hours and the decrease in wages accounted for directly in work orders (unit wages). First we calculate the total coefficient for all manual workers together, then separately for individual trades. These coefficients are used exclusively for control purposes and must not be used to recompute the norms. The norms are revised as a matter of principle according to normative data only.

If we do not ensure a further increase in labor productivity in establishing the new wage system --

a) The coefficient of the norm-hours decrease will be given by the ratio of the norm-fulfillment under the new wage system to that under the old wage system. In our example, the norm-fulfillment under the new wage system is 111.3 % and under the old 231.7 %. The coefficient of the norm-hours decrease is:

$$111.3 : 231.7 = 0.48.$$

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b) The coefficient of the unit-wages decrease will be given by the ratio of the average hourly earnings without additional remuneration and without the collective premium under the new wage system, to the average wages under the old wage system. In our example, the average planned assignment earnings under the old wage system is 8.03 Kcs and under the new wage system 7.10 Kcs. The coefficient of the unit-wage decrease is 0.88 ($7.10 : 8.03$). We must point out that the wage reduction applies only to wages accounted directly in relation to the product. The total content of wages with the collective premium are as a rule not decreased.

Since in all cases we must provide for a further increase in labor productivity, the coefficients must be reduced further to cover this increase in labor productivity. In our example, in establishing the new wage system we provide for a 6.2 % increase in labor productivity per hour, and therefore the coefficient for reducing norm-hours is $0.48 : 1,062 = 0.45$, and for reducing wages $0.88 : 1,062 = 0.83$.

TABLE 4

SURVEY OF NORMS UNDER THE OLD AND NEW WAGE SYSTEMS

Production operation:..... Trade: Tariff grade:.....

Old wage system					
Work class	Technically justified norms I			Other norms	
	Total number of minutes N	Kcs		Total number of minutes N	Kcs
N min.					
Kcs					

Table 4 continued

New system		Change in grade in N minutes	
Technically justified norms I	Other		
Total number of minutes N	Total number of minutes N	increase	decrease

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The provisions for the tasks to be completed in the preparatory work are controlled on forms such as shown in Table 4, "Survey of norms under the old and new wage systems." The form is filled out separately for each trade and for each tariff grade within a trade. We enter each revised norm on this form. From this survey we determine:

- a) the ratio between norm-hours under the old and new wage systems,
- b) the percent of superstructure calculated from the norms,
- c) the coefficient of wage decrease,
- d) the increase or decrease of grade under the new wage system,
- e) the percent of technically justified norms.

All these data are necessary for a detailed analysis and final determination of the influence of the new wage system on labor productivity and average earnings.

Influence of the New Wage System on the Labor Plan and Computation of the Collective Premium

A general evaluation of the establishment of the new wage method is carried out through an analysis of labor productivity and its relationship to the increase in average earnings. The analysis for our example is presented in Table 5. The analysis includes both the actual figures for the period for which the earnings of individual manual workers have been evaluated in the wage inventory, as well as the plan figures for the period in which the new wage system is to be introduced. The plan is prepared according to both the old and the new norms. All data are derived from the wage inventory and from the analyses of Tables 2 and 3.

Procedure in analyzing labor productivity:

- a) The norm-hour plan (line 2) and the unit-wage plan (line 8) are reduced by the coefficients calculated according to the analysis presented in Tables 2 and 3.
- b) The necessary number of completed work-hours and the number of manual workers in production is computed on the basis of the expected norm fulfillment (line 6).
- c) According to the wage inventory, we determine the amount corresponding to additional remuneration for difficult working conditions and for supervising squads of manual workers.
- d) The difference between the unit-wage plan under the old wage system, and the plan under the new wage system (including additional remuneration), indicates the size of the collective premium (line 9).
- e) We calculate the influence on labor productivity both on the hourly and monthly basis. In our example, labor productivity increases 1.6 % while productivity per hour increases 6.2 %. Average earnings also increase by 6.2 %.

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Before we prepare the analysis, we check to see that the values given in Table 1 (wage inventory), in Table 4 (comparison of norms under the old and new wage systems), and in this table agree with each other.

The collective premium computed in this manner is the maximum collective premium which can be paid to manual workers. From this amount, we have to keep -- at least in the beginning -- a reserve to cover additional remuneration for manual workers who work in lower tariff grades than their own qualification grade, as well as a reserve to cover possible production losses (stoppages).

The premium percentage is computed in Table 5 from the entire volume of unit wages under the new wage system. Since the premium percentage is expressed as a ratio of the sum of the time tariffs of the qualification grades of manual workers, we increase this percentage in relation to the assignment wages without additional remuneration (Table 1, column 13) and in relation to the time tariff of the qualification grade (Table 1, column 9). In our example, the assignment earnings are 7.10 Kcs per hour and the time tariff of the qualification grade is 5.93 Kcs per hour, so that the maximum percent of the collective premium is:

$$19.1 \cdot \frac{7.10}{5.93} = 22.8 \%$$

TABLE 5

Index	Old wage system		New wage system	
	Actual Quarter II	Planned Quarter IV	Planned Quarter IV	%
1. Gross production	21,574	23,193	23,193	100.0
2. Norm-hours	599.3	625.5	282.9	45.2
3. Completed work-hours	262.5	270.0	254.2	94.1
4. Number of manual workers	500.0	500.0	492.0	98.4
5. Hourly earnings per norm-hour (1:2)	36.0	37.1	82.0	221.0
6. Norm-fulfillment (2:3)	228.3	231.7	111.3	48.0
7. Work time fund (3:4)	525.0	540.0	516.6	95.7
8. Unit wages	2,077.1	2,168.1	1,804.6	83.2
9. Collective premiums	--	--	344.6	--
10. Additional remuneration	--	--	18.9	--
11. Total wages	2,077.1	2,168.1	2,168.1	100.0
12. Labor productivity of manual workers	43,148	46,386	47,140	101.6
13. Productivity per hour	82.2	85.9	91.2	106.2
14. Hourly wages of manual worker in production	7.91	8.03	8.53	106.2
15. % of collective premium	--	--	19.1	--

Procedure of the Economic Analysis

The economic analysis in establishing the new wage system is not a one-time performance carried out at the end of the preparatory work. Such an analysis would not serve its purpose: to give all the working people a correct picture of the tasks and measures which have to be carried out in order to establish the new wage system properly and to make sure that its effect is as beneficial as possible with regard to both the national economy and the working people. In our opinion, the following procedure is proper:

1. The preliminary economic analysis must be carried out as soon as possible. It must be done before the preparatory work has been started. In this preliminary analysis, we must do the following:

- a) Calculate the norm-fulfillment capacity under the new wage system;
- b) establish a preliminary wage inventory;
- c) prepare an analysis of the balance of norms in Tables 2 and 3 and determine the additional increase in labor productivity when the new wage system is introduced;
- d) calculate the coefficients of the decrease in norm-hours and unit wages.

2. The control of increases in labor productivity is carried out in the preparatory work. It continues during the entire preparatory work until the new wage system is established. The control is done with the relevant form (Table 4).

3. The final analysis is made about 7 weeks before the new wage system is put into effect. By that time the manual workers have been classified in individual qualification grades and a sufficient number of norms has been revised to allow definite conclusions as to whether the new wage system has been worked out to the extent where it can be put into effect. In this final analysis we take the following steps:

- a) We determine from Table 4 the grade changes according to individual trades and individual tariff grades, and we also determine the average assignment tariff for individual trades.

- b) We carry out the final wage inventory, in which we take into consideration actual figures for the past 3 months.

- c) From Table 4 we compute the coefficients of the decrease in norm-hours and unit wages, and we recompute the work plan. Also, we compute the collective premium (see Table 5).

- d) We evaluate the influence of the new wage system on labor productivity and average earnings.

- e) We carry the assumed distribution of the collective premium into the individual trades of the manual workers, and within a trade according to the performance and quality of the work of individual manual workers.

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f) We determine the effect of the new wage system on the average earnings of individual manual workers, including the assumed collective premium.

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FIGURE APPENDIX

collective premium (III)

collective premium (II)

collective premium (I)

Number
of
manual
workers

Average wages without premiums in NWS=7.17 Kcs	Actual average wages in OWS= 7.91 Kcs OWS plan=8.03 Kcs	Planned average wages in NWS= 8.53 Kcs
---	---	--

% of
manual
workers
(added)

Minimum
increase of
productivity
when establishing
NWS

$$\% = \frac{\text{average wages in OWS}}{\text{average wages in NWS excluding premiums}} \cdot 100$$

[Captions for Table 3]

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Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains.

• *Laurea* (1996) *Journal of Management Studies* 33(1): 111-124

TABLE 3

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INCREASED INTEREST IN THE DEVELOPMENT AND INTRODUCTION OF THE
NEW TECHNOLOGY THROUGH REMUNERATION

[Following is a translation of an article by Milos Boleslav of the Ministry of Heavy Engineering in Podnikova organizace (Industrial Plant Organization), Prague, Vol. XIV, No. 3, March 1960, Pages 126-128.]

Comrade Boleslav's article was written in answer to the following question addressed to the editors: "How are the existing principles of paying premiums affected by the new announcement of the Chairman of the State Planning Commission and the Minister of Finances, No. 196/1959 of the Official Gazette, concerning the increase of material interests of the workers in the development and introduction of the new technology?"

To explain this question, we have to get acquainted at least briefly with the main principles and general meaning of the announcement made by the Chairman of the State Planning Commission and the Minister of Finances, No. 196/1959 of the Official Gazette (referred to hereafter only as "the Announcement"), more specifically with its Part IV discussing the personal material interest in the development and introduction of the new technology.

This part of the announcement explains the present method of creating a personal material interest in making new suggestions, which together with other new economic suggestions in the field of technical development is to contribute to a successful development and introduction of new technology. This involves a complex handling of material motivation in ensuring and fulfilling the tasks of the new technology in all its stages. Consequently, the Announcement is not limited only to new suggestions creating personal material interests, but it also uses some existing regulations concerning remuneration, which through their incentive form also increase the interest of workers in fulfilling the tasks of the new technology. If the implementation of principles contained in Part IV of the Announcement is to serve fully its purpose, we cannot separate the new method of premium payments and rewards from the existing regulations. It is necessary above all that all the existing regulations concerning premium payments and rewards be used better than they have been so far, in order to fulfill the tasks of the new technology. This should be done in accordance with the principles outlined in the Announcement.

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What are the main principles of personal material interest outlined in Part IV of the Announcement?

According to the brief explanation of the Announcement, we can basically divide the principles of personal material interest as follows:

1. New method of premium payments which
 - a. completely replaces,
 - b. supplements,
 - c. expandsthe present regulations.
2. Use of existing regulations for
 - a. giving premiums and rewards to creative technical workers,
 - b. giving rewards to other technical, economic or possibly administrative workers,
 - c. remuneration of manual workers.

In order to get a correct answer to the question of how the new Announcement affects the existing regulations concerning premium payments and rewards, we shall now clarify the stated main principles, namely, both the methods of giving rewards as well as the groups of workers to whom these rewards apply, and the tasks or results of work for which premiums or rewards can be paid.

1. New Method of Premium Payment

a. The new method of premium payment, which replaces completely the existing regulations, can be applied only with regard to tasks contained in the plan of technical development, the adoption and introduction of new industrial products into production and the related measures to adapt production technology and technical norm setting, insofar as they are carried out under the jurisdiction of the Ministry of Heavy Engineering by departmental research and experimental institutes or by workshops of manufacturing economic units.

Premiums for such tasks can be awarded above all to creative technical workers in research, development construction, technology, metallurgy, and planning work, who plan and introduce new industrial products in production, to workers in norm setting and to economists who participate directly in the fulfillment of tasks and who influence the preparation of norms of higher quality than specified in the plan through their own proposals. Such premiums can also be paid to other technical workers. The director of the manufacturing economic unit or the departmental research institute will name such workers under his jurisdiction, taking into consideration their creative work and their direct participation in the fulfillment of tasks of the new technology. However, the premiums must not be

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used to reward administrative workers, even if their work helped, for example, to complete the tasks on time, when they did not have any share in the creative technical work as draftsmen, copyists, etc. (However, such workers may be rewarded in accordance with the regulation of Paragraph 19 of the Announcement according to the existing regulations, as explained in point 2b).

b. Furthermore, the new method of premium payment supplements the present method of premium payment to leading workers in the executive field, who do not solve problems of research and development directly themselves, but who direct and organize the work of a large number of creative workers. These workers will receive premiums for their annual fulfillment of tasks of the new technology in addition to the premiums or rewards paid according to existing regulations (decree of the MTS [Ministry of Heavy Engineering] No. 3/58 or instructions of the MTS for the implementation of the government resolution No. 142 of 18 January 1956 concerning rewards for solving scientific and research tasks; in establishments of the MVS [Ministerstvo vseobecneho strojnictvi ? -- Ministry of General Engineering], decree of the former MAP [?] of 31 March 1958, decree of the former MPSt [Ministerstvo prumyslu strojnickeho ? -- Ministry of Engineering Industry] of 1 April 1958, and directives and regulations for departmental research institutes of the MVS No. 27/59 of 21 May 1959).

This applies especially to workers holding:

- a functional position described in the nomenclature of functions as "manager" (vedouci) or "independent" (samostatny),
- functions listed in the nomenclature of functions under No. 1 to 8 according to the work and salary regulations for employees of research institutes under the central government administration.

The premium rates for individual managing workers are determined in advance within the maximum limits (35 %) by the director of the organization concerned, who must be sure in making his decision that the premium rates are in a desirable relationship to premium rates for creative technical workers rewarded according to the Announcement and for managing workers of manufacturing economic units, enterprises and establishment, who receive premiums for annual economic results (see point c).

Advance payments can be made on account of these premiums by the director of the organization, if all the tasks of the new technology are completed according to plans for a particular quarter of the year. This can be done only during the first three quarters of the year, and the advance payment may represent up to one eighth of the entire annual premium. If all tasks of the new technology are not fulfilled for the entire year, the premiums must not be paid; however, advance payments are not to be returned.

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c. Part IV of the Announcement extends further the existing method of premium payments to managing workers of manufacturing economic units, enterprises and establishments, as follows: these workers, who receive premiums according to Paragraph 2 of the decree of the Minister of Heavy Engineering No. 3/58 (in enterprises of the MVS, according to the same paragraph of the decree of the former MAP of 31 March 1958 and of the former MPSt of 1 April 1958) for annual economic results, and who are also responsible for the fulfillment of tasks of the new technology, may receive the premiums or advance payments on these premiums in the full amount only on condition that all planned tasks of the new technology are fulfilled in the appropriate premium period. This condition is obligatory for directors of manufacturing economic units, enterprises and establishments, and also for other managing technical workers as determined by the director. If this condition is not fulfilled for the individual quarters or for the entire year, the director of the manufacturing economic unit, enterprise or establishment is obligated to reduce or to cancel completely advance payments or full annual premiums paid to the respective managing workers. In making such a decision, the director will take into consideration the amount of tasks of the new technology which have not been completed and the importance of the unfinished tasks. The Ministry of Heavy Engineering will proceed in a similar way in granting annual premiums to directors of manufacturing economic units or rewards to directors of departmental research institutes.

If exceptionally favorable results are obtained in the field of the new technology, the ministry may increase annual premiums or rewards payable to the directors of manufacturing economic units and departmental research institutes in proportion to the results obtained and to the premiums paid according to these instructions to creative technical workers. The same authorization applies to the director of an enterprise with regard to the managing workers in the enterprise and with regard to directors of establishments.

2. Application of Existing Regulations and Premium Payments.

If certain tasks included in the plans for technical development cannot be covered by rewards under the new premium payment system because of the nature of the work, but if the production is increased or made more economical because such tasks have been implemented (e.g., through improved technology, increased labor productivity, decreased costs, etc.), rewards will be paid according to the existing regulations concerning premiums and rewards as follows:

a. Creative technical workers will receive premiums in accordance with the principles of decree No. 3/58 of the Minister of Heavy Engineering of 29 March 1958 (in enterprises of the MVS, according to the decree of the former MAP of 31 March 1958 and of

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the former MPSt of 1 April 1958), and special rewards according to Part III, column 1 of the directives and instructions of the MTS No. 4/59 of 14 January 1959 (in MVS enterprises, according to regulations and instructions No. 3 of 7 January 1959, Part II, letter C, column 1). This applies to organizations subordinated to manufacturing economic units. In departmental research institutes, these workers will be paid rewards according to the respective regulations of the work and salary order for employees of research institutes under central government administration, issued by the MTS on the basis of the government resolution No. 1890 of 18 July 1956, and according to the instructions for the implementation of government resolution No. 142 of 18 May 1956 concerning rewards for solving scientific and research tasks, issued by the MTS as supplement No. 8 to the above-mentioned work and salary order for employees of departmental research institutes (in MVS enterprises, according to the directives and instructions for departmental research institutes of the MVS No. 27/59 of 21 May 1959).

b. Other technical, economic or administrative workers, who cannot receive premiums on the basis of principles described above because of the nature of their work, but who contributed actively and demonstrably to the solution or speedier fulfillment of tasks of the new technology, will receive the following types of rewards on the basis of a decision of the director of the manufacturing economic unit, enterprise or establishment:

-- Rewards for exceptional performance according to Paragraph 6 of decree No. 3/58 of the Minister of Heavy Industry of 29 March 1958, or according to Paragraph 3 of the supplement to decree No. 2/58 of the Minister of Heavy Engineering concerning salaries of technical and administrative workers in research institutes of manufacturing economic units (in the MVS, according to the decree of the former MAP of 31 March 1958 and of the former MPSt of 1 April 1958, or according to the decree of the MVS of 15 June 1959, No. 61. 672/59 concerning salaries of technical and administrative workers of research institutes of manufacturing economic units);

-- Special rewards from the premium fund according to the regulations of Part III, column 2, of the directives and instructions for manufacturing economic units and MTS national enterprises No. 4/59 of 14 January 1959 (in MVS enterprises according to the directives and instructions of the MVS No. 3 of 7 January 1959, Part II, letter C, column 2).

c. In order to increase the interest of manual workers in the introduction of new technology, certain measures can be taken according to the following regulations now in force, in addition to possible rewards granted on the basis of regulations concerning inventions, discoveries, and improvement proposals:

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-- Manual workers (specialists) may be granted personal additional pay according to the regulations of Paragraph 13 of decree No. 1/59 of the Minister of Heavy Engineering of 1 March 1959 (in MVS enterprises according to Paragraph 13 of decree No. 1/59 of 3 January 1959);

-- In introducing new methods of production and in applying new difficult technology, temporary performance norms may be applied in accordance with regulations given in Supplement IV to the directive concerning measures for improving work norms, MTS (MVS) decree No. 1/59, point 33. Also, according to the regulations of Paragraph 4, column 7 of decree No. 1/59, manual workers may receive rewards for certain short-term tasks, e.g., for verifying and passing new work methods, in the amount of the average wages for a maximum period of 3 months;

-- Manual workers may receive single premium payments for timely adaptation of the new technology in accordance with the regulation of Paragraph 9, column 3 of MTS (MVS) decree No. 1/59 of 3 January 1959.

-- For creative participation in solving problems of the new technology, for participating in the introduction of the new technology, and for continued development of the technology in all forms of workers' participation, manual workers may be granted special rewards from the premium fund according to the regulations of Part III, column 2, of the directives and instructions for manufacturing economic units and national enterprises of the MTS, No. 4/59 of 14 January 1959 (in MVS enterprises, according to the directives and instructions of the MVS No. 3 of 7 January 1959, Part II, letter C, column 2).

The explanation of individual methods of remuneration given in the extensive contents of the Announcement gives us the answer to the question asked. We must point out again that enterprises must make better use than before of all present forms of remuneration, so that the greatest number of workers will become materially interested in solving successfully the tasks of the new technology. Undoubtedly other economic suggestions in the field of the new technology will also help in this respect, so that heavy engineering will be able to fulfill all its tasks.

For readers' information, I point out that for the purpose of implementing Announcement No. 196/1959 of the Official Gazette, the MTS issued directive No. 78/59 and the MVS issued directive No. 82/59, which discuss almost all the regulations of this Announcement.

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5668

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TASKS OF CZECHOSLOVAK METALLURGY IN AUTOMATION IN THE

THIRD FIVE-YEAR PLAN

[Following is a translation of an article by Engr. Vitezslav Kadlec of the MHD (Ministerstvo hutnictvi a dolu -- Ministry of Metallurgy and Mining in Automatizace (Automation), Prague, Vol. III, No. 3, March 1960 Pages 65-66.]

The year 1960 is not only a year of preparation for the Five-Year Plan, but also a jubilee year which will remind us of the 15th anniversary of the liberation of our fatherland by the USSR.

Socialist countries headed by the USSR see in the new techniques, especially in mechanization and automation, not only a powerful means to catch up with and to overtake advanced capitalist countries, but also a foundation to build a material-technical basis of communism. The wealth of society grows through the increase of labor productivity, and thus the standard of living of all working people increases also.

Metallurgical industry is of key significance for fulfillment of the tasks outlined in the directives of the Third Five-Year Plan. Steel production determines the level of economic development and the increase in labor productivity. During the Third Five-Year Plan, we shall release for the building and development of the metallurgical industry as large a quantity of investment funds as we have used during the last 10 years. The total industrial production of our economy will increase 101.3 % by the end of 1965 as compared to the year 1958. In order to reach this goal, we cannot approach this task with the present techniques, technology, and methods of management. Of decisive significance will be the introduction of mechanization and automation, with regard to both production and its preparation, but mainly in management and administration.

Production of metallurgical establishments and ore mines will increase up to the end of 1965 as follows: ore extraction 32 %, limestone 74 %, coke and coke gas production 60 %, pig iron 62 %, steel 54 %, laminated products 58 %, heat-resistant ceramic material 69 %, production of metallurgical by-products 56 % and nonferrous metals 7 %.

About 40 % of this production increase is to be obtained through intensification of production processes by means of reconstruction and modernization of existing plants.

When we reach these figures, we shall occupy the first place in the world order.

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However, most of our plants are rather old, and the present situation is characterized by the development of basic degrees of mechanization and automation of the principal production processes. As for the order of stages in introducing mechanization and automation, economic experience shows that the best results are obtained with mechanization and automation in those fields of production which include a large volume of manual labor, i.e., in rolling mills and steel mills.

In metallurgical establishments in the USSR, the average increase of labor productivity through the automation of production reaches 7 to 10 % in blast furnaces, 7 to 9 % in SM [?] furnaces, 7 to 10 % in heating and depth [?] furnaces, and about 10 % in rolling mills.

The important economic contributions will consist not only of substantial savings of labor force, but also of substantial savings of power and raw material, and improved quality of products.

Complete automation of a blast furnace at the same time reduces fuel consumption by about 2 %. The decrease of coke consumption by one blast furnace of 1,000 cubic meters represents 9,000 tons annually.

Successful introduction of complex automation in metallurgical establishments assumes first of all that we have solved and developed the problem of sense-organs -- special instruments and installations which by their construction would satisfy the increased requirements of the metallurgical environment. By the end of 1960 we will have developed and tested pressure boxes with indicators for measuring laminating pressures up to 300 tons, a numerical register of production parameters, a numerical coordinatograph, submersible and radiation pyrometers for measuring high temperatures (up to 2000° C), an automatic electronic fast-recording compensator, an installation for planned combustion in deep furnaces, a gauge for measuring the amount of fuel oils, current transformers 20 mA for various measured values, automatic instruments measuring the thickness of the laminated material, a registration instrument for counting and time-registration of red-hot levers, an instrument for automatic cutting by fast-action scissors, and other.

To secure the production of these special instruments in the shortest time possible, we are thinking of establishing a plant which would follow up the prototypes already developed and which are of key importance in automation. These will be manufactured in small series. Such productions would be uneconomical in the machine engineering industry. The plant will have about 250 employees and will be built probably in 1960-1961. Its production will be oriented toward assisting industrial establishments in introducing and maintaining automation.

To accomplish these tasks, we will need the closest cooperation between research workers and planners and metallurgical establishments. The creation of departmental centers for measurement

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techniques and automation in MHD enterprises and institutes is the first step toward completing the tasks. It definitely is not a complete solution. The number of employees in research and planning institutes and in experimental laboratories of industrial enterprises will increase by the end of 1962 about five times as compared to the number today.

In order to reach these figures during the Third Five-Year Plan, we are to build the following model installations in our metallurgical and ore-processing establishments which will be completely mechanized and automated:

- one typical cold-process ore dressing station, which will be put in production in 1965;

- one to two blast furnaces in VZKG, which will be put in production in 1965;

- one to two agglomeration belts in NHKG and in TZ-VRSR, which will be put in production in 1965;

- one steel SM plant equipped with a complex technological control system in NHKG, which will be put in production in 1965;

- one electric arc furnace equipped with a control mechanism for the arc based on the temperature of the bath in VZKG, TZ-VRSR and SONP, which will be put in production in 1964;

- one coke-oven will be equipped with a high-degree automation system in NHKG; it will be put in production in 1964;

- a line for controlling, cleaning, and grading of laminating material for the pipe-manufacturing plants in VZKG, NHKG, VTZ, which will be put in production in 1963;

- a line for grading metal bars made by duction in VTZ, which will be put in production in 1964;

- an installation for the automatic determination of initial weight in the blooming mill and the connecting single-heat mill trains which will be put in production in 1963.

In addition, in a number of manufacturing establishments mechanization and automation of individual modes will be introduced. Also, systems of complex automatic operation of steel works and of a nickel foundry using oxygen will be worked out. In the production of aluminum, before 1965 we shall introduce automation of the principal phases of the technological process of manufacturing Al, Al₂O₃, and the anodic substance.

Further implementation of a higher degree of automation in our foundries will depend on the operational results of the automatized installations. These results will be gradually verified during the Third Five-Year Plan.

Within the reconstruction and modernization program for the coke-manufacturing industry, obsolete establishments must be equipped with installations which would make it possible to control centrally and to automatize the chemical processes of coke ovens. The automation of the coke ramp will have to be completed. With regard to further development of automation, it will be necessary to

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concentrate our efforts on the development of instruments which would solve the problems of automatic guards against over loading of conveyor belts, fast-action analyzers with remote control registering, automatic regulators of fuel in batteries, an automatic mixing regulator of air and gas for the laminating furnace, and others.

When introducing mechanization and automation in steel works, we have to concentrate in the first stage on mechanization. First of all, we shall have to make far-reaching changes in the planning, development and production of mechanization and automation instruments.

The introduction of automation into the thermal order of SM furnaces during the first stage of partial automation will mean fuel savings of 3 % and a 4 % reduction in the use of heat-resisting material.

Installation costs of automation of our furnaces under study vary between 0.38 and 5.3 $\cdot 10^6$ Kcs, while savings in the operation of the furnaces under study reached the amount of 508 to 1900 $\cdot 10^3$ Kcs, so that the costs of installation are paid off in a period of from 0.5 to 4.5 years.

In existing steel works, we are looking for new ways of complex automation not only with regard to the thermal conditions of SM furnaces, but also with regard to the operating, programming, and controlling of the technological processes.

In the rolling mills, we will have to improve the present technical level of older lines substantially by developing mechanization and automation further. At the block plant, on the continuous belt lines (kontipasovi trate) continuous profile lines (kontiprofilovate) and continuous wire lines (kontidratove trate) mechanization and automation are concentrated above all in the sorting plant, on the grading of material before the rolling and sometimes after the rolling process, and on the grading of the finished products. In the pipe rolling plant in VZKG, we use a defectoscope to determine internal and external defects and quality of the pipes. The installation for insulating pipes in an electrostatic field in NHKG proved to be good and the consumption of protective material decreased as much as 50 %.

When we put in production all the rolling lines under consideration, those which are being completed at present and those which will be built during the Third Five-Year Plan, we shall reach our goal of developing a complex automation of rolling lines representing about 62 % of the total production capacity of rolled products.

Another important element of the planned automation in metallurgical establishments will be the use of automatic analogical or numerical calculators, which will become indispensable in all modern metallurgical establishments. These calculators will be used directly in the control of production processes as well as in the operations of the enterprise itself, as a part of the mechanization and automation of the plant administration.

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When we plan and introduce mechanization and automation in our metallurgical establishments and ore mines, we do not deal with the question of complex automation in an isolated manner. In December 1958, we concluded an agreement with certain organizations in the USSR concerning cooperation in the field of ferrous metallurgy, and in June 1959 the coordination of the program was divided among individual states of the RVHP [?]. Czechoslovakia is coordinating research in the field of technological and mathematical preparation of automation and in the field of grading techniques in grading plants of the rolling mills.

Research in England and in France has shown that western countries have not advanced any farther in the practical application of complex automation, and that even in the USSR there is still no major metallurgical plant operated under conditions of complex automation. Everywhere the problem is studied conceptually, accurate measuring and calculating technics are being established, and obsolete installations are being mechanized and reconstructed.

Although we have achieved some good results, we will have to speed up the present pace of research and development, so that by the end of 1962 at the latest we can proceed with constructing, planning, and building type and model systems of complex automation for the principal metallurgical aggregates, which in substance is the task of the Third Five-Year Plan.

In spite of the difficulties which appear when we introduce new things, the successes achieved so far in introducing mechanization and automation as well as the initiative of the working people are the best indications that the tasks in the sector of mechanization and automation will be completed successfully at the end of the Third Five-Year Plan.

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5668

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PROBLEMS OF THE LONG-TERM DEVELOPMENT OF THE CZECHOSLOVAK

NATIONAL ECONOMY THROUGH 1975

[Following is a translation of an article by Zdenek Pucek in Planovane Hospodarstvi (Planned Economy), Vol. XIII, No. 4, Prague, 1960, Pages 249-264, representing an extract from a speech given at the active of leading economic workers on 29 February 1960.]

In the period when the working people of our country are preparing to celebrate the fifteenth anniversary of the liberation of Czechoslovakia by the Soviet Army, 15 years of building a socialist Czechoslovakia, in the period ending the transition from capitalism to socialism, and on the eve of the completion of the collectivization of agriculture in Czechoslovakia, we approach the process of working out the long-range plan for further development, for the development of a Czechoslovakia which is already socialist, a Czechoslovakia which is building Communism.

This work is to constitute the publicizing and firming up of the goals and experiences of the working class and, on the basis of directives issued by the Communist Party of Czechoslovakia, is intended to lay out the further fighting program for the new historical era in the development of our society.

The first considerations regarding the long-range development of the national economy were called the first preliminary hypotheses. We decided to designate them as such because the complexity of the work involved in long-range plans has its specific forms. The problem is primarily one in which we, on the one side, progressively set forth first the basic, then sector-wide and finally specific assignments and, on the other side, by analyzing our possibilities provided by natural wealth, development of science and technology, increased international division of labor, as well as other factors, check on the realistic nature and mobility of such tasks; only then does the synthesis of this complex work lead to the first variable in the long-range plan. Therefore, the figures with which we work during the present period are preliminary in nature, have a hypothetical character, and are more the expressions of concepts and directions of development rather than a precise planning index.

The actual working out of the long-range considerations was also not, and could not be, approached at a random time. The fact that we have begun is an expression of the growing strength and experiences of our country and the whole socialist camp because at present, questions of long-term development are being worked out in all countries and particularly in the USSR.

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Fifteen years is such a long time that we could very well imagine at the beginning of the work that we have a "green pasture" ahead of us. This is not so for a number of reasons.

We have set before us, through the resolutions of the Central Committee of the KSC (Komunistická strana Československa, Communist Party of Czechoslovakia) and the government, concrete goals and paths of development for the national economy through 1965. Thus, however, we form the basis for development for a number of years ahead -- in fact for the entire period of the Fourth Five-Year Plan. It is therefore necessary to point out that the work on the Third Five-Year Plan cannot be separated from the work on the long-range plan and that only through mutual coordination of such work can we arrive at a good long-term plan, as well as at good five-year plans.

Each plan derives from a given experience and ties in with preceding development. This is particularly important to remember in working out the long-range plan, primarily from the dialectic point of view. Each point of departure (Vychodi stav), its very structure, is the result of all of the development which preceded it. It is only during the analysis of each point of departure that we momentarily, for the duration of the analysis, halt the pace of this development, so as to be able to differentiate between requirements which have been met and those which have not been met, so as to be able to correctly assess those elements of production and consumption which are expiring and those which have already expired, and so as to enable us to primarily find all progressive elements in our point of departure and in the development which has preceded it, which are perhaps only a germ today but will be a common occurrence tomorrow.

Thus, analytical work in Czechoslovakia must be given its pure form; it must not merely become a tool of description and interpolation but rather a basis for finding key points which will lead to new qualitative levels of economic development. Simultaneously, analysis must be supplemented by creative publicity for the possible future direction of development because otherwise it could not fulfill its mission, particularly in the period when we shall be forging the basis in the practices of a thus far non-existent Communist society. However, even in this case do our existing experiences take on immeasurable meaning, since Socialism is the first phase of Communism and only the development of a socialist economy leads to its dialectic transformation into a communist economy.

I. The Current Status of Our National Economy

First, let us turn to the concrete problems of the current status of our national economy from which we depart in setting the goals and paths of our future economic development.

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I would particularly like to mention the way of life of people and their direct consumption, be it personal or social, and secondly, their standing in the production process -- our production needs.

The object of the examples I shall cite is to show the number of problems concealed in the global indexes of the standard of living, as well as in the global indexes which characterize the economic level. I am doing this in order to be able to arrive at the thesis, which is perhaps recognized by all but nevertheless continues to be a prime problem -- namely that the requirements of human society are generally limitless.

It is generally known that the standard of living in Czechoslovakia has risen more or less rapidly in recent years. Real wages, for example, have increased 45 percent over the past 10 years, per capita personal consumption, 61 percent and the per capita share of the national income, 94 percent.

However, what is the structure of the wages and consumption of the population?

Roughly 1/3 of the population has an income of less than 400 crowns per month per member of the household; another 18 percent have incomes under 500 crowns per month. On the other hand, approximately 1.2 million persons live in circumstances where more than 900 crowns per month falls to each member of the family. These families already enjoy a relatively high standard of living to-day.

Even this look at the structure of incomes shows the magnitude of the tasks inherent in raising the standard of living on the road to Communism which we must solve. We arrive at similar conclusions in comparing the regional [geographic] composition of incomes.

The difference in incomes is also reflected in per capita material consumption. It is known that per capita consumption of meat in Czechoslovakia is rising and will amount to about 56 kilograms in 1960. However, if we take a look at this consumption according to the structure of income groups of the population we see that the consumption of meat in the highest income group is about double that of the lowest income group.

These facts show that if we assigned ourselves only the task of creating such pre-requisites in economic development as to make it possible for the population groups with the lowest income per family member to attain the same standard of living as the population groups with the higher incomes, we would be faced with a very ambitious program. Simultaneously, it is necessary to consider that these are primarily families with a larger number of children. The importance of this path was underscored by the XIth Congress of the KSC, which formulated the line calling for a rise in the standard of living primarily of these groups of the population.

Or, let us take the current consumption of water, which amounts to about 172 liters per person per day, considering that in 1958, only 48 percent of the population was being supplied from the public

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water supply. From the point of view of existing knowledge, a daily per capita water consumption of 250 liters is considered reasonable. If all persons living in communities of more than 2,000 inhabitants were to be supplied with this quantity of water (that is to say about 70 percent of the total population), this would require about 14.5 billion crowns of investment funds.

The introduction of compulsory middle school education would require an increase in the student body by 220,000, which is necessarily reflected in the slower increase in the labor force. If this entire number was to be derived from the sphere of production, the usable national income would drop 4 percent while expenditures for schools to accommodate the increased number of students would rise by about one billion crowns.

Another group of requirements, which become ever more pressing, are the requirements to improve the whole environment in which we live, particularly the cleanliness of the air, water, our immediate surroundings, the environs of towns, etc.

Better satisfaction of direct personal consumption needs of the population, as well as the various pressing forms of social needs, is possible only in coordination with the development of production and, particularly, through the growth of the social productivity of labor.

Therefore, a serious question of economic development, and even a deciding one, is the amount of time required by the individual to acquire one unit of his consumption needs or, in other words, what is the level of his social productivity of labor? Productivity of labor determines not only the amount of production accomplished per unit of time but also the amount of time a person must work to attain a specific level of material consumption. During a certain stage of development of a society, and in conjunction with the expansion of production forces, the need to shorten working hours becomes just as pressing a problem as does material consumption. This is a type of law which has prevailed throughout all of the developments up to now with an iron force, since the criteria for reproduction of the working force change with the economic and cultural development of society. It will make itself felt all the more in a socialist and communist society, where man is transiting -- as Engels put it -- from the realm of necessity to the realm of freedom.

Let us examine the problem of the growth of the productivity of labor in terms of labor required to produce selected agricultural products.

For example, in the production of one metric quintal of the products listed below, the number of working hours indicated were consumed:

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Item	US	Czechoslovakia
	1950 - 1953	1950
Wheat	1	5.7
Sugarbeets	0.5	2.8
Potatoes	1	3.6
Milk	5.3	23.1
Slaughter cattle	8.8	126.6
Slaughter pigs	6.4	46.8

These figures, which represent the national average, are quite high when compared to the results obtained by large enterprises with a high degree of mechanization. The American farmer Garst produces one quintal of corn in 12 minutes. In our large-scale hog fattening establishments, one quintal of slaughter hogs is produced in 5.29 hours using the conventional method of feeding; that is to say, in one-eighth to one-ninth of the period indicated by the national average. When automatic feeding is used, the time drops to 2.13 hours, that is to say to less than one-twentieth of the national average.

The above differences are caused, primarily, by the completeness of equipment in the hands of persons in the production process, by the quantity of the means of production and their technical and economic level. The growth of equipment is a law of social development which is reflected in the growth of organic capital under Capitalism and which, under Socialism, is demonstrated in better equipping of the workers with constantly more progressive equipment.

A higher degree of equipping workers with the means of production is also a requirement of society; it is actually a basic need, since it decides the ultimate productivity of labor and thus also the standard of living. This basic principle is also expressed in our plans which favor the priority growth of the means of production over the growth of consumer goods.

An analysis of the current status then shows not only the needs but also the means of satisfying them. However, it shows them only in basic, rough outlines; its main value lies in the fact that it facilitates consideration of the utilization of the most progressive practical experiences and results of science and technology in such a manner that the avant-guard phenomena of to-day may become the every-day phenomena of the future.

A closer scrutiny of this sphere shows the extent of the reserves for further rapid development of the national economy which are concealed in the current level of our economy.

Thus, for example, if we compare the results of the economies of the average and the best JZDs (Agricultural Cooperatives) in terms of individual commodities in accordance with gross income allocated to each hectare of land, we obtain the following picture for 1957 (income was derived from sales at current prices which differed, in 1957, for compulsory deliveries and deliveries to the state bulk-buying system):

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Item	Production Region		
	Corn Belt	Beet Belt	Potato Belt
All JZDs	100	100	100
Prime JZDs	134	136	147
Key JZDs	292	186	249

The large differences in gross incomes per hectare of agricultural land show the reserves in agricultural production whose activation points up the absolute realistic nature of the possibility of attaining a large increase in agricultural production as a whole.

If, in working on the long-range outlook, we fall back on the analysis of the current status, and if we count on the fact that the best results attained to-day will become the average results of tomorrow, then we are merely expressing the results of science, technology, and economics from the past.

It is clear that the attainment of the results of the best cooperatives as an average is wholly realistic, provided we create appropriate economic, technical, personnel, political, and organizational pre-requisites. The longer the period under consideration, however, the more burning becomes the question as to what new contribution, new experiences of science, technology and practice we can count on over and above those experiences known to us to-day. Although this question appears unsolvable, we must gradually learn the manner in which this factor must be considered.

The greatest difficulty then lies in the determination of qualitative changes in consumption for the future and the qualitative methods of satisfying this consumption.

I would like to illustrate this problem with two examples: personal consumption of the population and methods of satisfying it, and the significance of qualitative changes in the development of production forces.

There is no doubt that the scope and methods of satisfying personal consumption in a Communist society will be qualitatively different from those we know to-day. There will certainly be gradual basic changes in the entire way of life of the society, particularly changes in the proportion between so-called personal and social consumption, changes in working qualifications, in differences between mental and physical work, etc. Let us take, for example, the question of household work. The individual preparation of meals continues to consume large amounts of time. The curtailment of working time, the growth of the technical level, the growth of general education -- all of these factors will permit, women to be used in production processes to a substantially greater extent in the future. Therefore, the necessity of food will certainly be assured by new means in the future; by more productive methods and by methods which will help to disseminate the principles of correct scientific nutrition on a mass scale.

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A complex problem, for example, is the future solution to the question of transportation. If the tendencies which are demonstrable to-day were to continue, we would have to count on having an immensely large number of automobiles, a factor which, with all its subsidiary implications, would mean tremendous investments and a large volume of work. We believe that this question should be re-examined in such a way that the need for rapid and comfortable transportation be solved in a more economical manner and that the funds conserved in this area be utilized in a more complex improvement of the standard of living.

The methods of transporting the populace for recreational and tourist purposes will influence the structure of engineering production (buses, train sets, automobiles), the production of motor fuels, tires, the method of building recreational facilities (hotels or family cottages), their location, size of lots, etc. The form of ownership of the means of transportation will influence the claims made on garages and the development of various kinds of services.

There are a number of such problems and they must gradually be worked out. They are important in that the method chosen can directly influence the development of many production branches and reaches deep into the overall effectiveness of our economic development.

No less significant a problem is represented by the gradual determination of the qualitative changes in production, the introduction of new technology, and their effects on the changes in production. In this direction, the existing methods of scientific work -- or rather the complexity of evaluating the possible future contributions of science and technology -- are of little practical value for the present. Particularly qualitative changes which have revolutionary results are not excluded in our lifetime; on the contrary, they can be anticipated. It is even one of our main tasks to organize such qualitative changes, by utilizing science to the utmost in this work and through the support of science and technology, so that they come about as soon as possible. The work on the long-range plan is a creative process in which the basic starting considerations must be constantly re-evaluated; where every consideration means only an approach to the solution of the problem.

II. On the Speed of Development of Material Production

The tempos of satisfying the requirements of society are governed primarily by the tempos of the growth in material production and productivity of labor. We have already spoken of the virtually limitless requirements. However, the tempos of growth of material production over a given period of time are limited and the principle problem of national economic theory and practice should constitute the battle for their increase.

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What is the starting point in determining the tempos of economic development for such a long period of time? In this connection, I would like to treat three main groups of question:

1. Experiences with the tempos of development of socialist countries;
2. Our natural wealth, the possibilities of the international socialist division of labor, and the profile of our economy; and
3. Questions of the quantity of work, productivity of labor and the influence of selected economic factors on the tempos of economic development.

Experiences With the Tempos of Development of Socialist Countries

Socialist production relations have formed completely new conditions for the development of the national economy. It has been proven that under any territorial, climatic, and nationality conditions, wherever socialist production relations have been victorious, the country in question has undergone rapid economic development; more rapid than ever before in the past during the capitalist era of its development and even more rapid than development in capitalist countries during the same period. The era of the building of socialist production relations has already meant, for all countries, a tremendous increase in production forces and the gaining of lead in the tempo of development of production, as well as in the growth of the standard of living, in comparison with capitalist nations. Historically, to gain and maintain a lead in tempo means to pass from the field of the vanquished to the field of the victor.

Let us compare some data on the tempo of growth in industrial production in the socialist countries. The average tempo of growth of industrial production in the USSR between 1918 and 1958 amounted to 10.1 percent annually. During the same period, the average rate of growth for the United States was 2.9 percent. Development in the USSR is significantly distorted by the period of World War II, when industrial production declined at the rate of 1.7 percent per year for the years 1941-1945, whereas this period, which can be called the golden era of industrial development in the United States, saw an average annual rise in the rate of American industrial production of 9.8 percent.

Between 1948 and 1958, during the period of the creation of socialist production relations, the rate of growth of industrial production in Czechoslovakia amounted to approximately 11 percent per year. This means that in 12 years since surpassing the pre-war level, industrial production in Czechoslovakia has increased 3.6 times. In capitalist Czechoslovakia, from 1924 to 1937, that is to say over a period of 13 years, industrial production increased only 27 percent and remained below the level of 1924 for a number of years.

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Similar rises were also attained in the other nations of the socialist camp. In 1950-1958, the nations of CEMA (Council for Economic Mutual Assistance) increased their industrial production on the average about 12.1 percent annually, whereas the nations of the capitalist Organization of European Economic Cooperation increased their industrial production on the average about 5.6 percent over the same period. Also, agricultural production in the CEMA nations was increasing more rapidly than that of the European capitalist states. According to rough estimates, the average annual growth in agricultural production among the CEMA nations during this period amounted to 4.9 percent, whereas the OEEC nations increased their agricultural production only by 3.1 percent.

From the above data, we can deduce that the lead in the tempo of growth of production is clearly on the side of the countries of the socialist camp. Gradually, we are attaining the necessary pre-requisites even for absolute primacy. Thus, for example, prior to World War II, the CEMA nations accounted for 32 percent of all European steel production; in 1958, they were already producing 45 percent of the total European production of steel. Similarly, in the production of electric power, the share of total European power production accounted for by the socialist countries has risen from 31 percent to 41 percent.

The socialist camp is gradually also gaining supremacy in per capita production. It is known that the socialist camp as a whole, including the Asiatic socialist countries, almost surpassed the capitalist system in per capita production as early as 1958 (the capitalist system, including economically underdeveloped nations), although the 1950 level of per capita industrial production in the socialist camp as a whole was roughly one half of the per capita industrial production of the capitalist system.

On the basis of this analysis, we can form the following conclusions:

1. Socialist production relations present the possibility of rapid development of material production; substantially more rapid than under capitalism.

2. There exist no laws on the decline in the tempo of development of production, as proven particularly by the development of industrial production in the socialist USSR and by the current development in the people's democracies.

3. Constant tempos of development of production have great advantages over fluctuations in tempos, since the constant and rhythmic increases in production facilitate the most economic utilization of all forces and means.

The question as to what kind of tempos of development of production we can plan for the future can be answered by calling for maximum tempos; however, for practical work we require more concrete knowledge as to the method of determining these tempos. I believe that it is first of all necessary to analyze the possibilities of

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utilizing the natural wealth, the international standing of our country and the possibilities of deepening the international division of labor in the socialist camp. On the basis of this analysis, we can then (1) determine the prerequisites for the possible quantitative domestic and foreign resources for the growth in production; and (2) determine the method of utilizing them, on the basis of mutual confrontation of the substantive utilization of raw materials and the social economy.

This question is particularly difficult and complicated in countries which have a limited raw materials base. I have in mind primarily the need to examine the influence of natural conditions on social productivity of labor and the reverse influence of this analysis on the determination of the profile of the economy.

A further group of problems which determine the tempo of growth of production are the prerequisites for the quantity of work which it will be possible to organize within the society, particularly the level of the productivity of labor. Simultaneously, it is necessary to examine a number of economic factors which determine the level of the quantity of work and the productivity of labor. On the basis of this analysis, it is necessary to determine the approximate influence of these factors on the tempo of growth of the social product and the national income, to determine the preliminary influence of science and technology on economic development and, finally, to determine the preliminary basic economic relations, particularly between accumulation and consumption, as well as to formulate additional conclusions of synthesis.

Questions of our Natural Wealth, International Division of Labor and Their Influence on the Profile of our National Economy

The present limitations in our raw materials base and the full scope of raw materials requirements of a mature society constitute one of the principle problems of our national economy.

The basic problem of the development of every economy is the need for electric power. Development of production forces is accompanied by the need to equip the worker with mechanical devices requiring more electric power. Curtailment of working time and the rapid growth of the output produced by a worker during one hour of work further increases the need for power equipment. The hourly consumption of electric energy grows more rapidly than the hourly rate of productivity of labor. For example, the annual rate of increase in the amount of electric power used in work in the United States was 3.5 percent between 1939 and 1953, whereas the increase in the productivity of labor for the same period was 2 percent. In the USSR, the annual increase for the period 1955-1960 is 11 percent and labor productivity is growing at the rate of 9 percent.

According to our first considerations, the electric power requirements for 1975 will amount to 90-100 billion kilowatt hours, or 6,000 Kwh per capita per year.

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We arrived at these figures during the first phase of our work and were later able to confirm their accuracy also by comparing those of the USSR where, in the words of Khrushchev, a production of roughly 1,500 billion kWh of electric power is anticipated by 1975, a figure which would mean the same per capita consumption which we anticipate for Czechoslovakia. These are large figures; however, they follow logically from the requirements of the development of a socialist and communist society.

According to existing data, our domestic resources are adequate for coverage of the anticipated power requirements through 1970. In the fifth Five-Year Plan (1970-1975) however, it is necessary to cover virtually the entire increment in requirements of primary resources through other means.

The following are the possibilities for safeguarding adequate quantities of fuel and power for the Fifth Five-Year Plan:

a. Import of petroleum from the USSR; b. Import of other forms of power (natural gas, coal, electric energy); c. Construction of nuclear power plants; d. Further increasing the extraction of brown coal and curtailing the life cycle of brown coal mines or drawing on bound reserves (protective areas of cities and seas); e. Utilizing unaccountable (nebilančni) supplies of coal, both by turning them into gas insubterranean processes, as well as mining them along with accountable supplies of coal (bilančni); f. Utilizing the waste from hard coal dressing plants (kamenouhelné prádlo).

A basic solution would be the construction of nuclear power plants. Only the time at which it is realistic to count on this resource on such a scale remains a problem. The power problem already arises in the Third Five-Year Plan; however, it takes on a new quality in the fifth. Our greatest natural wealth is represented by the large supplies of coking coal which, due to its composition, presents good prerequisites for the development of high-quality coke production. The wealth of coking coal gives an impetus to our entire economy, primarily because it facilitates the rapid development of the metallurgical and engineering industry based on it and simultaneously supports the possibilities of rapid development of the chemical industry.

We cannot satisfy our requirements for iron ore from domestic resources. In the Third Five-Year Plan, however, the USSR made it possible for us to expand our metallurgical base through imports of more than 10 million tons of Soviet iron ore. If we consider that the USSR has the largest iron ore deposits in the world, then it is possible to suppose that even in the future our metallurgy can develop in cooperation with, and with the assistance of, imports of Soviet iron ores. Such a conception would also permit Czechoslovakia, through the rapid development of her metallurgical industry, to assist the other countries of the socialist camp, particularly the European ones.

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The advantageous raw materials conditions based on the domestic extraction of coking coal, the development of domestic supplies of iron ores, the exploitation of sources of amortization scrap, and the assurance of the missing quantities of iron ore through imports from the Soviet Union have led to a considerable acceleration in the development of ferrous metallurgy in Czechoslovakia during recent years. Whereas the production of steel increased only 1.8 times over a 35-year period from 1913 to 1948, rose 2.5 times during the decade from 1949 to 1958. In accordance with the directives of the Third Five-Year Plan, steel production for the period 1959-1965 is scheduled to increase an additional 80 percent.

Domestic consumption of foundry products made of steel and cast iron has been increasing during the past 10 years at an average annual rate of 8.9 percent. According to the directives of the Third Five-Year Plan, the average annual tempo of domestic consumption of ferrous metals will increase to 9.6 percent in the next 6 years. This development shows that not even after 1965 can a basic change in the tempo of development of domestic consumption of metals be anticipated.

In countries which do not have such advantageous conditions for the development of ferrous metallurgy, namely the GDR, Rumania, Hungary, and Bulgaria, a limited increase in the production of iron and steel can be anticipated in the future. However, their consumption of steel will continue to grow. They will, therefore, have to count on importing ferrous metals. Apart from the USSR, only Czechoslovakia and Poland can meet these import requirements. Based on domestic requirements, as well as on the requirements of the European People's Democracies, Czechoslovakia faces the necessity of rapidly developing her ferrous metallurgy. Therefore, preliminary examination is made of the possibilities of having Czechoslovakia increase her production to 17-19 million tons per year by 1975. From the point of view of production capacity, such a development in the production of steel can be assured in ferrous metallurgy enterprises established prior to 1965 by completing these enterprises in the form of economically and technologically integrated entities, particularly through the full utilization of the possibilities which derive from the construction of the East Slovakia Iron Works (Vychodoslovenske zelezarny).

By increasing production to 17-19 million tons, the per capita index of steel production for Czechoslovakia would rise from 450 kilograms in 1959 to 1,100-1,250 kilograms in 1975. Thus, Czechoslovakia would indisputably reach the leading position among the most industrialized nations of the world in regard to this index, considering that, for example, the United States reached a per capita production of 638 kilograms in 1955 but the average index in the US for the past 10 years only stands at 565 kilograms, due to the irregularity of development.

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However, it is impossible to judge the long-term development of production and consumption of metals only in terms of quantitative indicators. In working out the long-range plan, primary attention must be devoted to questions of efficiency of production and consumption of metals, particularly in the engineering industry which, as a key consumer, accounts for about 70 percent of the total consumption of metals. In this industry there are real possibilities for reducing the consumption of metals per billion crowns' worth of gross production by 45 percent over the next 15 years.

Savings in metals in the engineering industry can be achieved primarily by systematic reduction in the weight of machines, following in the wake of design changes, by using new design elements, by increasing the efficiency of machines, through better utilization of materials in technical processing, by wider use of refined steels, aluminum, plastics, etc.

In order that the planned development of the ferrous metallurgy industry may satisfy all the requirements of the national economy and that maximum conservation of metals may be attained, metallurgical production will also have to create certain conditions. These will be basically changes in the assortment of foundry products, characterized primarily by an increasing share of refined steel; further, these conditions will include an increase in the consumption of sheet metal in the total consumption of rolled products, the introduction of widespread production of shapes, an increase in the production of steel pipe, etc.

Another significant resource of our natural wealth is limestone, which permits the rapid development of the cement industry and the determination of cement as the basic building material of the future. Naturally, this is not [cement] in its original natural state but rather in the form of prefabricated structural parts, in the form of various mixtures and light concretes which will facilitate maximum increases in the productivity of labor in the construction industry.

Orientation toward the use of cement as the principle building material will, according to existing knowledge, facilitate the industrialization of the building industry through the production of structural parts from concrete, reinforced concrete, pre-stressed concrete, and light concretes. This will facilitate the transfer of wet processes to industrial enterprises and require only assembly work to be done at building sites. Only in this manner is it possible to assure a substantial rise in productivity in investment construction.

We also have great wealth in refractory materials which will permit not only the coverage of domestic requirements of our metallurgical industry and other industries, but also the orientation of this branch of the economy toward export.

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On the other hand, our natural wealth does not provide us with the possibilities of covering our domestic needs in non-ferrous metals which play a great role in the present and future development of our economy.

As far as non-ferrous metals are concerned, although intensive geological research during recent times has assured a considerable increase in the supplies of copper and lead-zinc ores, which will facilitate increased mining of these ores, nevertheless, despite this rise in domestic production, our import requirements for non-ferrous metals, particularly copper, will continue to grow substantially. A deciding quantity of these metals must be obtained through cooperation with the other socialist countries.

The most stringent economies must be constantly maintained and improved in the consumption of non-ferrous metals. Non-ferrous metals should be used only where, in view of their physical properties and mechanical and chemical characteristics, their use is essential; only where circumstances command their use, where their use is connected with the demands of foreign customer of machines, etc.

Simultaneously, it will be necessary to systematically seek new methods, and expand existing methods, of substituting those metals which are not in short supply for those in which critical shortages exist, and to examine the possibilities of substituting other materials for non-ferrous metals, particularly plastics.

As far as agricultural and arable land are concerned, our situation is characterized by a very low ratio per single inhabitant; for example, the per capita amount of arable land in Czechoslovakia is 0.37 hectares, a figure which will continue to decline as the population increases. With the exception of the GDR, all other countries of the socialist camp have more favorable conditions in this regard.

A very significant problem is presented by the situation in the felling of timber and consumption of lumber; as a result of repeated felling, we must count on an absolute decline in the consumption of lumber in the future, so that consumption and re-forestation can be equalized.

From this very brief analysis of our natural resources a clear conclusion can be obtained. We shall have to foster the chemical industry as another key sector of our national economy. We have prerequisites for the chemical industry in our coking coal and, partially, in our deposits of brown coal, natural gas, and several other raw materials. However, we lack one of the basic raw material resources for modern chemistry, namely petroleum. Therefore, it is necessary to connect the solution of our power balance with the creation of a new materials base for the chemical industry on the basis of the import of crude petroleum from the USSR.

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On the basis of coking coal, and in anticipation of the import of Soviet petroleum, we would have the possibility of rapidly developing the production of plastic materials, synthetic fibers, synthetic rubber, etc. The chemical industry could become our new raw materials base for the consumer industries and for agriculture and could, to a certain extent, also facilitate the solution of the problem of inadequate supplies of lumber and non-ferrous metals. By developing the chemical industry, we could rid ourselves, to a considerable extent, of the burden of imports from capitalist countries of such commodities as rubber, natural fibers, etc.

Such an arrangement would facilitate the coverage of long-range requirements for plastics and synthetic fibers on a level which would greatly surpass the current consumption in the industrially-most-advanced nations. In addition, rapid development of chemistry will also permit this branch to gradually become an export sector of the Czechoslovak economy.

In summary then, metallurgy and chemistry will form our principle materials base which will facilitate the rapid expansion of all branches and the full utilization of our other natural and economic resources.

Under our conditions, the degree of utilization of our natural resources is governed by the international division of labor. Our known natural resources would not permit such a high degree of satisfying the needs of society if Czechoslovakia could not simultaneously draw on the natural resources of the countries of the socialist camp and, conversely, if the countries of the socialist camp did not share in the natural wealth of Czechoslovakia.

The concept of the expansion in the exchange of goods between socialist countries must be mutually advantageous to all countries concerned. This can be achieved primarily by adapting the structure of exports from our engineering industry to the requirements of importing countries; also, by Czechoslovakia, as a country with a high standard of living, assisting the other countries of the socialist camp in overcoming their economic problems which are connected with the rapid development of the materials base, which, in turn, requires large investments.

Our assistance to the countries of the socialist camp must take both the form of economic and technical assistance through the delivery of machines and equipment.

It is necessary to assure wide specialization and cooperation in the long-range plan which must lead to a substantial increase in serialization (seriovost) and thus to an increase in the social productivity of labor. The fact that the development of the economies of the countries of the socialist camp will be characterized in the next 15 years by the gradual equalization of the economic level, will result in favorable conditions for deepening specialization and cooperation.

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On Question of the Quantity of Work, Productivity of Labor
and Some Economic Factors

The quantity of work in a society depends primarily on the number of inhabitants in the production age groups which are utilized in production. The development of the number of persons in the production age groups through 1975 is generally already known, since it is determined by the number of inhabitants already alive to-day. It can be anticipated that by 1975, the number of inhabitants in the production age group will increase by about 980,000, that is to say by 12 percent.

A determination of the overall number of inhabitants is more complicated. A number of factors can come into play. For the present, we calculate that the annual population increment in this period will amount to about 0.7 percent, which means approximately 94,000 persons, so that by 1975, Czechoslovakia would have a population of roughly 15.5 million persons.

Another factor which determines the quantity of work in a society is the working activity of the productive population. As far as this factor is concerned, we can anticipate an increase in working activity, particularly by continuing to include women in the labor force. It is further possible to anticipate that a certain number of persons in the older age groups will be working.

However, we must subtract from the usable resources of the number of persons who are capable of work those persons who will be tied up with non-productive work, that is to say, students of schools at all levels and apprentices; furthermore, there will be a need to increase the number of persons engaged in non-productive activities.

The overall balance of the increment in the number of persons in the productive age groups and their deployment shows that the number of persons working in the productive sphere will increase only slowly.

The quantity of work however, does not depend on the number of workers alone but is also dependent on the length of working time. If we anticipate that working time will be gradually curtailed, then this shortening of working time will mean that the amount of working time in the production sphere which we will have available during a given period will constantly decline. We must completely replace this decline in the quantity of work in the production sphere by an increase in the productivity of labor. These new facts cause a number of new and pressing problems. Primarily, they shed new light on the attitude toward the problem of equipping workers with machines and installations; they force us to face the necessity of increasing the attention devoted to questions of economic efficiency of new technology and also bring out the need for a new attitude toward questions of social effectivity of basic funds as a whole.

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Analyses of the relationship between the growth in productivity and growth in the equipping of workers with basic mechanical funds, conducted here and in some developed industrialized countries, indicate the possibility of a somewhat more rapid growth in productivity as compared to the growth of equipping workers with mechanical and basic funds. In view of the fact that this relationship depends on a number of factors whose influence it has not been possible to adequately examine in the course of existing work, a somewhat more rapid rise in the rate of equipping the workers over a rise in productivity is assumed for the present in the hypothesis.

If we count, for the present, on a more rapid rise in the equipping of workers than in productivity, this is merely a rough working reference. We are not of the opinion that it is necessary for such a development to become a reality, since this ratio depends primarily on the economic efficiency of new technology and a number of other social factors. This ratio should be the focal point of a battle for the economic effectivity of our national economy. It represents a big social order, placed with all the workers of the economic front, with all research institutes and with all technicians. On its solution will largely depend the ratio between accumulation and consumption and thus the overall growth of the standard of living in the future. This will primarily require that we substantially increase our demands for economic effectivity of the proposed technical solutions. It will not be possible to be satisfied with just any kind of technology, with just any way of increasing productivity; we will have to select those solutions which will permit us to attain the greatest growth of productivity with the minimum necessary increases in technological equipment. It will not be sufficient to merely compare the individual variables of the solutions, since none of them need be the maxim as to what can be achieved with the means at hand. It will be necessary to compare all variants, not only to one another but also with the highest level of technology and organization attained in the world and to work toward surpassing this level.

A very important question is the creation of a new attitude toward questions of the social effectivity of basic funds. If we are to anticipate a decline in the number of working days per individual worker, as well as a decrease in the number of working hours per working day, we cannot permit an analogous decline in the time-utilization of basic funds, particularly machines and equipment. There will be shorter shifts and if we merely wish to retain the current level of time-utilization of machines and equipment, shift work (smennost?) will have to rise from the present average of 1.4 to more than 2 and, in some sectors of the economy, to even more than 3. If we were to proceed in another manner, we would have to expend additional billions of crowns for basic equipment which would remain unused for a considerable portion of the year. Therefore,

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every increase in time-utilization of basic funds facilitates considerable social economies. We must therefore, seek additional ways of increasing the time-utilization of machines and equipment, ways of making the transition toward continuous work on the maximum possible scale, and thus achieve the greatest possible social savings.

A very important question for the economy of our economic development is that of the structure and composition of the basic funds. The objective tendency, which it has been possible to ascertain through overall development thus far in Czechoslovakia, as well as in other countries, shows that the rise in the amount of machines, compared to the total of the basic funds, is a rule. For example, in Czechoslovak industry, the number of machines has risen from 40 percent in 1950 to roughly 47 percent in 1960.

We must assist this tendency to the maximum by including such technical solutions in our plans for future production capacities as will demonstrate themselves in maximum savings in terms of construction and in the highest technical level in terms of machines.

The principle ways of increasing the share of machines are as follows:

a. Maximum utilization of the possibilities of re-construction and modernization of existing production areas; b. Optimum sizes for newly-created capacities, interconnection of related branches, uncovering of processes and other possibilities for achieving savings in construction work by way of economical solution of designs; and c. Introduction of new technology and new techniques, primarily the automation of production processes.

Status of Work on the Hypothesis of Long-Range Development and Further Progress of the Work

Further work will proceed along several lines. Primarily, this will be the line of international clarification of Czechoslovak relations in the future; furthermore, the State Planning Commission will work out several independent questions of our economic development, and finally, the individual branches of the economy, the research institutes and other work places will work out the individual tasks and assignments.

I would like to emphasize several particularly important assignments among the tasks we must solve which, precisely because we are dealing with long-term periods, take on a new quality.

Questions connected with the deployment of productive forces will be of considerable difficulty. It will be a question of assuring such deployment which, in conjunction with natural and economic conditions, would assure the speedy growth of social productivity of labor and which drives from the necessity of removing previously arisen inequalities in the economic and cultural level of the individual regions.

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In deciding on the deployment of concrete capacities, it will be necessary to carefully seek such methods which would simultaneously solve both of the problems encountered in deployment.

In equalizing the economic level, the removal of differences between the Czech lands and Slovakia must be considered to be the prime task. The combined prerequisite for this step is the removal of the differences between the degree of inclusion of persons capable of work in the work process and the attainment of basically the same level of labor productivity. On the basis of this, it will be possible to remove the basic differences in the standard of living.

For the solution of this problem, Slovakia has relatively good prerequisites in the natural increment of the population in the productive age groups and in the fact that a deciding quantity of raw materials moves into Czechoslovakia across our eastern border.

The assumed deployment of industrial production between the Czech lands and Slovakia must however, be understood only as a conceptual deployment. The difficulty of determining the exact degree is inherent in a number of factors, primarily the fact that during the current period we cannot definitely determine the extent to which production can be increased by 1975 in those capacities which will exist in 1965 and, furthermore, how many completely new enterprises with as yet undetermined production we will be able to have at our disposal in the years 1965-1975.

Slovakia has very favorable conditions for increasing agricultural production. In recent years, agricultural production in Slovakia has been developing at a substantially more rapid rate than that in the Czech lands; however, it did not thus far reach the level and intensity of agricultural production in the Czech lands. The current production in Slovakia per hectare of agricultural land is about 20 percent below that of the Czech lands.

Through the development of irrigation, melioration and drainage, together with an adequate quantity of natural and mineral fertilizers, as well as a substantial increase in mechanization, it is necessary to create conditions for a substantial increase in plant production and, through correct organization of the structure of livestock production, to attain the same intensity of production in Slovakia as that existing under the same conditions in the Czech lands.

In connection with further development of the national economy and the raising of the standard of living, it will be necessary to solve the complex problems inherent in water management, since the demand for water in all sectors of the national economy will increase considerably due to economic development.

It will therefore be necessary to implement a number of measures designed to assure adequate water resources for future requirements of the national economy. It will be necessary to dam water resources in sufficient quantities, be it through the erection

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of large dams or the construction of a larger number of local reservoirs; it will also be necessary to assure the multiple utilization of water [using the same water several times]. This will, understandably, also require certain measures in the field of cleaning waste waters. One of the important tasks will be the assurance of a correct water regimen of the soil, since the growth of agricultural production is largely dependent upon it.

Another serious problem, which takes on an extraordinary importance in the long-range outlook, is the problem of cadres.

The introduction and, primarily, the utilization of new technology in production cannot be accomplished without qualified cadres. The level of the qualification of the cadres must be commensurate with the level of technology.

The number of qualified workers in the total labor force of Czechoslovakia to-day still does not amount to the level of the USSR, particularly in terms of advanced school cadres.

In Czechoslovak industry, however, the situation is somewhat better than that of the USSR, which is evident from the lower number of workers with middle school education in the USSR.

Number of Qualified Workers (per 1,000 Employees)

	In the Total Economy of			
	USSR	Czechoslovakia	USSR	Czechoslovakia
	1958	1958	1957	1958
With Advanced School Education	55	22	18	14
With Middle School Education	81	91	39	90
Total	137	114	57	104

The inadequate number of qualified workers in Czechoslovakia during the current period is evidenced by the composition of the engineer-technical and economic workers, of whom a considerable number do not have the necessary education.

Existing considerations which have been made in this direction, pre-suppose a relatively large increase in the number of persons attending advanced and specialized school.

Within the next 15 years, we shall achieve a stage in which all young persons will leave school with a complete middle school education. This, certainly, together with the reforms in the method of education will certainly increase the qualifications of all workers substantially. The majority of older workers however, will not have this education and therefore, it will be necessary to support all manner of extra-scholastic education.

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A special problem is posed by the question of determining the number, composition of, and method of education for, cadres educated at advanced schools. In solving these questions, much has thus far been arbitrary; it will be necessary to take a new approach toward the solution of these questions.

* * *

I am convinced that the publicizing of the creative approach to the problems of working on the long-range development of our national economy, as well as the dissemination of the experiences of millions of our workers must, in future work, result in a significant contribution and that through combined effort, we shall succeed in working out such a proposal for a long-range plan for the development of the national economy which could be the basis of a program of continued economic development in our country.

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TASKS OF TRANSPORTATION IN THE THIRD FIVE-YEAR PLAN

[Following is a translation of an article by Minister of Transportation, Dr. Frantisek Vlasak, in Planovane Hospodarstvi (Planned Economy), Vol. XIII, No. 4, Prague, 1960, Pages 265-272.]

In conjunction with the development of the national economy, the overall volume of goods transportation in 1965 is scheduled to attain the level of 861 million tons, in accordance with approved directives. Of this volume, public transportation is scheduled to account for 484 million tons and enterprise transportation, 377 million tons. Of the 484 million tons of goods to be moved by public carriers, the railroads are to account for 259 million tons, public automotive transportation, for 219 million tons, and water transportation, for 5.7 million tons. In enterprise transportation, almost the entire volume is accounted for by automotive transport.

The attainment of the cited overall volume of goods transportation, when compared to that of 1957, represents a growth of 82.9 percent, whereas the directives of the XIth Congress of the KSC (Communist Party of Czechoslovakia) call for a rise of 90-95 percent.

The lower rate of growth in the volume of transportation, while fully meeting the transportation requirements of the national economy, is the result of widespread analyses and research and is favorably influenced, particularly by the organized limitation of overly long transport routes, better deployment of new production capacities in suitable regions, better utilization of local resources, more wide-spread dressing of raw materials prior to their shipment, reductions in deliveries moving in opposing directions, and other measures which can be anticipated during the Third Five-Year Plan.

All of these measures have also resulted in the fact that during the Third Five-Year Plan even the growth in transportation output, in ton/kilometers, is substantially lower in relation to the growth of gross industrial production than was the case during the Second Five-Year Plan, when the volume of transportation grew at approximately the same rate as gross industrial production. During the Third Five-Year Plan, it is anticipated that, given a growth in industrial production of 50 percent, overall transportation output will rise about 28 percent. This phenomenon is economically very favorable, since in transportation (with certain exceptions in passenger transportation) there is no social interest in raising output as long as the requirements of the planned development of the national economy are fully assured.

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Within the entire transportation system, there will be a more rapid growth of automotive transportation, as opposed to rail transportation. Automotive transportation is scheduled to increase the volume of its output 44 percent in tons and 61.2 percent in ton/kilometers during the Third Five-Year Plan; on the other hand, railroad freight transportation is scheduled to increase 30.6 percent in tons and 23.3 percent in ton/kilometers.

Nevertheless, during this period, rail transportation will remain as the principle component of our transportation system. It will concentrate primarily on the transportation of bulk-type cargo over medium and long distances, on shipments of goods between various forwarders who have sidings or branch lines at their disposal, and on international transportation. Therefore, it will have the largest share in the transportation of solid fuels, ores, raw metals and in international transportation. It is anticipated that the average rate of annual growth will be 6.1 percent in tons transported and 4.6 percent in ton/kilometers. The slower rate of growth in ton/kilometers compared to tons will be caused primarily by a substantial increase in the transportation of building materials, as opposed to the rise in transportation of brown coal. In the latter case, the mean distance is considerably greater than that of building materials. In view of the above, the mean transportation distance is scheduled to decline from 241.6 kilometers in 1960 to 228 kilometers by 1965.

In passenger transportation, a further transition toward bus transportation for short distances and air transportation for long hauls is anticipated. In conjunction with this tendency, it is anticipated that by 1965, passenger transportation on the railroads will increase by 2.1 percent over that of 1960. In 1965, the railroads are expected to haul about 620 million persons.

The lower rate of growth in rail passenger transportation (during the period 1945-1959, the growth was roughly 30 percent), will contribute toward a substantial increase in the culture of travel, which must be considered a basic task in this sector.

Therefore, the number of passenger coaches will be increased by 2,600 (in 1956-1959, roughly 1,200 cars were delivered). These will all be 4-axle cars of the latest design. To assure the development of suburban and commuter transportation, we are expecting the activation of 80 two-story rail units and at least 30 pantographic units during the Five-Year Plan. In addition, there will be fast motor-driven units for express trains. In conjunction with this modernization, the Five-Year Plan will see the implementation of widespread measures aimed at substantially speeding up passenger transportation, both for commuters and long-distance passengers. Toward this end, improvements will already be evident in the time tables for 1960-1961. Thus, the national speed of travel will increase 9 percent; for example, in the case of the R 30 express train from Prague to Kosice, travel time will be cut by more than 2 hours.

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There will be an additional separation of passenger transportation, so as to divide long-distance transportation from suburban and commuter traffic, and international travel from internal transportation, resulting in better service to the public.

In the spirit of the principles of the most economic division of transportation assignments, automotive transportation will primarily assure the movement of passengers over short distances and the hauling of small packages and shipments which are dependent on speedy delivery or limitation of transloading operations. The key areas will again be in the transportation of building materials, fill dirt or soils, sugar beets or slices, potatoes, firewood, foodstuffs and piece goods. The volume of automotive freight transportation moved by the CSAD (Czechoslovak Automotive Transport Enterprise) is scheduled to increase roughly 75 percent in tons and 115 percent in ton/kilometers in 1965, over 1960. Unlike the procedure of previous years, it is anticipated that public automotive transportation will be separated from technological transportation, as in the case of hauling mechanically-excavated soils, etc. However, automotive transportation will have to assure the small public services for the population to a greater extent than heretofore. The overall mean transportation distance in public automotive freight transportation, which has stood at 12-15 kilometers for a number of years, is scheduled to increase 23 percent in 1965, compared to 1960, and will reach a level of more than 21 kilometers.

In the transportation of passengers by automotive means, a certain slowing in the tempo of growth is scheduled to take place. Compared with 1960, the number of passengers hauled by automotive media will rise about 23 percent; that is to say, in 1965, some 1,330 million passengers are to be transported. In this sector, as in the railroad sector, there will be an intensification of the quality of travel and the number of available seats will rise to 745,000 in 1965, compared with 518,000 in 1960. The number of buses will be increased by the addition of high-capacity modern coaches and trailers. This will facilitate further expansion of the network of bus connections and will substantially increase the transportation of workers and students.

Similarly, enterprise automotive transportation is scheduled to fulfill important tasks during the Third Five-Year Plan. However, according to accepted principles of coordination of all types of transportation, its volume will grow considerably slower than heretofore. The share of both types of transportation in the overall volume of freight moved by automotive means of transportation is scheduled to develop in such a manner that public transportation shall reach a level of 65 percent, in ton/kilometers in 1965, compared to 35 percent in 1955. Nevertheless, it is anticipated that enterprise transportation will achieve substantially better utilization of transportation media and equipment.

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The main task of Czechoslovak navigation during the Third Five-Year Plan will continue to be the assurance of the transportation of goods of foreign origin. In this regard, transportation of goods through the port of Szczecin and the Black Sea ports, is to be strengthened. On the Labe River, capacities will be utilized for railroad transports on GDR territory, particularly in the export of coal and the import of industrial salts and synthetic fertilizers. On the Danube, the transportation of ore from the USSR will rise, as will the import of cargos from overseas through Rumanian ports. Passenger transportation will retain primarily a recreational character.

Czechoslovak aviation is faced with great tasks in the Third Five-Year Plan. Air transport output is expected to rise 217 percent. The number of passengers transported by air is scheduled to rise from 680,000 in 1960 to 1.5 million in 1965. During the Third Five-Year Plan, foreign transportation will rise more rapidly; its share in the overall volume of air transportation will increase from 51 percent in 1960 to 65 percent by 1965. The development of foreign air transportation will be aimed at supplementing the network of European connections and at inaugurating long-distance, intercontinental lines. The development of domestic air transportation will be aimed at rendering this type of transportation a more effective component of the overall transportation system and at contributing, through speed and comfort, to a substantial improvement in passenger transportation.

One of the deciding means of achieving the stipulated goals will be wide-spread changes in the technological base of all branches of transportation; changes which can be characterized as a sweeping technical reconstruction of transportation.

In rail transportation, the emphasis will be primarily on the continuation of electrification of main lines, where the addition of 1,054 kilometers of electrified line is anticipated for the period 1961-1965. The main line from Most to Cerna, via Valasske Mezirici - Ostrava - and Bohumin, will be electrified. The share of electric traction in the overall transportation output is scheduled to rise from 24.6 percent in 1960 to 51 percent in 1965. Simultaneously, the share of motor traction will increase from 3.5 percent to roughly 20 percent of the total. To fulfill this assignment, the railroads are to receive heavy electric freight locomotives of the CoCo type and approximately 1,000 diesel-electric locomotives; of the latter, more than 400 are to be medium and heavy-duty line locomotives. The changeover from steam traction to electric and motor-driven operation in so short a period of time will result in great national economic savings. Thus, for example, in 1965, almost 5 million tons of coal will be saved due to electrification and dieselization.

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The increase in speed and the growing intensity of railroad transportation will require that the railroads be equipped with modern safety equipment. During the Third Five-Year Plan, some 534 kilometers of railroad line are to be equipped with automatic block signals; 1,237 kilometers, with automatic stop signals (auto-stop), and 98 stations are to be equipped with relay-type safety installations. The length of non-touching (bezstykove) rails is to be almost tripled.

In addition to this technology, it is planned to establish a centralized dispatching service on sectors of line which have 15 stations and are 86 kilometers in length. One such sector will be the line between Chob and Plzen.

An indivisible part of automatization and possibly even mechanization of railroad operations will be the automatization and mechanization of classification work in key locations. Currently, freight cars are worked in Czechoslovakia at about 90 technical stations, of which 30 are large or medium in size. The stipulated increase in the weight of trains, the creation of consists and the increase in the formation of heavy trains (zatezove proudy) will lead to the concentration of train make-up operations at a decreasing number of technical stations.

This concentration of work presents conditions for wide mechanization and automatization of classification operations. Mechanization and automatization of classification operations in deciding locations of the network will then facilitate the discontinuation of a number of junction stations and their removal from the make-up and classification process. Complex automatization will raise capacity and decrease car waiting time in classification yards by as much as 50 percent and complex mechanization by as much as 30 percent. Thus, the investments in automation and mechanization will have an amortization rate of 3-5 years (with the exception of those cases where actual reconstruction of yard lay-outs is involved.)

In working out the automatization and mechanization of classification yards, we shall be proceeding from the following principles:

1. Full automatization of classification yards which have the possibility of processing more than 4,000 cars per hump. According to current long-range estimates, there are roughly eight such key classification yards.
2. Complex mechanization of roughly 20 additional main classification yards.

Under the above program, we intend to fully automatize the station at Ceska Trebova during the Third Five-Year Plan, as well as mechanize 10-15 other classification yards, such as Kosice, Malomerice, Cierna and Tisou, Nymburk, Vrsovice, Sturovo, Ostrava (right-hand distant station), and others.

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In cases of full automatization, we anticipate the installation of rail brakes at the classification yard, equipment for their automatic control with the assistance of electronic computers, equipment for central automatic control of humping operations, and the installation of rapidly-functioning pneumatic or electrical switches at all points. A substantial part of the entire automatization process will be the installation of equipment designed to curtail the waiting time for cars on approach and departure rails, and portable radio equipment for communication between clerks, car inspectors, the technical office and shunting locomotives. Special installations will be used to automatically check on hot boxes and flat wheels. It will also be necessary to solve the problem of introducing automatic couplers, a problem whose solution is conditional upon negotiations within the framework of the International Railroad Union.

In complex mechanization of classification yards, we are counting on providing rail brakes for humping operations, or automatic buffers; on equipment to facilitate central switching with rapid-action switching gear for points and, in some cases, also on equipment for programming.

Our main task during the Third Five-Year Plan will be the concentration of new technology, primarily on the main line from Usti and Labem - Nymburk - Hranice - Bohumin - Zilina - Kosice - Puchov, and on the Prague - Kolin line.

A completely new element in automatization will be the utilization of automatic computers for control, computation and administrative work. Newly-designed automatic electric computers present favorable conditions for their application in all sectors of transportation. It is particularly significant to use these machines in, for example, working out the curve (grafikon) of train transportation; determining the efficient make-up of consists; optimum control of car availability and in other calculations which, because of their complexity could not thus far be accomplished at all or only to a limited extent. We anticipate that we shall activate the imported Soviet automatic computer URAL in 1961 and that by the end of the five-year plan, additional EPOS computers, produced in Czechoslovakia, will be in use.

In conjunction with the mighty development of automotive transportation and with the growth of the number of road motor vehicles, a corresponding expansion of the road network will be assured during the Third Five-Year Plan. Our proposals for the Third Five-Year Plan will assure the following goals:

1. The modernization of the road network in such a manner that by 1965, a minimum of 60 percent of the roads will be dust free [hard surface?], which will constitute an increase of 33 percent over to the current status.

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2. The execution of general repairs in the case of 2,250 bridges and the reconstruction of 576 unsuitable bridges, as well as the creation of at least 100 overpass crossings (mimourovno -- other than on the same level) of important highways and railroads. In this regard, maximum use will be made of standardized pre-assembled construction parts, not only in the construction of bearing structures but also for the lower levels. Experiences which we already possess in this regard have shown that the use of prefabricated components permits the attainment of savings amounting to about 2/3 of the investments involved and a substantial acceleration of the construction process.

3. Abandonment of the extensive reconstruction of the basic road net, as called for by the State roads plan, with the exception of essential sectors. However expansion of about twelve exit sectors adjacent to large cities will be undertaken; five will be built extending from Prague. Their capacity is already inadequate to-day to handle peak traffic loads.

4. In conjunction with the resolution of the XI Congress of the KSC, construction of the basic leg of the long-distance cross-country highway from Prague through Brno, Trencin, Zvolen, Kosice, to Michalovce will begin. The project will cover 720 kilometers. The overall length of this long-distance highway, which will be tied in with the road network, is estimated at about 1,640 kilometers. During the Third Five-Year Plan, the first phase of this work will be implemented at least along the Prague - Jihlava sector, with a connecting highway from Bozkov to Benesov. In its final stage, the long-distance highway will be built as a four-lane communication and will have two separate roadways, 7.5 meters wide, separated by a center strip. It will thus be 27.5 meters wide. The highway will cross other roads on overpasses or underpasses, thus permitting a travel speed of 140 kilometers per hour.

In the technical development of Czechoslovak navigation, an improvement in the ratio between traction and tonnage is scheduled to take place; the motorization of ships will continue, as will the mechanization of stevedoring operations. Obsolete vessels will be scrapped. The expansion of the fleet is thus aimed at rapid and most suitable motorized units, capable of supplanting obsolete ship space to the maximum possible extent. The vessels in question will be motor freight ships of 700 k/100 tons and 250 k/700 tons. The planned investment in vessels with higher technico-economic parameters will make it possible to scrap a large number of obsolete vessels during the Third Five-Year Plan. The motorization of ship space will thus rise from the present level of 5.5 percent to 24.5 percent.

A great deal of expansion in technology and operations is also anticipated for Czechoslovak air transportation. The development of new technology in aviation will be the deciding factor in the realization of increased goals of air transportation. The air

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fleet will be continually modernized during the Third Five-Year Plan through the use of Soviet aircraft -- the best aircraft in the world. The basic goal in investment construction is the rapid completion of the work at Ruzhyn Airport, to bring it up to world standards, and the execution of essential work at Bratislava Airport.

In connection with the development of new technology in all branches of the transportation industry, problems of the mechanization of heavy and taxing work come to the fore. These problems are all the more serious for not having been adequately worked out thus far.

In order to achieve the stipulated goal -- mechanization of 85-95 percent of these operations -- we are concentrating primarily on the following areas:

- a. Maximum mechanization of loading and unloading operations in public and enterprise transportation;
- b. Mechanization of construction work and machine-building operations and maintenance;
- c. Mechanization and automatization of operational and control work in key sectors.

In loading and unloading operations, mechanization is only introduced in 54 percent of the cases. Some 46 percent of the operations are conducted manually and investigations have shown that in this work alone, some 70,000 workers are engaged. In expanding mechanization of loading and unloading operations to a level of roughly 90 percent by 1965, it will be possible to lower the manpower requirements to one third. In addition to savings in manpower, mechanization will result in lower production costs in cargo manipulation, better utilization of transportation media and, primarily, will make a social contribution by removing physically tiring work.

As far as utilization of transportation media is concerned, calculations have shown that the anticipated mechanization will, for example, result in saving about 1,000 railroad cars at the level of output foreseen for 1965 in railroad transportation and a savings of about 1,500 5-ton trucks in highway transportation.

The mechanization of loading and unloading operations will require the following basic provisions in the various branches of transportation:

- a. In railroad transportation: concentration of loading and unloading operations by 1965 from the currently-used 1,500 stations in about 500 stations, of which about 150 will have a daily average turn-around capacity of 60 cars and over and 300 stations with an average daily turn-around capacity of 30-60 cars. This will facilitate the economic utilization of mechanical equipment and the transition to a more economical form of operation in the actual technology of the transportation process. More than 120 million crowns will be devoted to the necessary mechanization.

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b. At the sidings of transportation enterprises: here it will be necessary to remove the current diversification. Of the overall number of 2,600 sidings, virtually 2,000 handle a maximum of 5 cars per day, with the majority not turning around more than one car per day. Such sidings do not have the necessary conditions requiring the mechanization of cargo handling, are absolutely uneconomical, and therefore, it appears efficient to discontinue them and to transfer the volume of freight handled by them to stations which conduct concentrated loading and unloading operations. It will be necessary to equip those sidings which are not to be discontinued with suitable mechanical means and to introduce new technology for the work on sidings and for their servicing.

c. In public highway transportation: introduction of additional concentration of loading and unloading operations with complex mechanization. Toward this end, creation of 20-25 transloading facilities, primarily located in kraj cities and in some okres towns.

The above provisions, that is to say, the introduction of new organization in the transportation of full car loads of freight to selected railroad stations, and the discontinuation of uneconomical sidings and warehousing facilities, will gradually facilitate the realization of a uniform transportation system with the goal of attaining further reductions in operating costs of the entire transportation process and speeding the circulation of raw materials and products.

The mechanization of cargo-handling operations on "public use" rails at railroad stations will facilitate the formation of a new system of organization of work in loading and unloading operations. We are counting on the fact that mechanization will be promoted and sponsored by the railroads and the distribution and collection of goods shipments by automotive transportation. Through this method of organization we wish to achieve a status in which one transportation organization would be responsible for the entire transportation process in combined rail-highway transportation, from the recipient to the consumer.

The tempo at which our social system makes it possible for us to solve this problem is thus far without precedent. The basic prerequisite for full realization of these intentions, and thus the attainment of the anticipated results, is the complete assurance of the necessary means of mechanization through production. This is the focal point of our maximum efforts at this time.

In connection with the compilation of the five-year plan in the sphere of transportation, special attention was devoted to the evaluation of investments. As a result of the high goals which we set for ourselves in the area of mechanization of heavy and tiring work, we re-examined the composition of the entire investment plan with the object of controlling the scope of the individual investments and their necessity, determine the correctness of their timing and obtaining funds for increased machine investments, primarily in

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the area of mechanization. The entire re-evaluation was conducted in close relationship with the solution of the problems surrounding the introduction of a two-shift system. Many significant savings were achieved through the re-evaluation of investments. Thus, for example, in re-evaluating the investments in railroad workshops for the repair of rolling stock it transpired that it is unnecessary to build a new workshop for the repair of 4-axle passenger cars and that the necessary output can be achieved by the introduction of a two-shift system and minor reconstruction in existing facilities. This resulted in a savings of roughly 100 million crowns. In accordance with the overall reexamination of investments, it will be possible to conclude the construction of the Ceska Trebova junction in the Third Five-Year Plan, to substantially expand the Prague junction, to speed up the reconstruction of the Prague airfield, all of which will facilitate a better conception of investment plans than has heretofore been the case. Many factual examples have shown us that the wide participation of the workers, the examination of their views, suggestions, and opinions facilitates the formation of a substantially better investment plan. This method of re-evaluation of investments should therefore not be considered as a unilateral action; rather, we wish to use it as a system in our investment policy.

The fulfillment of the high goals of transportation will be accomplished by people. New technology which is being introduced in transportation and will develop in it rapidly requires a high degree of qualification and constant improvement. Therefore, simultaneously with the solution of the problems of the development of the technical and economic base of transportation, we are assuring the extensive education and re-education of the working people, particularly on the railroads. In the spirit of the basic directives pertaining to the re-organization of our educational system, education in transportation is being reorganized in such a manner as to connect it more intimately with both the Advanced School of Transportation (Vysoka skola dopravní) and the specialized transportation schools.

We shall also assure the substantially higher qualification of transportation workers through supplemental education and study for existing workers. This will be a very extensive and difficult task. The unprecedented tempo in the introduction of new technology will require higher qualifications of tens of thousands of existing workers in transportation.

From this brief discussion of the basic tasks it is apparent that transportation as a whole will undergo unprecedented technical change during the Third Five-Year Plan. This extensive change in the technical base of transportation will facilitate the achievement of rapid growth in the productivity of labor and the lowering of transportation costs. Thus, for example, productivity of labor in railroad transportation will be increased 25 percent and operating costs will decline 10.5 percent. This means that the increased scope

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of transportation work will be fully covered by the growth in the productivity of labor, which is facilitated primarily by the rapid introduction of new technology.

A serious task for workers in transportation will be the preparation and assurance of a 42-hour week, which is preliminarily anticipated by 1963. This task is all the more difficult because it has thus far been impossible to eliminate overtime work on the railroads and to raise the number of workers to planned levels. These inadequacies must be removed by 1962 at the latest.

The shortening of working time will demand an increase in the productivity of labor, primarily through the maximum utilization of newly-introduced and existing technology, through improved organization of work, through better utilization of working time and through the implementation of a number of organizational provisions, such as the joining and amalgamation of small units, the introduction of dual professions, the lengthening of trips, the increasing of daily locomotive runs, etc.

The assurance of the high volume of transportation in the Third Five-Year Plan and the execution of the technical reconstruction in transportation will require a considerable amount of effort on the part of all workers in transportation. The wide participation of the workers in compiling the proposals for the plan, their valuable reminders and active assistance in solving all problems, their thousands of pledges and the unprecedented development of socialist competition are the best guarantees that the Third Five-Year Plan for transportation will not only be well processed but also assured and fulfilled.

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MATERIAL INTEREST OF NATIONAL COMMITTEES IN THE RESULTS

OF THEIR ENTERPRISE MANAGEMENT

[Following is a translation of an article by Engr. Vladimir Siba, in Planovane Hospodarstvi (Planned Economy), Vol. XIII, No. 4. Prague, 1960, Pages 297-303.]

In conjunction with the new territorial administrative organization of the State and in view of the broadened legality and responsibility of the national committees in the direction and planning of the economy, questions of the material interest of the national committees in the results of the management of enterprises under their jurisdiction take on new significance. It is necessary to evaluate existing valid principles of material interest of national committees and to consider their possible adjustment according to new conditions.

In the economy directed by the national committees, there exists, in addition to the material interest of individual economic organizations with general ways of financing on the basis of long-term standards, also material interest of the national committees as economic entities.

The financial plan of a national committee forms a closed balance which is regulated by the allocation of funds from the budget of the national committee of a higher rank and, in the case of Kraj National Committees, by allocations from the State budget.

In the directives for the Five-Year Plan, as well as in the plan itself, the allocations are only orientational indexes, are not binding, and can be altered in the individual annual plans. The national committee is not adequately interested in compiling a mobilizing plan. It has, on the other hand, an interest in including in its plan the lowest possible revenues and the maximum possible expenditures, because in this manner it is more easily able to exceed the planned incomes and to achieve savings in expenditures.

The material interest of national committees is not a long-term proposition (it derives from the five-year plans); in addition, national committees are interested only in the attainment of better results of enterprise management vis-a-vis the annual budget and in its fulfillment. They are thus interested in achieving above-plan resources, in exceeding planned revenues, and in effecting savings in planned expenditures. The realization of above-plan financial means is possible only through the creation of surplus material resources (in exceeding the production plan), through the mobilization of local material reserves which were not included in the plan, or by forcing those consumers for whose planned financial

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means the material coverage was planned, out of the market. For these reasons, difficulties arise in realizing above-plan resources and the national committee is frequently forced to assign them not where they are most needed but rather where their realization is feasible. Thus, the national committees create free (unencumbered) financial means. The situation wherein a surplus of funds exists is not conducive to favorable conditions for improving economy and forces the national committees to see to the fulfillment of their revenues, and pay particular attention to accounts receivable and local and State taxes.

Long-range standards of enterprise and individual material interest are introduced in those branches of the economy which are directed by national committees but for which the planning is still done at the ministerial level (construction, transportation). These standards are determined by and large by the ministries, independently of the material interests of the national committees. In sectors of the economy which have thus far been planned by the national committees themselves, standards of material interest exist only in selected enterprises of the local economy.

Principles of Material Interest of National Committees

In solving questions of the material interest of national committees, we consider it correct to proceed from the following basic principles:

Of basic significance to the material interest of national committees are their own revenues and the funds entrusted to them by the State. From the point of view of interest, it is necessary for the national committee to have the opportunity of influencing the size of its own revenues and the State funds. The volume of its own revenues and the amount of State funds which can be influenced by the national committee is to be the deciding component of the national committee's revenues.

One of the instruments used to assure long-term material interest of national committees is the correct determination of allocations (allotments) from the budget of a higher component. The allotment from the higher budget is the basic directing index of the financial plan of the national committee and expresses its relationship to the national economy. This mission of the allotment (allocation) is not limited by its size (volume). It is necessary to reduce the volume of allocations and simultaneously increase those revenues whose creation the national committee is able to influence.

The allotment should not be an automatic balance equalizing the plan of revenues and expenditures of the national committee, but rather a complex indicator determining the development of its economy. The allocation must then not be automatically determined

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by the revenues and expenditures of the national committee, but rather, in the case of dynamically planned revenues, must determine the maximum limitations of the volume of expenditures.

The material interest of national committees must be such that it would simultaneously assure the proportional development of economic and cultural expansion of the national committee, in accordance with the requirements and goals of the entire national economy.

National committees should be primarily interested in the planned attainment of better results, that is to say, in the compilation of mobilizing plans and budgets, a factor which is economically far more valuable than the attainment of results which are an improvement over the plan (creation of surpluses).

In a socialist economy, it is not possible for every organization, and thus also the national committee, to retain all of the funds which it creates. In order to satisfy national requirements, it is necessary for the state to share in the created means. Therefore, it is also necessary for part of the financial resources attained by the national committees, be it through an increase in the mobility of plans or by exceeding the plan, to be turned back to the State for redistribution. The share of these funds kept by the national committees must remain so large as to render their interest in the creation of these resources adequately effective.

In the case of enterprise whose operations will now be independently planned by the national committees, the standards of enterprise interest have generally proven themselves. We anticipate that in the case of these enterprise, the standards of enterprise interest, prescribed for them by the directives on the Third Five-Year Plan, will be basically preserved, albeit following appropriate recalculations (primarily for organizational reasons).

The material interest of national committees as entities must support the correct functioning of the standards of enterprise material interest in the enterprises directed by them.

Structure of Revenues and Expenditures in Financial Plans of National Enterprises, Seen From the Point of View of Assuring Material Interest

The cumulative financial balance of a kraj includes the revenues and expenditures of the Kraj National Committee and all local and okres national committees in the kraj, as well as gross revenues and expenditures of all subordinated economic and budgetary organizations. The receipts and expenditures of economic organizations, as shown in the balance of the kraj, contain for example, the total economic results, all write-offs, total investment expenditures, etc.

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The revenues of the kraj national committee include (1) its own revenues; (2) revenues entrusted to it by the State, and (3) the allocation from the central budget.

The committee's own revenues are composed of the revenues or incomes of economic organizations, functional and administrative incomes of budgetary organizations, the incomes of Machine Tractor Stations (MTS), revenues from local taxes and fees (including agricultural taxes), and insurance premiums.

The income entrusted to the national committee by the State is composed of all individual income taxes, artisan taxes and cooperative income taxes, as well as all turnover taxes and taxes on output levied on enterprises of the local economy, producer and consumer cooperatives, other cooperatives and selected other enterprises.

The anticipated transition of selected enterprises of the consumer and food industries and general machine building industry from the administration of the ministries to direction by the national committees, by 1 January 1961, will facilitate a substantial expansion in the income base of the national committees, since these establishments are significant payers of turnover taxes. This will result in an increased volume of revenues, whose creation can be influenced by the national committee, and the allocation from the central budget can be substantially reduced.

In this connection, we propose the following:

1. That individual income taxes and artisan taxes be transferred to [the heading] local taxes and thus to the revenues of the national committees;

2. That all cooperative income taxes be included (as heretofore) in the revenues entrusted by the State to the national committees, plus the full amounts of all turnover and output taxes, insofar as they are realized by the enterprises and organizations directed by the national committees.

The revenues of the national committees, based on turnover and output taxes, will thus be increased from the present less than 3 billion crowns per year, to roughly 10 billion. The consumer and food industries are, generally, evenly distributed over the territory of Czechoslovakia, so that there will not be a basic difference in the income base of the individual Kraj National Committees. It is not considered correct to establish only a percentage share of the tax revenues from turnover and output taxes for use by the Kraj National Committees. This caused unnecessary reductions in the volume of revenues whose amounts the national committee can influence and the allocation from the state budget should be equivalent to this amount.

Following the reorganization of the economies directed by the national committees, by 1 January 1961, and following the implementation of the proposed measures in the composition of national committee revenues, the structure of the cumulative

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annual balance of national committees for the entire territory of Czechoslovakia, as outlined below, is anticipated for orientation purposes (in billions of crowns):

<u>Revenues</u>		<u>Expenditures</u>	
Income of economic organizations	9	Investment costs	13.5
Other income of the national committees	6	Including economic organizations	(4.5)
Entrusted State funds	11	Non-investment type expenditures	26.5
Allotment from central budget	14	Including economic organizations	(4.00)
Total	40	Total	40

It is anticipated that the allocation for national committees from the State budget will decline from the existing 22 billion crowns to roughly 14 billion crowns. The overall allocation from the State budget will be allotted to the various Kraj National Committees on the basis of the volume of their own and entrusted revenues and in conjunction with the planned development of the economy and culture of the national committees in the kraj.

It is assumed that a maximum of two or three of the eleven new Kraj National Committees, and the national committees equivalent to them in rank, would have a somewhat higher revenue base, particularly in regard to the taxation of turnover and output, compared to expenditures (for example, the North Bohemia Kraj). In the case of these krajs, plans would call for them to turn funds over to the state.

In the event of a high share of turnover tax and output tax in the revenues of the national committees, the committees will be interested in the revenue from these taxes paid by the enterprises directed by them. This interest could be accompanied by several incorrect tendencies, as for example, efforts aimed at slowing down the decline in retail prices, or changes in the structure of production in favor of products with above average tax yields. However, we consider that the central formation of State retail prices and the heightened significance of the elected organs of the national committees as collective representatives of the interests of the people (in other words of the consumers), will avert these unhealthy tendencies.

The national committees will be interested in the turnover tax and output tax, as well as in the profits of enterprises -- the taxpayers. These enterprises, as taxpayers, through the means of the standard enterprise interest norms, are interested in increasing their profits. A combination of these interests can contribute toward the formation of the required proportions between profit and turnover and output taxes.

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The Interest of National Committees in Compiling Mobilizing
Financial Plans and Budgets

From the economic standpoint, it is important to provide for the long-term interest of national committees in the planned (not sporadic) attainment of better results of management, that is to say, the compilation of mobilizing financial plans which are strictly binding on the mobilizing material parts of the plan.

During the present period, the conditions for long-term interest of national committees as a whole in the compilation of mobilizing proposals for five-year plans, are not yet present. It is particularly impossible in the Third Five-Year Plan, because the directives stipulate only orientational type allocations for Kraj National Committees, primarily in terms of organization of the economies managed by the national committees through 1 January 1959.

We suggest the following method for assuring the material interest of national committees as a whole:

1. The directives for the compilation of the five-year plan should contain directing indexes for individual Kraj National Committees in the form of the maximum possible allocation (minimum possible return to the state). The size of this allotment should be made conditional upon the fulfillment of certain conditions, namely the stipulation of certain concrete goals for the development of the individual branches of the economies of the national committees.

In writing its directives then, the Kraj National Committee sets forth the long-term material enterprise interest for the individual branches directed by the national committees. In view of the interest of the national committees as a whole in the formation of mobilizing draft plans and budgets, and in view of the diversity between the various branches and enterprises directed by them, it will be suitable to leave the setting of norms of enterprise interest to the jurisdiction of the national committees. Prior to setting the norms of enterprise interest, the Kraj National Committees will negotiate their proposals with the State Planning Commission.

2. In the five-year plan, the government sets forth a binding allocation from the central budget for the individual Kraj National Committees for the individual years. The allotment will depend upon the fulfillment of all directing indexes of the plan through which the government sets forth the goals and means of economic and cultural development of the national committees; it will be binding, both for the national committees, as well as for the State Planning Commission. Simultaneously, the government stipulates the overall limit of decentralized investment construction. In extracting portions of the five-year plan, the Kraj National Committees are given, in addition to the allocations, the

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overall volume of their own and entrusted revenues (including the volume of revenues of economic organizations) and the volume of expenditures by economic organizations.

3. Government provisions for compiling the state plan and the budget firm up the indexes of the five-year plan for the development of the national economy: these provisions are based on the allocations contained in the Five-Year Plan and are adjusted only as a result of substantive changes in the plan, changes of an organizational character, and methodological changes. Simultaneously, the provisions of the government also adjust the indexes of output and financial means, which form the conditions for the allocation of funds.

At the same time, governmental provisions stipulate the following for all Kraj National Committees:

a. The percentage share of the Kraj committee (for example 70 %) in the planned exceeding of revenues, not counting income of economic organizations, in the proposals for the annual plan, compared with the anticipated revenues of the Five-Year Plan (firmed up by the government provisions);

b. The percentage share of the Kraj committee (for example, 70 %) in the planned improvement in the balance of revenues and expenditures of economic organizations, as opposed to the balance anticipated for the five-year plan (possibly adjusted by government provision);

b. The percentage share of the Kraj committee (for example 50 %) in the surpluses of the actual economy for the plan year.

4. If the Kraj National Committee, in its draft annual plan and budget, exceeds the level of its other local and entrusted revenues, as compared to the five-year plan (or the government provisions) and not counting the income of economic organizations, then it retains, for the purpose of planned increases in expenditures, 70 percent of the surplus and its allocation from the central budget is curtailed to the extent of 30 percent of the surplus.

In the event the Kraj National Committee, in its draft annual plan and budget, improves the balance of revenues and expenditures of economic organizations as opposed to the five-year plan (or government provision), it retains 70 percent of the value of the improved balance for planned increases in expenditures and its allocation from the Budget is curtailed to the extent of 30 percent of the value of the improvement. The enterprises themselves will primarily be engaged in efforts to exceed planned revenues, in accordance with the standards of enterprise interest. In determining the balance of incomes and expenditures for economic organizations, naturally, their incomes do not show turnover and output taxes, as well as increases and declines of all types of credits.

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In the event the Kraj National Committee, in its draft annual plan and budget, shows savings, in expenditures (apart from those of economic organizations) compared to the five-year plan, its allocation will not be changed from that stipulated in the five-year plan.

If, on the other hand, the Kraj committee's draft annual plan and budget contain proposals to lower the revenue, not counting income of economic organizations, or, calls for higher expenditures with the same level of revenues, or if it shows a deteriorating balance between the expenditures and revenues of economic organizations, compared to the five-year plan figures, the allocation for the committee, as set forth in the five-year plan, will not be increased (lowered).

These increased financial means, (higher than those of the five-year plan), will be directed, according to plan and expressed in the draft plans, by the Kraj National Committees to the most effective use; the annual plan will assure their realization materially. The Kraj committee may use the larger funds for raising the volume of decentralized investment construction over and above that contained in the five-year plan. It must assure the material coverage of these increased investments by an increase in construction and other deliveries. The purchase of older machines and equipment and possibly the purchase of selected other equipment of a machinebuilding character, may be considered as an exception.

National Committee Interest in Compiling Mobilizing Plans
(Kraj National Committee Share of Interest -- 70 %)

	Plan for 1961 according Draft to Annual approved Plan 5-Y-P 1961	Increase or Decline	Shared By KNV (Kraj Natl Comm)	Subordi- nate economic organiza- tions	
a. Revenues of Economic Organizations	100	120	/20	2.8	16*
b. Other local revenue and entrusted funds	200	250	/50	35	--
c. Allocation from State budget	100	83.8	-16.2	--	--
d. Total revenues	400	453.8	/53.8	37.8	16
e. Expenditures of economic organizations	90	106	/16	--	16*
f. Other expenditures	310	347.8	/37.8	37.8	--
g. Total expenditures	400	453.8	/53.8	37.8	16
h. Balance of revenues and expenditures of economic organizations	/10	/14	/4	2.8	--

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Note: (*) In the case of economic organizations with ordinary methods of financing, the share is determined, for the most part, in relationship to the actual figures of the preceding year through the use of the long-term standard [estimated?].

The Interest of National Committees in the Fulfillment and Over-Fulfillment of Approved Plans and Budgets

Following the apportioning of the approved annual state plan and state budget, the Kraj National Committee compiles its basic budget. The basic budget assures the maintenance of the prescribed proportion of development in the individual branches of the economy directed by the national committees, as contained in the state plan and state budget.

In compiling a real mobilizing annual plan and budget, the scope of its overfulfillment and the creation of surpluses is limited.

If, in the fulfillment of its basic budget, the national committee exceeds the planned level of income without authorization (for example, by charging exorbitant prices), or if the committee achieves savings in expenditures by not fulfilling certain tasks as planned, the financial surpluses thus created are to be returned to the state immediately upon identification.

In the event the national committee attains real savings in planned expenditures or exceeds the planned level of income, it can, as an exception to the rule and with the approval of the next higher organization, use one half of the surpluses thus gained to finance unplanned tasks; these investments can take place in the same year in which the surpluses were accumulated and are, in effect, 50 percent of the share of surpluses of actual management. This one half of the savings in expenditures can be used by the committee in the form of a budgetary transfer in the expenditures column. If the national committee utilizes the surplus funds in the same year in which they were created, it is obligated to immediately turn back to the state budget a sum equivalent to the total of the surplus funds used.

Surpluses which are identified following the closing of the account books in complex accounting procedures are primarily used to cover unplanned losses arising in the enterprises managed by the national committees (state farms).

Surpluses existing in economic organizations with regular methods of accounting are used in accordance with the standards of material interest for enterprises.

One half (assuming a 50 percent share for the Kraj National Committee) of the remaining economic surpluses (including surpluses arising from allocations and allotments of economic organizations) are retained by the national committee as its own financial means for use in future years. The other half, including one half of the remainder of the unexpended funds for decentralized investments (excepting decentralized funds of economic organizations with [interest] standards), are to be turned back to the state budget.

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The Kraj National Committee can utilize above-plan funds and surpluses from previous years for purposes of financing above-plan requirements of decentralized investments, provided that it assures their material and capacity coverage through increased output (particularly in construction) and through local means found in the kraj; however, this cannot be accomplished at the expense of other external consumers.

Surpluses may also be used by the national committees in the formation of reserves which serve primarily to bridge the time span between expenditures and incomes.

The national committees may also concentrate monetary means in their financial reserves for financing long-term future projects. Funds earmarked in such a manner should be centralized in the hands of national committees of a higher rank (particularly in the hands of okres national committees).

National Committee Interest in Exceeding the Approved Plan
(Kraj National Committee Interest - 50 Percent)

	Approved Plan for 1961	Actual 1961	Above- plan re- sources	Kraj Nat'l Comm.	Shared By Subordi- nate economic organi- zations	Central State budget
a. Revenues of economic organizations	120	130	10	1	8	1
b. Other local revenues and entrusted funds	250	270	20	10	--	10
c. Allocation from State budget	83.8	83.8	--	--	--	--
d. Total revenues	453.8	483.8	30	11	8	11
e. Expenditures for decentralized expansion of economic organizations with standards	40	38	2	--	2	--
f. Expenditures for decentralized expansion of other enterprises	80	70	10	5	--	5
g. Other expenditures	333.8	313.8	20	10	--	10
h. Total expenditures	453.8	421.8	32	15	2	15
i. Surplus	--	62	62	26	10	26

The proposed material interest is intended in its full scope for Kraj National Committees. The method of material interest for okres and local national committees is basically considered in the same light. It is anticipated that possible peculiarities based on

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local conditions will be solved by the Kraj National Committees in conjunction with state-wide methodology applicable to the management of a kraj as an entity with its own jurisdiction and responsibilities.

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SOME IMPORTANT ECONOMIC INFORMATION FROM THE IMPLEMENTATION
OF THE NEW WAGE ORGANIZATION

[Following is a translation of an article by Jozef Bednarik in Prace a Mzda (Labor and Wages), Vol. VIII, No. 3, Prague, March 1960, Pages 114-117.]

One of the most significant economic provisions effected during the period of the completion of the building-up process of socialism in our country is the indisputable introduction and expedient implementation of the new wage organization in the national economy.

The importance and the great political and economic significance of the implementation of the principles of the new wage system in the national economy was confirmed last year especially by the economic results in selected enterprises in individual sectors.

Now during the period when we are implementing these favorable results of the new wage organization in selected enterprises while introducing the new wage system on a wide basis in the greater majority of our manufacturing enterprises, there remains a no lesser significant task to know how to correctly implement the principles of the new wage system in the further development. The experiences of these enterprises, where in the course of the last year the principles of the new wage organization were consistently implemented, convinced us of the fact that the new wage system in these enterprises very favorably influenced the total level of the economic management of production.

For example in the Chemical Enterprises of Juraj Dimitrov for the first six months of last year the productivity of work rose more than 10 %, whereby the increase in production is guaranteed by an increase in the productivity of work from 63 %. In the section of the organization of work favorable influences were exerted by the provisions resulting from the introduction of the new wage organization especially on the decline in overtime which in this enterprise declined by 6972 hours during the first half year.

The total effect of these favorable results showed up in the final analysis also in the lowering of the actual costs and in the increase of accumulation. Only in the wage costs in calculation of 1 Kcs (Czechoslovak crown) of the commodity production and in the increase of average earnings by 5.6 % there was a decrease by 1.2 %.

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A very important point which in the introduction of the new wage system was especially useful and which in the meantime is often passed over is the question of the increased political and production activity of the workers in presenting valuable reminders for the management of production and the organization of work.

At the same time the departmental activity of the Factory Shop Committee of the Revolutionary Trade-Union Movement improved considerably and found in the introduction of the new wage system a very fertile soil for spreading its activity in the production branch, in increasing the qualifications and in introducing technically well-founded performance norms.

It would be detrimental for these enterprises not to know how to make permanent use in the management and development of production of this increased activity of the workers and total increase in the work effort.

Are Piece-Work Wages the Most Effective Form of Wages?

In conjunction with the implementation of the new wage organization different opinions arose regarding the development of piece-work and timework wages with a bonus, the amount of the bonus addition, the extent of extra pay for poor working conditions, etc., while at the same time the practical results of individual enterprises with the new wage organization also show very interesting data.

Because I think that the matter is one of real questions the correct development of which will be decisive for the effectiveness of the new wage system in its future use I would like to introduce some economic observations regarding this problem.

In conjunction with the revision of the wage systems of labor a definite restriction of direct piece-work wages is arrived at. Proof of this is the practical development in our enterprises where the new wage system has already been introduced.

In the Chemical Enterprises of Juraj Dimitrov the ratio of the workers working in individual wage forms is as follows:

Wage Form	Before the Introduction of the New Wage Organ- ization	In the New Wage Organization	Difference
Piece-work	34.2 %	31.1 %	-3.1 %
Timework with a Bonus	65.8 %	68.9 %	+3.1 %

From the above table it is evident that the ratio of the workers getting piece-work wages declined by more than 3 %. We made an effort in our findings to utilize such a form of wages as appeared to be most effective under given conditions.

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It is true that it is a different question when it comes to the most widespread form of wages, which on the other hand is not characteristic for piece-work wages but for timework wages with a bonus.

Piece-work wages have in comparison with timework wages with a bonus an advantage especially in this that they take into consideration the individual productivity of work and the intensity of work and bring out the direct interest of every worker in his work thereby increasing the productivity of work. With such characteristics piece-work wages basically contributed to the achievement of the high year to year increase in the productivity of work.

And in spite of all these economically very effective stimuli the extent of the use of piece-work wages will decline. This will happen because with the utilization of continuous production processes, complex mechanization and transfer to automatic direction of work the ratio of timework wages with a bonus will continue to increase.

Practice from such findings confirms, especially in chemical production, that time-work wages expediently supplemented with bonuses for completing quantitative and qualitative indexes often produces a more effective material interest in increasing the productivity of work than piece-work wages.

For this reason it is expedient in introducing the new wage system to utilize timework wages wherever piece-work wages do not suit the conditions of the technological process of production, do not contribute to the better utilization of technique and do not guarantee an increase in the quality of work.

This was done in the Chemical Enterprises of Juraj Dimitrov when in the production of powders they transferred from commissioned production to continuous production and introduced instead of piece-work wages timework wages with a bonus. The economic results of this production unit showed that it was correct to change the form of wages when the kind of production was changed. The performance of the workers did not decrease but confusion decreased considerably and the quality and economy of production improved.

Bonuses - An Important Economic Instrument for the
Development of Production

The efficacy of timework wages with a bonus is directly dependent on the effectiveness of bonus indexes. Those enterprises and plants which economically correctly complemented timework wages, I have in mind tariff wages, with bonus supplements for the quantity, economy, and quality of production will have in these rewards guaranteed for the future a very effective instrument for the development of production.

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Naturally the economically effective form of bonuses presupposes such indexes which for interested workers mean a maximum influence on the economy of production. The amount of the bonus addition percentage-wise is to correspond to the achieved productivity of work, economy of production and mainly it is to guarantee the progressive growth of the economy of production for future years.

There are cases where the enterprises used the bonus additions to level off the present earnings. Cases are not rare where the assistant and less qualified workers have higher bonuses assigned them than qualified workers, but that is only so that the difference in the hourly wage would not be so great.

It is self-evident that this is a question of a statement of policy regarding the equalization of earnings, with which the new wage system must not reckon.

Are the Supplements for Bad Working Conditions Permanent?

In introducing the new wage organization the correct principle that for poor working conditions which unfavorably influence the output of work and the health of the workers a special supplement is paid was put into effect.

By this provision part of the wage costs was omitted from the wage tariff which from the economic standpoint must be considered as unproductive costs because in no case do they guarantee the growth of the productivity of work.

From the standpoint of individual workers to whom those supplements are given it is necessary to explain economically correctly the meaning of these supplements because it is a question of part of the wage income which is not supported by the output of work and which it is not correct to consider as permanent supplements. The tendency of these supplements in calculating one hour worked is to have a declining character because in increasing the technical advancement of the place of work we must make an effort to continually improve the working environment. Even the highest hourly supplement for poor working conditions will not replace the loss in health of the workers and for this reason the harmful view must not predominate that by the payment of supplements the workers are sufficiently indemnified for poor working conditions.

We often meet this incorrect understanding both among technical workers and among individual workers. The effort to keep the amount of the acknowledged supplement leads some workers so far that from unjustified fear that the hourly earnings will be decreased in a lower classification they permanently keep the place of work on the same level.

It is self-evident that the predominant and first effort to remove the causes of the harmful places of work must be made by the administrative economic and technical workers. These must have a maximum interest in seeing to it that from the economic standpoint

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the amount of wage supplements of this kind drops continually, that illness and accidents are not the cause of increased absences and finally that the technical level of our places of work corresponds to the level of the political and economic development.

As an example of the situation in the chemical enterprises I will cite the example from the Chemical Enterprises of Juraj Dimitrov.

Structure	Supplements in Hourly Wage Fund		Supplements for 1 hour Worked in		Index July/January in %
	in %		Kcs		
	January 1959	July 1959	January 1959	July 1959	
Enterprise	9.78	9.82	0.68	0.71	105
Creative Guild	19.30	19.48	1.50	1.52	104

Of the total number of workers in high risk factories almost 50 % work in groups classified among the most difficult - C and D. The average supplement for difficult working conditions in the Creative Guild is more than 1.50 Kcs for one hour worked which represents 19.48 % of the hourly earnings.

These figures adequately show that the ratio of difficult conditions and conditions harmful to health is truly high in our places of work while at the same time from the development of this index for the first six months we find out that this tendency with reference to the introduction of new production continues to increase.

It would be very useful if our economists paid greater attention to similar questions so that the principles of the new wage system would have a perspective character. To successfully effect the implementation of wages - this does not mean a task for all of us only for the present. The question now will be to further improve the results already achieved by the implementation of wages and so that the rewarding of workers in production would be on a continually higher level.

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	3.00	3.40	3.85	4.85	5.50	6.20	7.05	8.00
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
1	00300	00340	00385	00485	00550	00620	00705	00800
2	00600	00680	00770	00970	01100	01240	01410	01600
3	00900	01020	01155	01455	01650	01860	02115	02400
4	01200	01360	01540	01940	02200	02480	02820	03200
5	01500	01700	01925	02425	02750	03100	03525	04000
6	01800	02040	02310	02910	03300	03720	04230	04800
7	02100	02380	02695	03395	03850	04340	04935	05600
8	02400	02720	03080	03880	04400	04960	05640	06400
9	02700	03060	03465	04365	04950	05580	06345	07200
11	03300	03740	04235	05335	06050	06820	07755	08800
12	03600	04080	04620	05820	06600	07440	08460	09600
13	03900	04420	05005	06305	07150	08060	09165	10400
14	04200	04760	05390	06790	07700	08680	09870	11200
15	04500	05100	05775	07275	08250	09300	10575	12000
16	04800	05440	06160	07760	08800	09920	11280	12800
17	05100	05780	06545	08245	09350	10540	11985	13600
18	05400	06120	06930	08730	09900	11160	12690	14400
19	05700	06460	07315	09215	10450	11780	13395	15200
184	552.00	625.60	708.40	892.40	1.012.00	1.140.80	1.297.20	1.472.00
186	558.00	632.40	716.10	902.10	1.023.00	1.153.20	1.311.30	1.488.00
188	564.00	639.20	723.80	911.80	1.034.00	1.165.60	1.325.40	1.504.00
192	576.00	652.80	739.20	931.20	1.056.00	1.190.40	1.353.60	1.536.00
194	582.00	659.60	746.90	940.90	1.067.00	1.202.80	1.367.70	1.552.00
196	588.00	666.40	754.60	950.60	1.078.00	1.215.20	1.381.80	1.568.00
198	594.00	673.20	762.30	960.30	1.089.00	1.227.60	1.395.90	1.584.00
200	600.00	680.00	770.00	970.00	1.100.00	1.240.00	1.410.00	1.600.00
202	606.00	686.80	777.70	979.70	1.111.00	1.252.40	1.424.10	1.616.00
204	612.00	693.60	785.40	989.40	1.122.00	1.264.80	1.438.20	1.632.00
206	618.00	700.40	793.10	999.10	1.133.00	1.277.20	1.452.30	1.648.00
208	624.00	707.20	800.80	1.088.80	1.144.00	1.289.60	1.466.40	1.664.00

Tables for the Calculation of Hourly Wages - Continued

Note: For Hours 1-19, in the result we separate by 2 decimal places.

On pages II and III of the supplement tables for the calculation of hourly wages are worked out for workers in the food industry (milk, smoked meats, etc.). For the calculation of wages of workers

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	3.00	3.40	3.85	4.85	5.50	6.20	7.05	8.00
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
* 1	003750	004250	004812	006062	006875	007750	008812	010000
2	007500	008500	009625	012125	013750	015500	017625	020000
3	011250	012750	014437	018897	020625	023250	026437	030000
4	015000	017000	019250	024250	027500	031000	035250	040000
5	018750	021250	024062	030312	034375	038750	044062	050000
6	022500	025500	028875	036375	041250	046500	052875	060000
7	026250	029750	033687	042437	048125	054250	061687	070000
8	030000	034000	038500	048500	055000	062000	070500	080000
9	033750	038250	043312	054562	061875	069750	079312	090000
**1	004500	005100	005775	007275	008250	009300	010575	012000
2	009000	010200	011550	014550	016500	018600	021150	024000
3	013500	015300	017325	021825	024750	027900	031725	036000
4	018000	020400	023100	029100	033000	037200	042300	048000
5	022500	025500	028875	036375	041250	046500	052875	060000
6	027000	030600	034650	043650	049500	055800	063450	072000
7	031500	035700	040425	050925	057750	065100	074025	084000
8	036000	040800	046200	058200	066000	074400	084600	096000
9	040500	045900	051975	065475	074250	083700	095175	108000

Note: For Hours 1-9, in the result we separate by 3 decimal places.

* OVERTIME WITH 25 % SUPPLEMENT

** OVERTIME WITH 50 % SUPPLEMENT

in the slaughtering and fat industry, sugar manufacture, etc., the tables published in number 2/1960 of the publication Prace a Mzda (Labor and Wages) on Pages II and III of the supplement should be used.

I (Continued)

- 126 -

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	3.00	3.30	3.65	4.10	4.50	5.10	5.75	6.55
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
1	00300	00330	00365	00410	00450	00510	00575	00655
2	00600	00660	00730	00820	00900	01020	01150	01310
3	00900	00990	01095	01230	01350	01530	01725	01965
4	01200	01320	01460	01640	01800	02040	02300	02620
5	01500	01650	01825	02050	02250	02550	02875	03275
6	01800	01980	02190	02460	02700	03060	03450	03930
7	02100	02310	02555	02870	03150	03570	04025	04585
8	02400	02640	02920	03280	03600	04080	04600	05240
9	02700	02970	03285	03690	04050	04590	05175	05895
11	03300	03630	04015	04510	04950	05610	06325	07205
12	03600	03960	04380	04920	05400	06120	06900	07860
13	03900	04290	04745	05330	05850	06630	07475	08515
14	04200	04620	05110	05740	06300	07140	08050	09170
15	04500	04950	05475	06150	06750	07650	08625	09825
16	04800	05280	05840	06560	07200	08160	09200	10480
17	05100	05610	06205	06970	07650	08670	09775	11135
18	05400	05940	06570	07380	08100	09180	10350	11790
19	05700	06270	06935	07790	08550	09690	10925	12445

184	552.00	607.20	671.60	754.40	828.00	938.40	1.058.00	1.205.20
186	558.00	613.80	678.90	762.60	827.00	948.60	1.069.50	1.218.30
188	564.00	620.40	686.20	770.80	846.00	958.80	1.081.00	1.231.40
192	576.00	633.60	700.80	787.20	864.00	979.20	1.104.00	1.257.60
194	582.00	640.20	708.10	795.40	873.00	989.40	1.115.50	1.270.70
196	588.00	646.80	715.40	803.60	882.00	999.60	1.127.00	1.283.80
198	594.00	653.40	722.70	811.80	891.00	1.009.80	1.138.50	1.296.90
200	600.00	660.00	730.00	820.00	900.00	1.020.00	1.150.00	1.310.00
202	606.00	666.60	737.30	828.20	909.00	1.030.20	1.161.50	1.323.10
204	612.00	673.20	744.60	836.40	918.00	1.040.40	1.173.00	1.336.20
206	618.00	679.80	751.90	844.60	927.00	1.050.60	1.184.50	1.349.30
208	624.00	686.40	759.20	852.80	936.00	1.060.80	1.196.00	1.362.40

Note: For Hours 1-19, in the result we separate by 2 decimal places.

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	3.00	3.30	3.65	4.10	4.50	5.10	5.75	6.55
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
* 1	003750	004125	004562	005125	005625	006375	007187	008187
2	007500	008250	009125	010250	011250	012750	014375	016375
3	011250	012375	013687	015375	016875	019125	021562	024562
4	015000	016500	018250	020500	022500	025500	028750	032750
5	018750	020625	022812	025625	028125	031875	035937	040937
6	022500	024750	027375	030750	033750	038250	043125	049125
7	026250	028875	031937	035875	039375	044625	050312	057312
8	030000	033000	036500	041000	045000	051000	057500	065500
9	033750	037125	041062	046125	050625	057375	064687	073687
**1	004500	004950	005475	006150	006750	007650	008625	009825
2	009000	009900	010950	012300	013500	015300	017250	019650
3	013500	014850	016425	018450	020250	022950	025875	029475
4	018000	019800	021900	024600	027000	030600	034500	039300
5	022500	024750	023375	030750	033750	038250	043125	049125
6	027000	029700	032850	036900	040500	045900	051750	058950
7	031500	034650	038325	043050	047250	053550	060375	068775
8	036000	039600	043800	049200	054000	061200	069000	078600
9	040500	044550	049275	055350	060750	068850	077625	088425

Note: For Hours 1-9, in the result we separate by 3 decimal places.

* OVERTIME WITH 25 % SUPPLEMENT

** OVERTIME WITH 50 % SUPPLEMENT

II (Continued)

- 128 -

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	3.30	3.65	4.00	4.55	5.15	5.85	6.65	7.50
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
1	00330	00365	00400	00455	00515	00585	00665	00750
2	00660	00730	00800	00910	01030	01170	01330	01500
3	00990	01095	01200	01365	01545	01755	01995	02250
4	01320	01460	01600	01820	02060	02340	02660	03000
5	01650	01825	02000	02275	02575	02925	03325	03750
6	01980	02190	02400	02730	03090	03510	03990	04500
7	02310	025555	02800	03185	03605	04095	04655	05250
8	02640	02920	03200	03640	04120	04680	05320	06000
9	02970	03285	03600	04095	04635	05265	05985	06750
11	03630	04015	04400	05005	05665	06435	07315	08250
12	03960	04380	04800	05460	06180	07020	07980	09000
13	04290	04745	05200	05915	06695	07605	08645	09750
14	04620	05110	05600	06370	07210	08190	09310	10500
15	04950	05475	06000	06825	07725	08775	09975	11250
16	05280	05840	06400	07280	08240	09360	10640	02000
17	05610	06205	06800	07735	08755	09945	11305	12750
18	05940	06570	07200	08190	09270	10530	11970	13500
19	06270	06935	07600	08645	09785	11115	12635	14250
184	607.20	671.60	736.00	837.20	947.60	1,076.40	1,223.60	1,380.00
186	613.80	678.90	744.00	846.30	957.90	1,088.10	1,236.90	1,395.00
188	620.40	686.20	752.00	855.40	968.20	1,099.80	1,250.20	1,410.00
192	633.60	700.80	768.00	873.60	988.80	1,123.20	1,276.80	1,440.00
194	640.20	708.10	776.00	882.70	999.10	1,134.90	1,290.10	1,455.00
196	646.80	715.40	784.00	891.80	1,009.40	1,146.60	1,303.40	1,470.00
198	653.40	722.70	792.00	900.90	1,019.70	1,158.30	1,316.70	1,485.00
200	660.00	730.00	800.00	910.00	1,030.00	1,170.00	1,330.00	1,500.00
202	666.60	737.30	808.00	919.10	1,040.30	1,181.70	1,343.30	1,515.00
204	673.20	744.60	816.00	928.20	1,050.60	1,193.40	1,356.60	1,530.00
206	679.80	751.90	824.00	937.30	1,060.90	1,205.10	1,369.90	1,545.00
208	686.40	759.20	832.00	946.40	1,071.20	1,216.80	1,383.20	1,560.00

On pages I and IV of the supplement tables for the calculation of hourly wages are worked out for workers in temporary occupations which are listed in parts I and II of the "Tariff Qualificating Catalogue of Temporary Occupations".

Note: For Hours 1-19, in the result we separate by 2 decimal places.

III

- 129 -

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	3.30	3.65	4.00	4.55	5.15	5.85	6.65	7.50
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
* 1	004125	004562	005000	005687	006437	007312	008312	009375
2	008250	009125	010000	011375	012875	014625	016625	018750
3	012375	013687	015000	017062	019312	021937	024937	028125
4	016500	018250	020000	022750	025750	029250	033250	037500
5	020625	022812	025000	028437	032187	036562	041562	046875
6	024750	027375	030000	034125	038625	043875	049875	056250
7	028875	031937	035000	039812	045062	051187	058187	065625
8	033000	036500	040000	045500	051500	058500	066500	075000
9	037125	041062	045000	051187	057937	065812	074812	084375
**1	004950	005475	006000	006825	007725	008775	009975	011250
2	009000	010950	012000	013650	015450	017550	019950	022500
3	014850	016425	018000	020475	023175	026325	029925	033750
4	019800	021900	024000	027300	030900	035100	039900	045000
5	024750	027375	030000	034125	038625	043875	049875	056250
6	029700	032850	036000	040950	046350	052650	059850	067500
7	034650	038325	042000	047775	054075	061425	069825	078750
8	039600	043800	048000	054600	061800	070200	079800	090000
9	044550	049275	054000	061425	069525	078975	089775	101250

Note: For Hours 1-9, in the result we separate by 3 decimal places.

* OVERTIME WITH 25 % SUPPLEMENT

** OVERTIME WITH 50 % SUPPLEMENT

III (Continued)

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	3.30	3.75	4.25	5.35	6.05	6.85	7.75	8.80
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
1	00330	00375	00425	00535	00605	00685	00775	00880
2	00660	00750	00850	01070	01210	01370	01550	01760
3	00990	01125	01275	01605	01815	02055	02325	02640
4	01320	01500	01700	02140	02420	02740	03100	03520
5	01650	01875	02125	02675	03025	03425	03875	04400
6	01980	02250	02550	03210	03630	04110	04650	05280
7	02310	02625	02975	03745	04235	04795	05425	06160
8	02640	03000	03400	04280	04840	05480	06200	07040
9	02970	03375	03825	04815	05445	06165	06975	07920
11	03630	04125	04675	05885	06655	07535	08525	09680
12	03960	04500	05100	06420	07260	08220	09300	10560
13	04290	04875	05525	06955	07865	08905	10075	11440
14	04620	05250	05950	07490	08470	09590	10850	12320
15	04950	05625	06375	08025	09075	10275	11625	13200
16	05280	06000	06800	08560	09680	10960	12400	14080
17	05610	07225	07225	09095	10285	11645	13175	14960
18	05940	07650	07650	09630	10890	12330	13950	15840
19	06270	08075	08075	10165	11495	13015	14725	16720
181	607.20	690.00	782.00	984.40	1.113.20	1.260.40	1.426.00	1.619.20
186	613.80	697.50	790.00	995.10	1.125.30	1.274.10	1.441.50	1.636.80
188	620.40	705.00	799.00	1.005.80	1.137.40	1.287.80	1.457.00	1.654.00
192	633.60	720.00	816.00	1.027.20	1.161.60	1.315.20	1.488.00	1.689.60
194	640.20	727.50	824.50	1.037.90	1.173.70	1.328.90	1.503.50	1.707.20
196	646.80	735.00	833.00	1.048.60	1.185.80	1.342.60	1.519.00	1.724.80
198	653.40	742.50	841.50	1.059.30	1.197.90	1.356.30	1.534.50	1.742.40
200	660.00	750.00	850.00	1.070.00	1.210.00	1.370.00	1.550.00	1.760.00
202	666.60	757.50	858.50	1.080.70	1.222.10	1.383.70	1.565.50	1.777.60
204	673.20	765.00	867.00	1.091.40	1.234.20	1.397.40	1.581.00	1.795.20
206	679.80	772.50	875.00	1.102.10	1.246.30	1.411.10	1.596.50	1.812.80
208	686.40	780.00	884.00	1.112.80	1.258.40	1.424.80	1.612.00	1.830.40

Note: For Hours 1-19, in the result we separate by 2 decimal places.
The description of the method of calculation of wages according to the printed tables was published in number 2/1960 of this publication.

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	3.30	3.75	4.25	5.35	6.05	6.85	7.75	8.80
Hours	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8
* 1	004125	004687	005312	006687	007562	008562	009687	011000
2	008250	009375	010625	013375	015125	017125	019375	022000
3	012375	014062	015937	020062	022687	025687	029062	033000
4	016500	018750	021250	026750	030250	034250	038750	044000
5	020625	023437	026562	033437	037812	042812	048437	055000
6	024750	028125	031875	040125	045375	051375	058125	066000
7	028875	032812	037187	046812	052937	059937	067812	077000
8	033000	037500	042500	053500	060500	068500	077500	088000
9	037125	042187	047812	060187	068062	077062	087187	099000
**1	004950	005625	006375	008025	009075	010275	011625	013200
2	009900	011250	012750	016050	018150	020550	023250	026400
3	014850	016875	019125	024075	027225	030825	034875	039600
4	019800	022500	025500	032100	036300	041100	046500	052800
5	024750	028125	031875	040125	045375	051375	058125	066000
6	029700	033750	038250	048150	054450	061650	069750	079200
7	034650	039375	044625	056175	063525	071925	081375	092400
8	039600	045000	051000	064200	072600	082200	093000	105600
9	044550	050625	057375	072225	081675	092475	104625	118800

Note: For Hours 1-9, in the result we separate by 3 decimal places.

* OVERTIME WITH 25 % SUPPLEMENT

** OVERTIME WITH 50 % SUPPLEMENT

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THE SUBSTANCE AND IMPORTANCE OF THE WAGE TARIFF

[Following is a translation of an article by Docent
Engr. Jan Prusa in Prace a Mzda (Labor and Wages),
Vol. VIII, No. 3, Prague, March 1960, Pages 125-121.]

(Conclusion)

The Role of the Wage Tariff in Performance Bonuses

Performance bonuses are paid with time wages and compensate piecework wages by making possible the dependence of earnings on the quantity worked (on the number of pieces and the like). It differs from straight piecework wages in that in this percentage of surpassing the performance norm the earnings in time wages with performance bonuses are higher than the earnings in straight time wages, but lower than the earnings in straight piecework wages. When the performance norm however is not completed the earnings are as a rule higher than they would be in straight piecework for the worker is compensated by time wages which are not dependent on the degree of fulfilling the performance norm. Individual kinds of performance bonuses then differ only in their course.

Performance bonuses are used for work for which it is impossible to establish a correct performance norm and it is possible to express only a more or less correct supposition or estimate of the necessary working time, or for work in which changes in working conditions occur often and which were considered in establishing the performance norm. If for such work straight piecework wages were used it would result in either a too high or too low fulfillment of the performance norm and by this in a considerable fluctuation of the earnings, without the work performance of the worker being changed or without it being changed in harmony with the fulfillment of the performance norm. Time wages with performance bonuses should equalize the inaccuracy of the performance norm or the fluctuation of working conditions and in contrast to straight piecework wages should limit the disproportionate increase in earnings in surpassing the performance norm or mitigate the loss of earnings in the non-fulfillment of the performance norm.

In reviewing the applicability of time wages with performance bonuses it is necessary again to proceed from the substance of the wage tariff. We proceed especially from this reality: that the wage tariff is a reward for a unit of time for normal

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work performance; that with this work performance performance norms may be fulfilled in various percentages, if they are established with various accuracy or if work conditions are changed for which the norms were established; that with this work performance, under the remaining circumstances, the earnings of the workers should be on the same level. If we proceed from these viewpoints then we must along with the various accurate performance norms and along with the various stable working conditions admit the various dependence between the percentage of the fulfillment of the performance norm and earnings which are expressed in the percentage of the wage tariff. From this viewpoint under certain conditions it is desirable to use time wages with performance bonuses instead of the straight piecework wages. (If we were to examine the applicability of performance bonuses from another viewpoint we would arrive at incorrect conclusions. For example if we were to judge the given problem only from the point of view of the outer dependence between the percentage of the fulfillment of the performance norm and the earnings, which is expressed in the percentage of the tariff wage, time wages with a performance bonus would seem to us to be unjust in comparison with straight piecework wages).

From the substance of the wage tariff we must proceed to judging which kind of performance bonus is best suited in a concrete case and for concrete working conditions.

The wage tariff is then also in time wages with performance bonuses an index as to what reward is suited for a unit of time of normal work performance and how the dependence between the fulfillment of the performance norm and the earnings should be adjusted in such a way that the degree of work performance will be rewarded by a wage of the same proportion.

The use of performance bonuses has in conjunction with the substance of the wage tariff numerous problems which are beyond the scope of these remarks. Thus for example the numerous kinds of performance bonuses are so construed that under a 100 % fulfillment of the performance norm the worker receives a full time tariff. This does not have to be correct, for performance bonuses are used wherever 100 % fulfillment of the performance norm is reached as a rule with subnormal work performance.

An analogous role as with time wages with performance bonuses is played by the wage tariff in a combination of time and piecework wages in which the worker receives a wage tariff for half of the actual work time and for half of the norm work time (occasionally in another proportion) and which is roughly used in those cases, as time wages with performance bonuses. (In the book by L. Jezek, "Mixed Wages. The Form of Wages for Unaccounted For Performance Norms" (Svepomoc, Prague, 1959) the author called combined time and piecework wages "mixed wages").

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The Role of the Wage Tariff in Other Kinds of Bonuses

If we proceed logically from the substance of the wage tariff as a reward for a unit of time for normal work performance, then the amount of the wage tariff must be for all kinds of bonuses (that is not only for performance bonuses and for other bonuses for quantitative results of work, but also for bonuses for qualitative results of work by the decisive index for establishing the rate of the bonus and the course of the bonus). (The rate of the bonus is the quantity which sets the amount of the bonus for a unit of bonus results of work. The course of the bonus is the dependence which fixes the amount of the bonus (bonus rate) for various (scaled bonus results of work and by this the method of increasing the bonus).

It is always necessary to fix the rate and course of any kind of a bonus in such a way that the relation of the total earnings of the worker to his wage tariff corresponds to the relation of the actual work performance of the worker to the normal work performance and so that for the same degree of work performance the workers would receive, under the same remaining circumstances, the same total wage.

Bonuses (except performance bonuses) are of course not dependent on the indexes which would directly accurately represent the work performance of workers receiving a bonus. On the contrary numerous kinds of bonuses are dependent on indexes which lead to the idea that it is impossible to look for their connection with the work performance, that this is not expedient, or finally that this is not possible. For this reason it is necessary to look in individual kinds of bonuses for methods as to how to transfer a certain degree of bonused results of work to the degree of work performance which corresponds to this. In other words, it is necessary to determine what degree of work performance (in comparison with normal work performance) is necessary to attain the various degrees of bonused results of work and according to this and with regard to the substance of the wage tariff then to fix the rate and course of the bonus. [See Note.]

([Note] Another question is in what manner should the bonus rate be expressed, whether in the percentages of the wage tariff, in the percentages of the attained effect, for example in percentages of attained savings or directly in Kcs. The manner of expressing the bonus rate is controlled by what is most practical in a concrete case and most clear for bonused workers. In every case the amount of the bonus rate must however be calculated with regard to the principles which were expressed above.

For example according to these principles a bonus rate of 20 % of the hourly wage tariff for 1 decagram of material which was saved at the average for one hour against the norm of use is correct (under the supposition that to achieve these savings it would be necessary to increase the work performance, in the sense of the outlay of physical or nervous energy, at the average for one hour

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at 20 % against the normal work performance). If the wage tariff is 6 Kcs for an hour and the price of 1 decagram of material is 12 Kcs, the bonus rate, expressed in Kcs, for a unit of bonused results of work is $\frac{6}{100} \times 20 = 1.20$ Kcs for 1 decagram of saved material and the bonus rate, expressed in the percentages of achieved savings is $\frac{1.20}{12} \times 100 = 10$ % of the price of achieved savings).

It is also necessary to reckon with this that in some cases the already achieved norms of the bonus index (for example keeping the norm of the supply of material, fulfilling the production plan, and the like) requires an increase in work performance over the normal level and that then it will pay bonuses for maintaining the norm of the bonus index.

To determine the relation between the degree of bonused results of work and the degree of work performance is not simple and it is indisputably more difficult than for example in piecework wages. A uniform standard of work performance common to all kinds of bonuses as the percentage of fulfillment of performance norms is in piecework wages, does not exist.

It is impossible even to say that the improvement of bonused results of work, expressed in the ratio of achieved results of work to the norm of the bonus index, is in every case identical with an increase in work performance (for example we cannot say in every case that it is necessary to achieve a better use of raw materials by 20 % by an increase in work performance by 20 % and the like). It is necessary first to solve these problems and their complexity can not be the reason for not looking into the substance of the wage tariff while establishing the rate and course of the bonus. [See Note.]

([Note] The complexity of these questions issues from the fact that bonusing as the sole method of rewarding work does not actually exist, but every kind of bonus (different from other kinds by the bonusing index) is a separate method of rewarding work with certain characteristics and differences. Thus for example in bonuses for savings of rare material in which the national economy has a special interest, a higher bonus for bonused workers may be fixed as an exception even when they achieved savings with the same work effort as did workers who saved a less significant material. Basically however the wage tariff should be an index for fixing the rate and course of the bonuses in such a way that under all the other circumstances the amount of the bonus would be in such a ratio to the wage tariff as is the actual performance of the bonused workers to a normal work performance and so that the workers would achieve during the same work performance the same earnings).

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The Role of the Wage Tariff in Rewarding Strenuous Work
and Work Under Difficult Work Conditions

According to this if the ordinary performance of work is combined with lesser or greater physical or nervous effort we differentiate between less or more strenuous work. Sometimes in this sense it is spoken of as light or heavy work. Besides simple and complex work there is then also light and heavy work. With this exertion is not as a rule a qualifying standpoint so that simple work can be light and heavy and also complex work can be lighter and heavier. (Sometimes however exertion can be an inseparable part of qualifying demands which are placed on the worker in doing certain work).

If we wish to clarify the role of the wage tariff in rewarding strenuous work and we proceed in this from the substance of the wage tariff as a reward for a unit of time of normal work performance, we must first make clear how the concept of normal work performance (that is, a normal using-up of physical and nervous energy) compares with physical and mental exertion of work.

From a completely theoretical standpoint light and heavy work should not exist at all with respect to the social average work performance, only normally strenuous work could exist. Taken theoretically all work could be done in such a way that in doing it the workers would expend for a unit of time the same quantity of muscular or nervous energy and would tire themselves in the same way.

Among workers there are individuals with various physical and mental abilities. The more efficient individuals can do certain work faster than those who are less efficient, and they do this by expending more muscular or nervous energy for the same unit of time than the less efficient workers could expend. Socialist society must in the meantime make use of these possibilities, that certain individuals are capable of working with a higher or average work performance. There is still enough work which must be done during a certain time interval without regard whether a higher than the social average work performance is necessary for this.

As far as the normal work performance is concerned we can look at it for strenuous work from two different viewpoints. Either in respect to an average work performance of a certain group of physically or mentally more efficient workers or in respect to the socially average work performance. If we express a normal work performance by the time which is undeniably necessary to carry out certain work, then we consider normal work performance from the first viewpoint given by us.

For example when we fix the performance norm for the digging of clay by hand, we verify it as an average from the time that was fixed, it is true, for many laborers, but not for any laborers but only for diggers. And if in measuring time we exclude extreme cases

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(exceptionally physically efficient laborers), still only workers, we make the measurement for them by imagining them as a group of more efficient workers than are for example women cleaning up offices. If then the diggers fulfill the performance norm by 100 % then from their viewpoint this is a normal work performance. However from the viewpoint of the social average work performance the question is one of a higher than normal work performance. From the viewpoint of the social average a digger in fulfilling a 100 % performance norm does a larger amount of work than an office cleaning woman does in a 100 % fulfillment of the performance norm.

If we proceed from the cited realities and from the substance of the wage tariff as a reward for a unit of time for a normal work performance (normal from the viewpoint of the social average), we come to the conclusion that for strenuous work higher wage tariffs must be established than for work of the same qualification but with lesser physical or mental exertion.

It is necessary to distinguish from strenuous work work which is done under difficult working conditions (for example work in high or low temperatures, in exceptionally dirty conditions, in exceptional noise, with a danger of becoming ill or injured, and the like). Difficult work conditions as a rule demand a higher physical or mental exertion of work. In such a case the role of the wage tariff in rewarding work under difficult work conditions holds good in the same way as what is paid for strenuous work. Sometimes difficult work conditions do not demand immediate exertion, immediate use of the working strength, but gradual use of the working strength or they represent the risk of sudden considerable use of the working strength. In these cases also the question is actually of a higher work performance in respect to that work performance with which the worker should work so that it would not result in a gradual use of his working strength or in the above-mentioned risk. For this reason in these cases also it is necessary to use a higher wage tariff. [See Note.]

([Note] In practice sometimes for work under difficult work conditions no higher wage tariffs are used but supplements to the normal wage tariffs. This however is not in conflict with our comments since a normal wage tariff with supplements for difficult work fills the function of the higher wage tariff. Use of supplements instead of special higher wage tariffs is made only from the practical viewpoint (supplements are used especially where there is a question of isolated difficult work and where it would not be expedient to designate special degrees of higher wage tariffs).)

The correct tariff rewarding for strenuous work and work done under difficult work conditions is especially important in places of work on which depends the fulfillment of production plans of the majority of branches of the national economy (in the so-called key places of work) and where all the conditions for the successful drawing of permanent work forces must be met.

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It is expedient to clarify the role of the wage tariff in rewarding strenuous work and work under difficult conditions. At the same time it is necessary to be mindful of the fact that more important than the proper solution of the question of rewarding this work is the decrease or complete removal of the strenuousness of work and the difficulty, harmfulness and danger of the work environment by pertinent organizational and technical provisions.

The Wage Tariff, Normal Work Performance and Earnings

If the wage tariff as a reward for a unit of time of normal work performance is to have a decisive role in the rewarding of the work of laborers and if its share in the average total earnings is to be basically increased, then logically the significance of the normal work performance must increase and the normal work performance must have a decisive importance in the average work performance of the collective of workers (shops, enterprises, and the like).

The significance and the predominant share of the normal work performance of course does not mean that the working strength of the workers should be equalized and that the initiative of the workers doing the normal work performance should be restricted. This question should be discussed in more detail.

The results of work are basically two kinds: 1. periodic, which are repeated in regular periods, as a rule every day or shift; 2. unrepeatd, which occur irregularly, exceptionally, as a rule during a longer period.

Periodic results of work should be predominantly the result of normal work performance. In the socialist economy the permanent, daily overstraining of the physical or mental strength of the working person over the normal level is not desirable. In socialism neither is sub-normal work performance which is apparent in tardiness in coming to work, in leaving work before time, in idleness during the work period, in disorder in the place of work, in short, in incomplete use of the lawful work period, is also not desirable. The development of technique (automatization, machine processes and the like) is directed toward the stabilization of the work performance to a normal level. The smaller the extent of hand and machine hand work, the smaller will be the fluctuation of the actual work performance around the normal work performance.

For periodic results of work, the workers are compensated by various forms of wages. In this the basis of every form of wages is the wage tariff as compensation for a unit of time for normal work performance.

Unrepeatd, exceptional, distinguishing results of work (for example inventions, discoveries, improvement suggestions, and the like) are different in this that once and for all, without

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the necessity of further repetition of the work performance, a higher level of certain indexes is reached (for example a permanent increase in the productivity of work, permanent decrease in the use of material, etc.). They are not as a rule the result of an unrepeated above normal work effort. They are more the result of the creative initiative, work enthusiasm, socialist awareness and similar characteristics, which develop in the socialist production relations and their permanent, daily implementation is revealed for a certain period in unrepeated, exceptional, distinguished results of work. Practical experience shows that it is necessary to create the best conditions for achieving unrepeated, exceptional, distinguished results of work in such a way that the daily periodic work performance of the workers is permanently kept at a stable, non-fluctuating, rhythmic normal level.

Unrepeated, exceptional, distinguished results of work are compensated by unrepeated, exceptional compensation of various kinds (for example reward for improvement suggestions, rewards for distinguished meritorious work, and the like). It is impossible to infer from the amount of the wage tariff as a reward for a unit of time for normal work performance, for it is impossible to make symmetrical even the unrepeated, exceptional, distinguished results of work with normal work performance. The index for establishing the reward is as a rule the effect which was achieved by the unrepeated results of work.

Further conclusions may be drawn from the preceding comments which concern the level and development of total earnings of laborers.

If the periodic work performance is to be continually stabilized on a normal level, the periodic total earnings of laborers should be kept on a permanent non-fluctuating level which corresponds roughly to the level of the wage tariff. (This, of course, does not mean the equalization of earnings, for wage tariffs are increased by degrees according to qualifications, in some cases according to the strenuousness, difficulty and the social significance of the work. In contrast this development will remove wage equalization wherever by the various fluctuation of earnings (for example as a result of the fulfillment of performance norms) the earnings of less qualified workers were adjusted to the level of the earnings of more qualified workers). The form of wages, especially bonuses, should be continually more oriented toward compensation for achieving and maintaining a certain level of the index, for example, bonuses for maintaining the progressive norm of the use of material.

In such a development it will also be possible to plan more simply and accurately the performance and wages of laborers.

In addition to the periodic work earnings established around the level of the wage tariff there will be however the possibility to achieve exceptional rewards on the basis of unrepeated, exceptional, distinguished results of work. Maintaining the periodic

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work performance on a normal level will not remove the possibility of increasing the work income, on the contrary it will create more favorable conditions for achieving unrepeated, exceptional, distinguished results of work without overexerting the physical and mental strength, and thereby for achieving exceptional rewards. (In addition to this it is necessary to reckon with an increase in periodic work earnings especially with a transfer to more qualified work and with a periodic increase of the wage tariffs in conjunction with the development of national economy and with the growth of the planned total nominal wage.)

The provisions, according to which the reconstruction of the wage systems of labor in our economy is conducted, create conditions for such a solution of wage questions which are outlined in this concluding paragraph. [See Note.]

([Note] Thus for example the decision of the state wage commission of October 2, 1958, Number 60, "On Provisions for the Improvement of Work Norms" the basic principle for the revision of performance norms was established according to which during every change of technical and organizational conditions for which the norm was established the performance norm must also be immediately changed at the same time in such a way that it will be in harmony with the new technical and organizational conditions. This basic principle holds good without regard to this, whether the change in the technical and organizational conditions was arrived at by provisions of the management of the enterprise or from the initiative of the worker (for the initiative which led to changes in the technical and organizational conditions and thereby to an increase in the productivity of work, the worker is however rewarded by an unrepeated, exceptional reward). From this it follows that the periodic earnings should fluctuate in a normal work performance (a permanent beyond measure increase in the work performance over the normal level is not desirous) around the level of the wage tariff, that however one must reckon with the initiative of the workers during an unrepeated increase in the productivity of work and with exceptional rewards for such initiative.)

It is however necessary to help in this solution in wage practice and to remove the hindrances which beset it. One of the ways is the proper understanding and consistent practical implementation of the substance and role of the wage tariff.

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TOWARD FURTHER IMPROVEMENT OF WORKINGMEN'S BONUSES

[Following is a translation of an article by
Frantisek Both in Prace a Mzda (Labor and Wages),
Vol. VIII, No. 4, Prague, April 1960, Pages 150-157.]

The revision of the wage organization of labor in industry is already coming to an end. Compensation for work in our socialist industry is thereby being placed on a new qualitatively higher foundation. Serious difficulties and deficiencies arising from the fact that the former wage systems became obsolete with the development of production strength and the increase of the cultural and technical level of workers, were able to be removed during the course of this politically and economically significant action with the active assistance of the workers, technicians and others working in the factories.

Now however the question is for all economic workers and trade union functionaries to be during the present time mindful that we must pay special attention still for another reason to perfecting the new wage systems and performance norms.

Even though the main principles of the new wage systems of labor were complied with in all the branches in every enterprise or plant there were some problems left unsolved to a smaller or larger extent. This holds good above all in the creation and implementation of the technically motivated performance norms where in some plants more than half of the set tasks were left incompletd.

Even more clearly however bonus payments to workers in time and piecework wages come to the forefront from this standpoint. This issues above all from the great significance which the payment of bonuses has in the present conditions of our production. Today it is impossible to speak of bonuses as of some less valuable form of material incentive of workers, as was true in the past. It is also impossible however to deny that it is really in the area of bonus payments that many deficiencies remained even after the implementation of the revision of the wage systems of labor, which we must gradually solve and remove.

In socialist industry only those bonuses have a permanent justification which are effective instruments in bringing about the material interest of the workers in increasing the productivity of work, in increasing the quality, implementation and surpassing the indexes of the plan, or in the economy of production.

We followed these aims also in the new wage systems during the considerable increase in time wages with a bonus. We shall give up the use of piecework wages in many jobs. During the period

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of preparation for the revision the question was mainly one of cases where piecework wages had an extremely fictional character. There are still other jobs in which it is still not completely clear which wage form will be the most correct. In addition now it is evident that with the progressive mechanization, automatization and chemicalization of production it will be necessary to examine the competency of piecework wages. In cases where piecework wages prove to be non-incentive it will be necessary to replace them with time wages with a bonus. For this reason it will be useful if we again remind ourselves under what suppositions the use of straight piecework wages is justified and where it is desirous especially in work directly in production to use time wages with a bonus.

It is expedient to implement straight piecework wages only in such work where the laborer can with his output affect the quantity of the work accomplished. Piecework wages are therefore not suitable for example in servicing power engineering installations in the large majority of operations in chemical production and in all other places of work where the output of the workers is designated by the running of machinery or the production equipment.

It is possible to further implement piecework wages only in duplicated work where the method of work is known and set beforehand because it is only in such work that it is also possible to fix the technically motivated performance norms. Piecework wages can not also fulfill its incentive function if the suppositions are not created for the perfect control of the quality and quantity of work and if the regular flow of material, raw materials and working aids is not guaranteed. At the same time piecework wages can not be introduced wherever by its implementation the security or health of the workers would be threatened.

The Task of the Bonus in the Improvement of Economic Results

It is not enough however to know only these principles for the replacement of piecework wages with time wages with a bonus. We know in practice that straight time wages do not encourage the achievement of better results. It becomes an instrument of material interest only in conjunction with the economically effective bonuses. The unsuitable or incorrect implementation of bonuses to time wages can however be equally bad as fictional piecework wages. For this reason the correct implementation of bonuses is a very excellent and responsible task.

A great advantage of the bonus with time wages as with bonuses in general is that they can be paid not only for the fulfillment of and surpassing of the quantitative indexes but for the improvement of the quality of production and for the decrease in the actual costs, therefore for the fulfillment of qualitative indexes. If needs be it is possible to tie in the payment of bonuses with the

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uniform fulfillment of production plans, for shortening the period for the completion of certain production or reconstruction or various equipment for the increase and use of new techniques and the like.

In these many sided possibilities of the implementation of bonuses rests one of the chief advantages for which already in some branches bonuses with piecework wages were implemented and in the new wage systems were basically increased. Namely in straight piecework wages the greatest danger arises that the effort of the workers to achieve the highest production will lead to a worsening of the quality of production, to waste of material, to uneconomical handling of machinery, equipment and the like. Socialist society however has an interest in this that the workers will be materially interested in the improvement of these qualitative indexes of production. We of course know that not only the quantity of production but its quality is decisive in increasing the national income and by this in the increase of the material and cultural level of the workers.

The wide possibilities of the use of bonuses at the same time however place great demands on economic workers and trade union functionaries in creating technical and organizational suppositions for their correct implementation. This issues also from the considerable decentralization of the jurisdiction and responsibility which was rightfully given to the economic and trade union organizations in the enterprises and plants in the area of bonuses.

These are all reasons for which in our entire industry, in all enterprises and plants, the task is outlined to further follow and improve the ranks of workers paid bonuses in plants and everyday practice in implementing them.

The Problem of Bonuses During the Period of the
Revision of Wages

By the introduction of the long term norms for personal material incentive and chiefly by the increase of the wage tariffs in the revision of the wage systems of labor favorable suppositions were created for an increase in the significance and economic effectiveness of bonuses.

In the decision of the government, number 400 of May 1958, it was emphasized that in the new wage systems only such premiums are to be used which are economically motivated and that in piecework wages it is necessary more than before to use bonuses for the fulfillment of the qualitative indexes. At the same time the government decided that wherever the qualitative (economic) indexes are economically more important than the index of piecework wages then it is better to use time wages with a bonus.

In harmony with these principles, in 1958, the chief industrial ministry issued as a supplement to the provision for the revision of the wage systems of labor the basic direction for the payment of bonuses to workers and 63 typical bonus classes. According

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to the above-mentioned decision of the government the directors of the enterprise were then empowered on the basis of these typical bonus classes to issue in agreement with the trade union organizations concrete competitive bonus classes according to the needs of production and according to the possibilities given by the wage fund.

The first experiences in selected plants have already shown that the implementation of the economically effective bonuses will not only be an excellent technical question as far as wages are concerned, but it will also require responsible political preparation. The educational and indoctrination work of the trade union and economic organizations and functionaries however was not without deficiencies in the question of bonuses. At first it was too general because in many plants the competitive bonus classes were not worked out in time and therefore it was not even possible to talk concretely with the workers regarding the conditions under which the bonuses will be implemented for them. In some plants however neither the economists, technicians and masters had enough experience and knowledge in how to choose the most suitable indexes and conditions for bonus payments and what suppositions in production it is necessary to create so that the bonuses will be correct and encouraging. Therefore it would be harmful to presume in the area of bonuses that everything is already in order in the new wage systems. The problems which so far have appeared in this area are understandably different according to what category of workers paid a bonus is in question. From this standpoint it is possible basically to divide the worker's bonuses into four groups to which we will pay attention in the following statements.

Bonuses for production workers working with time wages are significant for this reason that in numerous cases they replace straight piecework wages. Even when the removal of fictitious piecework wages occurred to the greatest extent among administrative workers in adjoining and auxiliary operations after the revision in harmony with the line given by the government decision the number of operational workers compensated with time wages with a bonus was basically increased.

Good experiences were gained with this form of wages in the past in those enterprises and plants where the workers service power units and other production equipment.

It was basically a more difficult situation with those production workers, although they could with their output affect the quantity of production, it is however impossible to fix technically motivated performance norms or working them out is very difficult. This is true especially in piece and lot production in engineering and in some work in the wood industry, local agriculture, production cooperatives and the like.

It has been proven that the transfer to time wages is in these cases as a rule desirable. Wherever it was not possible to fix for these jobs technically motivated performance norms keeping the

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individual piecework wages led to carrying over the repeated deficiencies to the new wage systems and with this to a decline in the incentiviveness of piecework wages.

During the transfer from piecework wages to time wages with a bonus for production workers however the question is not that with the introduction of the new wage systems the productivity of work would not decline. The bonus must be construed in such a way that it would be for the workers an adequate material incentive for the further planned increase in the productivity of work.

Experience shows that this demand can be guaranteed. Because the basic index of bonus payments for this work is as a rule the fulfillment of the planned volume of production of the workshops or centers, it is in the first place necessary that in the plant the operationally technical planning is in a good situation. For this it is necessary even after the removal of piecework wages to know the time needed for this production; it is then necessary to continue to fix norms for this work. However some economic workers and trade union functionaries still do not understand this. Setting norms for this work is however necessary in the interest of perfecting the operationally technical planning and thereby even for the responsible establishment of suppositions for bonus payments.

Experience further shows that even after the transfer to time wages it is necessary among production workers to plan the necessary increase in the productivity of work and to guarantee its completion with the active help of the workers by means of the necessary technical and organizational provisions. Still it is impossible to depend on this that the very form of compensation will remove the deficiencies in the technology, organization of work and direction of production which checks the increase of the productivity of work.

It is equally important to tie in the volume indexes of bonus payments with the completion of the appropriate qualitative indexes, as is for example, the maintenance or decrease of the norm of the use of tools, percentage of waste and the like. It is also necessary to introduce order into the operational list and to guarantee the proper division of the collective bonus.

Today there are enough examples proving that in the creation of the necessary suppositions in production work where it is difficult to establish technically motivated performance norms, time wages with a bonus perform their economic function better than piecework wages. In the Smeralov Plants in Brno where nearly 70 % of the workers work under time wages, in machine assembly bonuses were introduced for maintaining the norm of worked time. This form of bonus payment proved to be good in practice. The completion of the plan of the production of commodities is now guaranteed always before the end of the month and in the assembly of machinery haste during

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the last days of the month disappeared completely. After the introduction of time wages with a bonus it was possible to shorten the progressive time of assembly for some machinery by 25 %

Good experiences were gained with time wages with a bonus also in the tool shops. Interest in completion of sets of tools was increased and the formerly frequent phenomenon of the workers picking out the so-called best jobs while no one wanted to do the rest of the work disappeared in the meantime.

Altogether it is possible to say the compensation of production workers with time wages with a premium is fully justified in operations where the performance of the workers is designated by the motion of the production equipment, also in those plants with piece and small lot production where it is impossible to establish technically motivated performance norms. It is necessary to systematically evaluate and improve bonus payments of production workers working under time wages. In doing this it is especially necessary:

- a) to tie in the payments of bonuses for completion of the index and suppositions guaranteeing the planned increase in the productivity of work and increase in the volume of production in the required storing of sets;
- b) to continue setting norms for these jobs, never however with the aim of establishing performance norms for individual jobs and production operations, but in the interest of an objective determination of the need of time for the entire volume of production, for the completion of which a bonus will be paid, because it is possible to use even less workable methods of setting a norm for work, more than is necessary for compensating with straight piecework wages;
- c) to systematically think over and generally to improve the system of the operationally technical planning;
- d) even after the transfer to time wages to plan in those places of work the necessary increase in the productivity of work and with the active cooperation of workers to guarantee its completion by technical and organizational provisions;
- e) to tie in appropriately the volume indexes of bonus payments with the completion of some qualitative index, the completion of which the workers can affect as for example in maintaining or decreasing the norm of the use of tools, percentage of waste and the like;
- f) to extend and improve the operational list.

In the new wage systems of labor workers working under piecework wages comprise a comparatively extensive group being given bonus payments. Not even here is the situation equal in all branches. Positive experience was gained with bonuses with piecework wages already in past years in plants of the ministry of fuel, iron works and ore mines and the consumer industry. This experience could be used to further qualified bonuses during the implementation of the revision. In those branches the workers themselves contributed with their experiences because they already knew this type of bonus payment and had confidence in it.

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A more difficult situation with the introduction of bonuses with piecework wages occurred in those branches where so far there was no experience with this type of bonus. For this reason for example in mechanical engineering in the beginning a considerable number of economic workers and trade union functionaries considered these bonuses only as an instrument for adjusting the difference between the now piecework earnings and the formerly acquired wages of the worker. The term "supplementary bonus" originally used in typical bonus classes of both engineering ministries contributed to this. (Now the term used for this bonus in engineering is "collective bonus with piecework wages." Even this term does not convey adequately what is important in this type of bonus: To achieve the fact that workers would be materially interested not only in the increase of their individual performance, but in the uniform fulfillment of the plan of the entire workshop or center in the required quality and assortment, in any case in additional, especially qualitative indexes).

In some plants it was necessary in the beginning to overcome a definite distrust of the workers in these bonuses. Good experiences with this type of bonus payments contributed to the removal of this distrust in the majority of selected plants which as the first testing grounds certified the new wage systems.

Present experiences fully confirm the expediency and significance of bonus payments to workers working under piecework wages. The most valuable is this that workers now have an increased interest in fulfilling the plan of their workshop or center, in any event in the completion of additional indexes. In connection with the introduction of these bonuses in the majority of the plants the level of production conferences increased. During these the workers discuss the reasons for faulty flow of material and other types of idle time and they demand that the technicians and masters make better preparations for production and better organize the work.

It proved to be good to tie in the payment of these bonuses to the appropriate qualitative index, for example in maintaining, in any event, in lowering the limit of waste. For example in the national enterprise Tesla Pardubice, before the introduction of the new wage systems, waste amounted to 0.7 % from the costs in raw production; after the introduction of the new system and bonuses tied in with the decrease of waste, in the first three months waste declined on an average of one fourth of the original state. In the national enterprise Meopta waste declined during the course of four months from 4.94 % to 1.49 %. In the food industry after the introduction of bonuses with piecework wages the variety of production improved to which the bonus together with the fulfillment of the norm to 100 % are tied in, basically improved.

With all these additional appropriate examples it is impossible however to deny that in the majority of branches we have in these very bonuses the greatest deficiencies. Above all the efforts to

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use these premiums for leveling the formerly received earnings are not completely surmounted. In such cases bonuses are not scaled according to what degree one or the other worker merited them but often entirely the opposite way. It is understandable that such a method can "alleviate" the situation temporarily for economic workers and trade union functionaries only until the first payment according to the new wage system. Then those workers, who, for example, received only 3 percent bonus will begin to question why another worker who does not contribute any more to achieving the collective bonus receives for example 20 % bonus. It is necessary in every plant to correct as soon as possible such an incorrect method with the participation of all the workers in the place of work because otherwise the bonus could not fulfill its incentive function.

It is a serious mistake that in some plants the workers are given bonuses according to the fulfillment of the indexes of the plan for the entire enterprise or plant. A bonus established in this way cannot encourage the workers to achieve better results because they do not see the immediate dependence between their effort and the compensation.

Trade union organizations also cannot be satisfied with this that in some plants bonuses with piecework wages have not been established before and the economic workers reckon with this that they will regulate them according to how the performance norms will be fulfilled and according to the amounts in the wage funds. For these same reasons also in some plants they are making an attempt for the masters to divide up to 50 % bonuses according to their own considerations.

Similar attempts are incorrect and weaken the economic effectiveness of bonuses with piecework wages. With a review of the possibilities of fulfillment of the bonus indexes and the suppositions and the means which are at disposition in wage funds, it is necessary to fix the amount and course of the bonus in advance and to properly acquaint the workers with them. It is also impossible to tolerate, as it happened in the trial certification of the new wage systems in the national enterprise Kablo-Hostivar, that after complying with all the conditions and indexes a reduction from the bonus was made for the workers because in some other section there was poor management with the wage fund.

Generally it is impossible to say that many economic workers do not evaluate these realities, that a bonus with piecework wages will make it possible for earnings to be increased according to plan without mollifying the performance norms. Only in some plants is such an establishment of these bonuses in the same way as bonuses with time wages combined with the schedule of norm relations between the increase in productivity of work and the increase in wages.

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The greatest differences both in the typical bonus classes and especially directly in the competitive bonus classes are in bonus payments to workers working in auxiliary and supervisory operations. This stems from the heterogeneity of auxiliary operations, workshops and occupations, the given different character of production and its organization. Because it is a question of work for which almost generally time wages with a bonus is the most suitable form of compensation in plants where they have in this respect many years of experience, this type of bonus is on a good level. More problems appear wherever before the revision of the wage system they used in these places of work fictitious piecework wages.

In the bonus classes for auxiliary and supervisory workers markedly formal indexes are still used which it is not possible to responsibly eliminate and control. It is true that to use some suitable indexes often brings about considerable difficulties. For example measuring equipment is lacking by which it would be possible to determine the fulfillment of the selected index, consumption norms and the like are not worked out. If the quality of bonuses is to improve then it is necessary to try to remove all these deficiencies. In case that it is impossible to use concrete and controlling indexes it is more correct to replace such a formal bonus with performance supplements. Unfortunately so far even these typical bonus classes lead an enterprise to similar formal methods of bonus payments. Thus for example in the typical bonus class of the ministry of power and water these indexes have been established for workers of the depots:

a) timely, complete and prompt release of materials for the place of work;

b) careful tending of the depot materials and the correct preparation of documentation.

In this half of the bonus is designated for fulfillment of the plan which however is not an index but a condition for payment of this part of the bonus. Another condition is keeping order and cleanliness in the depots. It is certainly evident that in judging the claims for similar bonuses the subjective opinion of the master or the director of the operation will predominate because it is impossible to reliably eliminate or control the fulfillment of these indexes and conditions for the bonus.

A deficiency also is this that in the supervisory and auxiliary places of work so far the setting of norms for numerous classes of supervisory workers, as for example, setters, maintenance men, issuers of tools and material, shipping workers and the like, is neglected. Neither economic workers or trade union functionaries so far in all plants are not aware of the great reserves of increase on productivity of work hidden in those very places of work. In this without analysis and improvement of the technology and organization of work and without establishing correct norms for the considerable numbers of auxiliary and supervisory workers it is impossible to expect that the bonuses will act as an incentive factor.

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Also for these bonuses the principle holds good that it is necessary to suitably supplement the indexes of the character of performance by the conditional indexes of economy and vice versa.

Until now we talked only about the quantitative and mixed bonuses which are paid exclusively from the basic wage fund. However it is possible to also pay the workers economy bonuses from the bonus fund. In the meantime however these possibilities to interest the workers to economize in materials, raw materials, tools and the like in industrial plants, are insufficiently used, although there remain in the bonus funds considerable unused amounts. Proof of this is the fact that average costs of the bonuses and exceptional rewards paid from the bonus funds, in individual branches fluctuate from 7 to 17 Kcs for one worker for the entire year of 1959.

Some economists cite as a reason that qualitative indexes are used proportionately on a large scale for bonuses paid from the basic wage fund. This reason however is not convincing if we consider the great possibilities we have for example in bonus payments to workers for savings in materials on the basis of personal records of savings. It will only be necessary to revive again this tested form of socialist competition in our plants and to spread systematically the support of effective bonuses.

All the Provisions Should Be Made With the Cooperation
of the Trade Union Organization

As is evident even after the introduction of the new wage systems in the area of bonus payments to workers a great deal of work awaits us. It is necessary to achieve this, that the management of the plants together with the plant committee, shop committees and their wage commissions regularly evaluate the results which bring bonus payments to the workers and to remove any deficiencies noted. As in piecework wages so also it is true in bonus payments that they can act as an incentive only if the technicians and masters will create for the workers paid bonuses the necessary suppositions in production for facile and accomplished work.

The workers themselves can best tell where there are deficiencies. For this reason it is necessary to discuss the situation of bonus payments with the workers at meetings of the trade union sections and to consult with them in production conferences, to sift the solving of their complaints and reminders. It is necessary to pay particular attention to the division of collective bonuses. This will be orderly wherever the division of bonuses will be under the constant control of the trade union organization with the active participation of the workers.

However it is necessary to mention that higher economic and trade union organizations must contribute to the improvements in bonus payments. Experience has uncovered a series of deficiencies in typical bonus classes which it will be necessary to remove in

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accordance with the acquired experience. It is also impossible to overlook that in the directives for bonus payments and in the typical bonus classes of individual ministries there are considerable differences in some of the regulations which should be coordinated. One of the questions is for example in the principle as to when it is possible to give premiums only after the completion of the established bonus suppositions and when it is possible to also give premiums for surpassing them. There are for example unjustified differences also in the method of making reductions and bonuses when the established indexes and suppositions are not completed. The total significance of bonuses in the new wage systems and the necessity of improving them systematically brings forth more constantly the need of evaluating and making general all the present experiences in the field of bonus payments.

It is however impossible in any plant to delay with the removal of the existing deficiencies and with the increase in the incentive for bonuses. It will continue to be critical how far we will succeed in getting the workers to whom bonus payments refer to join in this work. During the period of preparation and introduction of the revision of the wage systems of labor we achieved basic successes in the education of the workers and in getting them to cooperate directly in the solution of wage questions. The clear line of the further increase of nominal and real wages of the workers, which the central committee of the Communist Party of Czechoslovakia inaugurated, contributed to this to a great extent. The revision of the wage systems of labor actually contributed to the further increase in the productivity of work and its earnings. There is no argument that with their help and experience it will be possible for us in a short time to guarantee that payments of bonuses to workers will be in full harmony with the socialist principle of compensating according to work, that it will effectively unite the interest of the individuals in increasing their earnings with the interest of the company for the increase in the productivity of work and the effectiveness of production.

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EXPERIENCE WITH THE UTILIZATION OF NORMS FOR MATERIAL
INCENTIVE IN THE NEW ORGANIZATION OF THE WAGES OF LABOR

[Following is a translation of an article by Miroslav Frank in Prace a Mzda (Labor and Wages), Vol. VIII, No. 4, Prague, April 1960, Pages 163-166.]

During the present period many discussions are being held among the workers in our plants regarding the new organization of the wages of workers. Results from the plants which responsibly prepared and introduced the new system show that by their correct implementation the economic results of the plant will improve. The experiences of the three largest engineering plants in the Brno kraj confirm this.

Thus in the Ball Bearing Plant in Lisne the new wage system has been in effect since January 3, 1959. In this plant they planned the average earnings of 6.70 Kcs per hour, in November they already reached 6.81 Kcs per hour while fulfilling the productivity of work by 104.9 %.

In the Klement Gottwald Plants, First Brno, the new wage system has been introduced since January 10, 1959 and the average earnings in October amounted to 7.54 Kcs, in November already 7.60 Kcs per hour while fulfilling the productivity of work by 104.5 %.

The situation is analogous in the Jan Sverma Plants where the new wage system has been introduced since January 3, 1959. Against the planned earnings of 6.72 Kcs per hour in November 1959 the actual average earnings of 6.89 Kcs per hour were achieved while the productivity of work was fulfilled by 105.6 %. The situation is the same in many other plants.

The correct implementation of the new wage system shows its advantages over the old wage system according to its merits.

Much has already been written about the principles of the new wage system. Articles have discussed the good results and the deficiencies connected with the introduction of the new wage system. The aim of these articles was to help those plants and organizations who are preparing to introduce the new wage system.

In the Brno region many plants have already introduced the new wage system with great success, and it is possible to say that they have acquired rich experiences with this introduction. In spite of this there are however still many very serious deficiencies.

The weakest point continues to be the setting of the technical norms of work, establishing the new technically motivated performance norms and ensuring their proper fulfillment. Many economic

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workers continue to see in the setting up of norms a means for establishing higher compensation and the bypassing of the actual mission of setting up technical norms for work, -- it being the means for the implementation of the most progressive technique and technology. For this reason many are faced with the problem of "establishing" the fulfillment of norms. This problem exists only for those economic workers who imagine that as in the past so in the future the increase of average earnings will be solved as in the past by an increase in the fulfillment of norms.

Those economic workers have still not understood the significance of the implementation of the correct technically motivated norms as the sole basis for correct planning and as a means of ensuring the increase in the productivity of work in a correct relation with the increase of average earnings.

Significance of Collective Bonuses

In the new wage organization there is a rather different composition of the average earnings than in the old system: Tariff plus earnings according to the percentage of the fulfillment of the norm plus collective bonuses, while in the old wage system there were only two component parts, tariff plus earnings according to the percentage of the fulfillment of the norms. The increase of average earnings in the new wage system is dependent on the tempo of the increase of the productivity of work, this relation being explained in each plant by the norm relation of the increase of the productivity of work and average earnings. In the future the nominal increase of earnings will be projected above all in the collective bonus and not in the higher fulfillment of norms as was the case until now.

In those plants where they understood the task of the collective bonus and the significance of norms for material incentive, there the collective bonus plays the role designated for it: material incentive of the workers in increasing the productivity of work.

In those plants where these questions were not properly understood they think over the fulfillment of norms and their height and say to themselves: "We would rather have planned average earnings guaranteed for higher fulfillment of performance norms than for some collective bonus." At the same time they are not convinced that the collective bonuses are a permanent form of compensation.

In those plants sooner or later this harmful political economical consideration must reveal itself in the overdrawing of the wage funds, in incorrect relations between the increase in the productivity of work and in the average earnings and in entirely bad economic results in the plant. The political consequences of this harmful wage practice are projected in this that these questions are not correctly explained to the workers, the workers do not

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have faith in the compensation and as a result of this they lose material interest in improving the results of their work.

It is understandable that the workers lose faith in collective bonuses if the technical workers say that if the plan will not be fulfilled neither will a collective bonus be acknowledged for the workers. This explanation is at the present time in conflict with the principle that collective bonuses are drawn from the basic wage fund.

It is most necessary for economic workers and trade union functionaries to correctly explain the principles of checking the wage fund and by this the means for collective bonuses in cases of non-fulfillment of the plan. It is equally necessary to explain to the workers that in surpassing the planned production the wage funds and thereby also the means for collective bonuses will increase. In the same way it is necessary to explain to the workers the rest of the factors which affect the decrease of the means for collective bonuses. If the workers did not know these factors they could not take part in removing the negative influences which slow down the achievement of better economic results. Thus for example it is necessary to speak with the workers about the fact that the means for bonuses can be decreased or altogether overdrawn by high overtime, surpassing the allowed and technologically motivated limits of waste, a special payment of other exceptional wages.

In some cases collective bonuses are used as a means by which wages are to be adjusted to a certain level. This is so especially because in many cases it is not possible to remove wage discrepancies which accumulated in production all at once during the years.

At the same time however it is necessary to openly admit and to speak with the workers in this sense that in such cases these deficiencies must be gradually removed by this that in the places of work where the situation was in the meantime solved by higher collective bonuses, a slower increase in earnings in relation to the productivity of work in comparison with the rest of the places of work will be planned. It will be necessary to proceed by this method until the period when correct wage relations will be achieved between individual classes of the tariff qualifying catalog and between individual professions.

Some Experiences in Using the Norms of Material
Incentive in the Jan Sverma Plants in Brno

The new wage organization presupposes that the earnings of the workers will continue to increase; this increase will be dependent on the increase in the productivity of work. Otherwise they would not create the conditions for further increases in the scale of living of all the workers. Erroneous implementation of the new wage system would naturally prevent the achievement of these aims.

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The Jan Sverma Plants in Brno had good experiences with the implementation of the norms of the increase in the productivity of work in relation to the increase in average earnings. In this enterprise they ordered norms for plants and guilds. For an increase in the productivity of work by 1 % the planned average earnings of workers are increased by 0.4 %. For individual guilds and workshops these tasks are established by decreases in the laboriousness of production, that is directly in savings in the norm hours. The plants can by the previous fulfillment of the planned decrease of laboriousness of production guarantee the planned productivity of work, incidentally also a higher fulfillment of the productivity of work in comparison with the plan and thereby they can guarantee for themselves also an increase in the planned average earnings which are projected above all in collective bonuses.

In the national enterprise of the Jan Sverma Plants all questions in connection with collective bonuses are energetically discussed. Valuable promises of the workers result from the discussions. Thus for example the workers of the tractor plant promised that they would fulfill the planned decrease in laboriousness for the first half year of 1960 in honor of the 15th anniversary of the liberation of our country by the Soviet Army and that they want to fulfill the all-year decrease in laboriousness of production for the anniversary of the Great October Revolution. At the same time they invited the workers of the rest of the plants to imitate them. It is understandable that the premature fulfillment of the planned decrease in laboriousness has an effect on the increase in the productivity of work and thereby also on the future increase of the planned and actual average earnings.

The norms of the relation of the increase in the productivity of work and average earnings and the norms for creating the bonus fund are for example in the Jan Sverma Plants in Brno the result of the initiative of the workers and good cooperation with the technique of the enterprise. Both of these norms in the enterprise are scheduled for the plants and guilds. The following results for example were achieved with the practical implementation of the norms:

The workers of the center of median mechanics succeeded in decreasing the laboriousness of production in January of this year. By this the collective bonus increased from the average 23.5 % to 25.7 %, which expressed by the absolute ratio represents an increase of hourly earnings in an average of 0.15 Kcs. This average increase can not naturally be imagined in such a way that it is paid to all workers without regard to the measure of the merits of the individuals. The master in cooperation with the trade union organization can within the framework of this average give advantage to those workers who shared in this decrease in laboriousness directly and in the greatest measure.

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A further effect which the workers achieved by this fulfillment of the planned tasks by the decrease in the laboriousness of production is the compensation paid for improvement suggestions and rewards for introducing new techniques. The achieved results best convince the workers that it pays to think over the work, to transfer to new, better and more progressive technique and technology. For this reason also the workers of the other plants of the national enterprise of Jan Sverma Plants accepted the invitation of the tractor plant for faster fulfillment of the tasks of the planned decrease in laboriousness. According to the present results there are presuppositions that the periods announced for this section will be shortened even more.

For the Implementation of the Norms Presuppositions
Must Be Created

This method should be used everywhere. If this is not so we can justly ask why these effective material incentives are used so little. The first reason is that the implementation of the norms of personal material interest places far greater demands and claims on the planning, documentation and organization of work. In this it is generally known that the very correct cost accounting schedules and operational planning are in many enterprises with small-lot and piecework production on a very low level.

It is understandable that in plants with mass and large lot production the solution of these questions will be far easier. It is however unquestionably necessary to also solve this question in plants doing piecework.

Questions connected with the implementation of the norms of the relation of the increase in the productivity of work and average earnings and the norms for the creation of the bonus fund are very complex and demanding. Their correct solution and implementation in practice however can contribute far more to the wide participation of the workers in directing production, implementing the best organization of work technique and technology, in setting the technical norms of work and in its recapitulation in achieving the optimal, economic results in production because we will be able to make use of the system of appropriate and economically effective material incentives.

The solution of the questions connected with the introduction of the norm of material incentives is dependent to a considerable degree on the masters and managers of the workshops who with the cooperation of technology, standardizers and the entire collective of workers can establish correct technological methods, contribute to the removal of various losses in production and to help to achieve the technically motivated performance norms.

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For the fulfillment of these tasks it is also necessary to make use of the movements such as is the competition "Everyone an innovator," and the spreading and more systematic use of the elements of Seifert's method, to achieve better cooperation with the collectives competing for the title brigade of socialist cooperation and the like. The result must be the removal of the so-called bad and good work and the introduction of optimum organization of work, technique and technology to production.

Comparatively few of our plants in the meantime are introducing schedules of norms of personal material incentive in the guilds and operations, incidentally even in lower segments. The example of the Jan Sverma Plants in Brno shows the way which it is necessary to take in this direction. In the meantime this is a difficult and complex road; nevertheless I am sure that after certain adjustments it will be possible to use them also in other plants.

The tasks of 1960 and the tasks of the third five-year plan are very demanding, especially as they refer to the tempo of the increase in the productivity of work, for in the final analysis the achievement of the aims established by the XIth Congress of the Communist Party of Czechoslovakia, the building up of socialism, will in the end depend on this tempo. The widest use of new techniques and technology can guarantee for the future this tempo of the increase in the productivity of work. If we do not demonstrate how to correctly and economically objectively to make use of the material incentives as the instruments for fulfilling these tasks we will not be able to guarantee these tasks. The fulfillment of these tasks will depend equally on how we carry out the material interest of every worker and the entire collective for fulfilling and surpassing the tasks.

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SOME EXPERIENCES WITH WAGE REFORM IN THE CONSUMER INDUSTRY

[Following is a translation of an article by Dr. Vaclav Hanzlik in Prace a Mzda (Labor and Wages), Vol. VIII, No. 4, Prague, April 1960, Pages 173-179.]

In our factories at the present time there is a great campaign for guaranteeing the tasks of the plan for 1960 and for orderly preparation for the third five-year plan. The workers are cognizant of the fact that the fulfillment of these daring tasks will make our country still stronger and richer which will contribute significantly to raising the scale of living of all our citizens.

The revision of the system of wages of labor plays a very important role in this. By April 1, 1960 compensation was given in our industry according to the new system to more than one million workers. Of these 390,000 belong to the consumer industry. Some of the experiences of the enterprises of the consumer industry are the subject of this article.

Economic Results

One of the aims of the new wage system is to have an effect on the improvement of economic results of enterprises and factories. Experiences show that this aim has been achieved. In the factories where the new wage system has been introduced better fulfillment of the play of production and the productivity of work has been achieved, as is shown in this comparison:

Index	Month	Entire Department in %	Factories with revised wages %
gross production	October 1959	100.7	101.4
	November	101.2	103.0
	December	102.0	103.0
	January 1960	99.2	100.7
productivity of work	October	100.4	101.3
	November	100.9	102.5
	December	101.8	102.7
	January 1960	98.9	99.9

Remark: In October the new wage system was introduced in 271 factories with 53,000 workers, in November in 437 factories with 94,000 workers, in December in 729 factories with 147,000 workers and in January in 993 factories with 197,000 workers.

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The increase in the productivity of work was also accompanied in connection with revision of wages by the extent of mechanized operations. For example in the national enterprise Koh-i-noor the productivity of work was increased by 3.84 % by means of appropriate bonuses (for uniform fulfillment of the plan).

There are many more examples proving that the factories with the revised wage system definitely affected all-ministry results: for example in the plants of the cotton industry the productivity of work was increased by 3.3 %, the same thing was true in the clothing industry and in the factories VHJ Hedva by 3.9 %. Definite improvement was achieved in the Karnola Ol Plant, where the productivity of work increased in the norm hours by 23 % and average earnings by 13 % as against the same period in 1958. In the national enterprise Fezko in connection with the introduction of the revision of wages they achieved by various technical and organizational improvements savings of 25 workers and by this an increase in the productivity of work by 1.43 %.

In the factories VHJ Industry of Household Textiles the wage costs declined in the sewing of double plush rugs by 85.5 %. In the textile-leather branch the introduction of the revision of the wages of labor affected the quality of production. Bonus payments directed to the increase in quality had good effects in the weaving mills for wool, cotton, silk and linen and in the same way the quality of production in the clothing industry increased.

In the branches of glass and ceramics the revision of wages helped by this that the individual sectional technical economic norms of waste were fixed. This showed itself also in the decrease in the number of faulty products and at the same time in increase in the quality of metallurgical production. In these factories there was also an increase in the productivity of work, for example in the factory Usti nad Labem VHJ Rolled and Pressed Glass, it was increased by 4.9 %, in the factory Rudolfova Hut (also VHJ) by 6.2 % and in the factory Usti u Stare Paky, VHJ Vertex by 18.4 %. In this branch the evaluation of the achieved economic results improved while the deficiencies noted are being taken care of by corrective measures and the managers of the factories are instructed to announce the achieved results to the workers in production conferences.

The implementation of the revision of wages also contributed to the increase in the productivity of work in the wood industry, in the factories of which an increase in the productivity of work was achieved by an average of 2 %. The main credit for this is due to the implementation of the technically motivated norms. Good results were achieved in the factory Klatovy, national enterprise Western Czech Wood Factories, where in connection with the revision of wages 30 technical organizational provisions were suggested. In the national enterprise Czech Furniture, factory Tynisten. Orl., after the introduction of the revision of wages the productivity of work rose by 2 % and in the factories Nove Mesto and Bedrichov

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VHJ Sport and Technical Equipment by 3 to 5 % according to the type of production. It is the same in the Slovak factories; the national enterprise Drevoimpregna, factory Rajecke Teplice, increased productivity by 8.3 %, in the national enterprise Smrecina, factory Gasparovo, productivity increased by 2 %, national enterprise Piloimpregna, factory Presov, by 4.6 % and the same elsewhere.

Drawing from the wage funds is also developing favorably: in October and November the factories with the introduced revision of wages relatively exceeded the wage fund always by 1.2 %, whereas in December relative savings were by 1.8 % and in January by 2.4 %. From the beginning of 1959 relative savings of 532,000 Kcs were achieved.

In the factories where the revision of wages was implemented the actual costs are better fulfilled and there are more favorable relations between the productivity of work and average earnings.

The fulfillment of the plan of actual costs is also affected by how the factories settled the decrease in overtime. In the majority of the factories this task is fulfilled successfully, for example:

Factory	Percentage of Overtime	Percentage of Overtime
	Work - Spring 1959	Work - Spring 1958
Vigona Ol Svitavy	1.09	3.42
Tepna Babi	6.06	6.55
Moravolen Libina	2.33	3.89
Elite Duba	0.20	2.80

Even though the consumer industry shows the lowest all-state ratio of overtime, it is necessary to devote to this question constant attention, especially in view of the prepared shortening of the working time.

In the enterprises where the revision of wages was introduced average earnings have increased. In contrast to the same period in 1958 the monthly earnings increased:

in October 1959 by 40.-Kcs
in November by 43.-Kcs
in December by 43.-Kcs
in January 1960 by 43.-Kcs

At the same time this increase was achieved above all by the implementation of improvement in production and organization of work. Understandable interest in the factories and enterprises is devoted to this, how the implementation of the new wage system affects the earnings of individuals, especially in what percentage of workers there is a decline in wages. This is evident from this comparison (data in percentages of the total number of workers compensated according to the new wage system):

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<u>Change in Earnings</u>	<u>November 1959</u>	<u>December 1959</u>	<u>January 1960</u>
Increase	43.7	45.0	43.0
Decrease	12.7	11.9	13.2

Because a part of the earnings - bonuses - is dependent on fulfillment of the indexes, in January there was a decline in wages in a larger number of workers, for in January a larger number of factories did not complete the planned indexes.

Decrease in the number of workers with decreased earnings is achieved by the most varied measures, as training of the workers with the aim of acquiring the required qualifications, creation of the most suitable conditions, as the norms presuppose, etc. The development of the increase in wages and the introduced provisions give assumption to this, that a further increase in wages as against 1958 will occur, as the directions given in a letter from the Central Committee of the Communist Party of Czechoslovakia presuppose.

All economic workers are directed to cooperate very closely with the party and trade union functionaries to regularly evaluate the achieved results at production conferences, membership meetings of the community, and the like. Special emphasis is placed on this that appropriate provisions be made for the removal of deficiencies.

Experience shows that it is impossible to evaluate the results only numerically, without deeper analysis. In a comparison of the index with the same period of the previous year we determine the effect of the new wage system. This holds good especially in the same production or production with little deviations, never however during basic changes in production. For example in the Liberec factory, national enterprise Severka, in December 1959 the production plan was completed by 100.4 %, which however represents in the index only 86.2 % of 1958. Analysis showed that in the factory there were changes in production and that then the results achieved in December are correct. In contrast to this in the border factory Spoli, national enterprise Otavan, where in 1959 production basically increased, the index comparison is very favorable: 239 % to December 1958. These examples show what great care it is necessary to devote to the analysis of the effectiveness of the revision of wages and the conduct of the analysis of the index increase of production.

Devote Full Attention to Technically Motivated Norms

The good results of the revision of wages in the consumer industry were also due to the technically motivated performance norms. The level of performance norms was on the average good in the textile, clothing and leather processing branches, where in the past many experiences were acquired with technical norms. These experiences were used in such a way that the revision of

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wages is generally implemented in the use of technically motivated performance norms, which are completed on an average of 102.3 %. Norms, which are fixed according to branch and departmental collections of norms, correspond to the existing level of technique, technology and organization of work.

The already considered fulfillment of the technically motivated norms from 102 to 105 % presupposes that all workers will not complete these performance norms. Today about 30 % of the workers complete the performance norms under 100 %. From the wage and political standpoint it is impossible to consider this situation as correct. For this reason a constant analysis is being made of the reasons for the low fulfillment of the technically motivated norms. Analysis shows that it is necessary to examine the reasons:

in a relatively large number of younger workers who hitherto have not attained the performance of an average matured worker; a similar situation exists among the unskilled workers who continually come into the consumer industry. Both these groups are being trained in factory schools of work so that they will gain knowledge and experience necessary for doing the work. For example in the factory Kojetice, national enterprise Pragodev (manufacture of girl's clothing), where the majority are younger workers, the technically motivated norms were fulfilled in March 1959 (in the first month of the revision of wages) by 89.6 % and by 99.9 % accompanied by a higher quality of production than before the introduction of the revision of wages. It is possible to cite a similar example from the factory Olomouc (production of men's coats); in January 1959 the technically motivated norms were fulfilled by 94.1 % and in December by 97.9 %, also accompanied by an increase in the quality of production;

in some cases analysis showed that the reasons for the low fulfillment are deficiencies in production and in the organization of work, for example, in the supply of material, lower operation of machinery than set by the norms, in the work of maintenance men and setters, and the like. After the removal of these deficiencies the fulfillment of the technically motivated norms increased.

Not only work commissions of production economic units for the revision of wages but also technical and economic conferences, for example in the production economic units of the Clothing Industry, Hedva, Linen Industry and other production economic units, are taking up this problem of low fulfillment of the technically motivated norms.

The norm creating group VHI Association of Enterprises of the Cotton Industry made a very detailed analysis of the causes for the low fulfillment of norms in winding and weaving and came up with these causes:

servicing of the lower sections (Tepna, factory 14, Orban factory 07);

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inefficient workers (Velveta, factory 5, where the problem is with trainees and new unskilled workers);

irresponsibly rapid operation of machinery (Orban 1, Zamberk, where provisions are being made to increase the winding speed of machinery) and

breakdown of machinery (Lina factory 1, Jaromer, where provisions are also being made for decreases in breakdowns).

The norm creating group made sure that the deficiencies will be removed according to plan.

On March 31, 1960 the ministerial body of the consumer industry took up the situation of fulfillment of the technically motivated norms. After analysis of the causes it established these main tasks for the decrease in the number of workers who do not fulfill technically motivated norms:

1. to hasten the increase in qualifications among younger workers and unskilled workers;

2. to continually devote attention to the improvement of the organization of production and to remove the causes of deficiencies, for example by implementing the methods of the German innovator Seifert;

3. to carefully prepare the onset of production during changes in assortment;

4. to more quickly introduce and implement the progressive methods of work, especially increasing the use of the already tested methods;

5. to further increase the participation of the workers in the technical norms of performance.

Discussion of the fulfillment of the performance norms in the places of work means the practical implementation of the principles of the decision of the State Wage Commission, Number 60/58,

regarding the setting of technical norms for work. The increasing interest of the workers in performance norms is heartening. Today it is clear in the factories in this respect that the technically motivated norms must be in harmony with the increased techniques, technology and organization of work.

Bonus Payments to Workers

Since 1954 bonus payments to workers in the introduction of the so-called "new wage organization," also known as "Jiholen," increased in the consumer industry to a considerable degree. Bonuses were, with the introduction of the new wage system, implemented both for workers working in piecework and those in time wages. While in some branches as in the leather processing industry and in the clothing industry bonuses were spaced according to classes of the TTK [Technical Control Commission]: the highest bonuses are given to the highest class. This is so because a worker in the higher classes will deliver to the company more valuable work,

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articles, and further, so that the material incentive of the workers to increase qualifications would be strengthened. Results show that this is a correct method which it will be necessary to use more.

The very character of the consumer industry manufacturing goods for wide consumption and often goods from imported raw materials orients the bonus to the qualitative indexes and economy indexes. The operation of bonuses has good results; the consumers especially should have pleasure from them. For example, among production workers in the clothing industry bonuses were implemented for quality. Not only workers in technical control whose domain this is, but also sectional trustees of the trade union organization or the members of the commission for mass production work are making evaluations of the results. They note the occasional drawbacks and speak about them in the workshops. In January in the factory Ol, national enterprise, Clothing Industry Prostějov, the effectiveness of these bonus payments showed up in the relatively high savings in the planned reductions (only 28 % of the planned reductions was admitted, while the plan of quality was surpassed by 0.06 %).

For cutters bonuses were implemented for savings. The experiences gained made it possible for the cutters in the national enterprise Otavan Trebon to promise on February 23 during the acceptance of the Red Banner of the Ministry and the UVOS [Central Committee of Trade Organizations] that there will be a saving in material up 500 Kcs annually for one cutter.

To Constantly Increase the Qualifications of Workers

The increase in the qualifications of workers is closely tied in with all the results which were achieved after the introduction of the revision of wages.

Careful progress in admitting qualification classes has such an effect that in all the factories there is great interest in the increase in qualifications. The extent of training conducted during the introduction of the revision has no analogy. It is evident from this that, for example, in the clothing industry at the present time 3800 workers are being trained, while almost 6000 workers have taken the examinations. Increase in qualifications affects the fulfillment of technically motivated norms, the increase in quality of production and the further increase in the earnings of the workers. Understanding the significance of increases in qualifications is evident from this that the workers make declarations while taking their final examinations regarding valuable socialist promises in honor of the 15th anniversary of the liberation of our country and the like. Increase in qualifications has a great significance also in regard to the presupposed increase in production and technique. Because the training of workers will be a

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permanent method for increasing qualifications it will be necessary to prepare good textbooks, as for example was done by the VHI Clothing Industry in Prostějov.

Good Mass Political Work Is Decisive

The present course of the revision shows that mass political work in the enterprises and factories generally increased. It is possible to highly evaluate the activity of workers, party and trade union functionaries, masters and other technicians. Activity is shown in the increased number of socialist promises both of the workers and the technicians, in suggesting further improvements in production, improvement suggestions, and the like. In connection with the revision declarations are frequently made regarding the most worthy promises - regarding efforts to gain the title brigade of socialist work. In the consumer industry in February, 1800 collectives competed for this honorary title. A great part of them were made and declared during the glorious declaration of agreement with the introduction of the new wage system. For example in February, 4 collectives in the border factory Jemnice, national enterprise Otavan, completed for this title; in the factory Mnichovo Hradiste, national enterprise Severka, 3 collective competed for the title brigade of socialist work, while in January, in the factory O3 of this national enterprise, 2 collectives entered the competition.

Among the collectives we will find workers of the national enterprise Jiholen, about whom it is known that they have always stood in the first ranks of propagators of the progressive principles of compensation. The outfitting collective in Jindrichov Hradec approached the subject of guaranteeing the revision of wages in this manner, after becoming acquainted with the experiences of the German innovator Erich Seifert every member of the collective ascertained and helped to remove idle time and deficiencies. Further provisions followed: technical training of two service men for sewing machines helped to decrease deficiencies in the manufacture of ready-made clothes by 90 %, improvement suggestions for savings in lubricants and other savings were presented and put into effect through their own efforts.

Improvement suggestions were made in connection with the revision of wages and considerable results were realized. For example in the factory Jemnice, national enterprise Otavan, 3 improvement suggestions were made, in the factory Chornice, national enterprise Kras, also 3, etc.

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Rapid Removal of Deficiencies

It was possible to achieve good results because a systematic analysis of the situation was made. So that the deficiencies would be removed still more quickly attention is directed especially to the following:

increase in the participation of the workers in the creation and verification of technically motivated norms; and even though a series of examples prove that the workers will participate in the creation of norms, this is not a general phenomenon and the decision of the State Wage Commission, number 60/58, regarding the setting up of technical norms for work has not yet become a general thing among all the workers;

acquainting the workers with the norms of material incentives; analysis showed that thus far all the workers are not familiar with the norms of material incentives and their significance for an increase in wages;

hastening the tempo of the introduction of the revision of wages in the glass and wood industries, where in comparison with the textile, clothing and leather industries it was slower. The provisions inaugurated with the help of the central organizations of the party and trade union organizations give the presupposition that here also the revision will be introduced with few exceptions by the end of April of this year.

It is possible to say that with the removal of these deficiencies in the consumer industry the principles of the revision of wages will be fully implemented and that the new wage system will be implemented, except for the few exceptions mentioned, by the end of April.

The Task Will Not End With the Introduction of the
Revision of Wages

The successful conclusion of the revision of wages must not mean the end of our attention regarding the further development of the wage policy, but on the contrary it is necessary to look at the revision and its conclusion as a foundation for further activity in wage policy. For this reason a concept for the development of wages in the third five-year plan was worked out for the consumer industry according to which the production economic units will reconcile the development of wages in such a way that the tasks of the plan will be guaranteed.

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RESULTS OF COOPERATION OF KOSICE KRAJ TRADE UNION ORGANIZATIONS IN
IMPLEMENTING THE WORKINGMEN'S WAGE ORGANIZATION IN ENGINEERING PLANTS

[Following is a translation of an article by Stefan
Major in Prace a Mzda (Labor and Wages), Vol. VIII,
No. 4, Prague, April 1960, Pages 180-182.]

The reconstruction of the wage organization of labor in industry which we are gradually putting into effect according to the principles approved by the government of the republic in May 1958 is at the present time one of the most important economic and political tasks. The question is this, that the wage system should in a full measure support the continually growing initiative of the workers, that it should unite most effectively the interest of the working individual and the collectives with the interest of the entire society, that it should correctly direct the attention of the workers to the solution of the present main tasks, to the fulfillment of the critical indexes of the development of the national economy. The increase in the effectiveness of the wage system has an extraordinary significance in conjunction with the complex provisions in the area of direction, planning and financing. Its chief aim is to guarantee the greatest participation of the workers in the management of the national economy and the direction of production.

To correctly effect the reconstruction of the wage system of labor is a very complex task. The aim of this article is to show the first economic results achieved in January 1960 in the national enterprise Tatrasfalt Matejovce and the allied plants Tatrasfalt Nizny Medzev, Tatrasfalt Plesivec and Pohorela.

The Trade Unions Must Also Ensure the Correct Course
of the Reconstruction of Wages

In the critical engineering plants in the Kosice kraj it was the enterprise Tatrasfalt Matejovce and its allied plants which first transferred to the reconstruction of the wage organization of labor on January 1, 1960. In view of the fact that this enterprise belongs among the critical ones in our region, the KVOS [Regional Committee of Trade Union Administration] of engineering plants paid personal attention to this enterprise and gave assistance during the preparatory period. It was necessary in every possible way to ensure that the preparation for the reconstruction itself and its implementation would take place with full responsibility

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and seriousness, because the question for us was to make general in other plants the good results, knowledge and experiences.

The chairmanship of the KVOS of engineering plants already in the first half of 1959 discussed with the management of the enterprise and the ZV ROH [Provincial Committee, Revolutionary Trade-Union Movement] the preparations for the reconstruction, the total course of the review of qualification, status and task in the norm creative activity, etc. After this discussion the enterprise worked out for itself a sample plan for the political and organizational guarantee of the reconstruction, the fulfillment of which was controlled by the wage commission of the KVOS directly in the enterprise. The deficiencies were also determined chiefly in the activity of the ZV ROH and the wage commission. The KVOS again took up this situation and after the accepted provisions the work chiefly in the ZV ROH and the wage commission basically improved. After this total good preparation, both political and technical, the chairmanship of the KVOS agreed as to the first critical enterprise to put into effect the reconstruction.

This form proved to be very good and this method we in the KVOS gradually used in additional enterprises. I am of this opinion that the correct preparation of the new wage organization of labor and its responsible safeguarding must reveal itself positively in the economic results on the one side and in the earnings activity on the other side.

Some of the Results Achieved By the New Wage Organization

All the provisions which the KVOS put into effect in the preparatory period in cooperation with the leadership of the enterprise and the trade union organization revealed themselves positively in the economic results already in January of this year. The plan of the production of goods was fulfilled in all the factories and in the enterprise to 100.4 % and the productivity of work to 100 % while drawing average earnings to 99.6 %.

A very favorable influence was played by the reconstruction in lowering the overtime hours where on the average for the enterprise the drawing declined in the first half of 1960 roughly by 50 % against last year. In individual factories the situation in drawing overtime hours was as follows:

Factory	Year 1959	IV/1959	January 1960
Matejovce	6.3	6.3	4.3
Pohorela	5.1	3.4	2.1
Nizny Medzev	8.2	7.5	2.4
Plesivec	4.1	3.4	1.4
Enterprise	6.3	5.7	3.3

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Against the favorable enterprise average of 3.3 there was a comparatively small decline in the base factory Tatrasmalt Matejovce of 4.3. This was influenced by the high loading and unloading of trucks in January 1960, further as a result of the reconstruction of the drying plant in the enamel works and because of the completion of the work on the tunnel type electric furnace. We assume that in future months after the necessary provisions are put into effect a further desirous decline will occur also in the base factory.

I shall yet call attention to the performance norms according to individual factories and according to individual classes. The workers fulfilled the performance norms thus:

Factory	To 90	90-99	100-109	110-119	120-129	Over 130
Matejovce	17	85	142	58	23	--
Pohorela	8	19	112	18	--	--
Nizny Medzev	1	20	108	31	17	8
Plesivec	1	2	27	1	--	--
Enterprise	27	126	381	108	40	8
In % of the total number of workers	3.91	18.26	55.21	15.65	5.81	1.16

Fulfilling the norms in individual classes:

Factory	2	3	4	5	6	7	Total	
							Assumed	Actual
Matejovce	101.9	101.5	108.9	102.4			110.9	104.6
Pohorela	104.1	103.7	111.0	--	--	--	108.0	104.4
Nizny Medzev	--	116.4	117.2	108.0	102.2	--	106.8	108.4
Plesivec	--	111.4	105.8	111.9	93.6	110.0	105.0	103.3
Enterprise	103.7	103.2	110.7	104.7	101.2	110.0	108.9	105.4

In almost all the factories the highest fulfillment of the norms is reached in class 4 which is the predominant class in that enterprise. They are surpassed chiefly by the working classes of coaters, metal spinners and grinders.

We cannot be however completely satisfied with the index of the non-fulfillment of norms in the base factory of Matejovce. In this factory during this time technical organizational provisions are being made for the improvement in the situation and for the creation of favorable conditions for the fulfillment of the performance norms. The situation was discussed in the coordinating commission after which the whole matter was discussed at the place of work with the heads of the guilds, with the masters and the workers who did not fulfill the norms. A basic improvement will take place in the first quarter.

The assumed average earnings in the first month of 1960 took place in all the factories, except in the base factory which did not draw the average earnings. The low drawing was also caused

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by this that the lower fulfillment of the norms occurred in the enamel works guild as a result of the transfer of the drying plant. Besides this the unfavorable weather conditions in the beginning of the year had a basic influence.

The level of the average hourly earnings reached in January of this year is given by the following table:

Factory	Assumed	Actual
Matejovce	6.52	6.32
Pohorela	5.73	5.73
Nizny Medzev	7.03	7.50
Plesivec	6.86	7.15
Enterprise	6.42	6.48

Significance of the Reconstruction of the Wages of Labor

The cited results which we achieved in the enterprise Tatrasmalt Matejovce and its allied factories point clearly even in the first month after the introduction of the new wage organization of labor to the economically good results. The total level of earnings which the enterprise achieved by a conclusive guarantee of the reconstruction also speaks convincingly of the correctness of the provision realized at the present time in the area of the wages of labor.

All suppositions exist that the achieved results will be in future months after its introduction still more favorable which is proof of the good cooperation of the trade union organizations of the Kosice region with engineering plants.

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DEVELOPMENT OF CZECHOSLOVAK FOUNDRIES AFTER NATIONALIZATION

[Following is a translation of an article by A. M. Plesinger, appearing in Slevarenstvi (Foundry Practice), No. 5, Brno, May 1960, Pages 149-151.]

The first task of the nationalized foundry industry was the transfer of the foundries to peace-time production and to introduce normal production conditions into those foundries which had been disrupted by the events of the war, many of which were in ruins. As early as 1947, the volume of production of castings made of industrial alloys of iron, (that is to say, gray cast iron and malleable cast iron) outstripped that of the pre-war year of 1937 and by 1948, had exceeded the production of the best pre-war years of 1928/1929. The constant growth in the production of castings in the liberated State is apparent from Table I; production for the individual years is given in comparative figures based on 1937 = 100 for castings made of ferrous alloys and 1950 = 100 for castings made of nonferrous metals. Several interesting conclusions can be drawn from Table I regarding the advantages of socializing of the means of production and the planned direction of production. Whereas in the 1947/1949 Two-Year Plan, when the nationalization of the foundry industry was being concluded, production of iron castings rose 48 percent compared to that of 1937, this production increased 76 percent during the First Five-Year Plan (1949-1953), or an additional 113 percent over that of 1937. During the Second Five-Year Plan, production of castings from ferrous alloys will attain a level at least four times that of 1937.

An index of the mighty expansion of the engineering industry as the principle consumer of castings is the increase in the per capita production of castings. Whereas per capita production of iron castings in 1937 amounted to about 18.5 kilograms, it attained a level of 74 kilograms by 1958, or about a four-fold increase. This volume places Czechoslovak foundry production in one of the leading positions in the world (second to the US and Great Britain).

Approximately 66 percent of all gray cast iron castings, 64 percent of the malleable iron castings, and 80 percent of the steel castings are processed into engineering products. The castings account for about 23 percent of the weight of engineering products.

In 1948, the foundries of the engineering ministries accounted for 62.8 percent of all castings produced, metallurgical enterprises accounted for 30.5 percent, and the foundries of other ministries

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for the remaining 6.7 percent. The major part of the production of non-ferrous metal castings (79.2 percent) is also concentrated in the foundries of the engineering ministries.

Table I also shows the irregular rate of growth in the production of castings made of various kinds of ferrous alloys. Whereas by 1958, the production of gray cast iron castings rose to a level 3.5 times greater than that of 1937, production of malleable iron castings quintupled over the same period, and that of steel castings increased to a level 4.5 times greater than that of 1937. In the case of steel castings, this is a somewhat normal phenomenon and, in comparison with other industrially-advanced countries, our share of steel castings in the overall volume of castings produced from ferrous alloys is much greater and is constantly increasing. In 1937, some 80 percent of all ferrous alloy castings were made of gray cast iron, 2 percent of malleable iron, and 18 percent of steel. In 1958, these figures were 77 percent; 2 percent; and 21 percent, respectively. In this regard, it will be necessary to educate designers appropriately so that, in many cases, gray cast iron or malleable iron castings may be used wherever possible.

Non-ferrous metal castings are maintaining a relatively stable share in the overall volume of the production of castings. If we take the overall production of castings as 100 percent, then non-ferrous metal castings accounted for 3-3.7 percent of the total over the past years.

Concentration of Foundry Production

The nationalization of foundries permitted their gradual concentration into larger, more productive entities (Table II). Although this concentration was going on throughout the entire industry, it proved to be most advantageous in the enterprises of the engineering ministries and had a favorable influence on average productivity. The distribution of foundry workers, on the other hand, proved to be relatively less favorable. Thus, for example, in October 1945, about 40 percent of all foundry workers were skilled, 25 percent were semi-skilled, and 35 percent acted as helpers. The high number of helpers at that time pointed to the unrational (neracionalni) nature of the equipment in foundries. At the present time, auxiliary workers are being included in the group of so-called non-productive workers, together with maintenance personnel, crane operators, warehouse personnel, cleaning help, etc. In most foundries, the overall number of these non-productive workers is excessively high (Table III). Despite the fact that our educational system makes it possible for all workers to increase their qualifications, the specialized level of engineering-technical workers is improving only slowly and the fact that there are only 8 percent of such workers [in the total labor force in foundries?] is inadequate.

Development of Production Methods

Many of our foundries, particularly the new ones, are equipped with modern mechanical equipment which is frequently imported; however, this equipment is not efficiently utilized and, therefore, does not fulfill its mission. For example, the share of mechanically-formed castings, which already amounted to 30 percent of the total production of castings in 1948, is not growing at a rate which would be commensurate with the possibilities of a socialist economy and, particularly, its requirements. Table IV shows the shares which various production methods occupy in the total production of castings between 1955 and 1957, according to a survey worked out by M. Gottfried (M. Gottfried: "Third Conference on the Production of High-Quality Castings," Brno 1960). Despite the fact that, for example, the share of mechanically formed castings in malleable iron foundries is high, only one such foundry (the Moravian Ironworks -- Moravske zelezarny) in Olomouc can be considered to be efficiently mechanized.

A rising tendency can be seen in green sand moulding, particularly in the case of gray cast iron and steel. However, the status of introducing chemically-hardened moulds, which can expand the sphere of green sand moulding to include heavy and very heavy castings, as proven by the Zdar Foundry and Engineering Works and the "Klement Gottwald" Iron Works in Vitkovice, is not satisfactory. Shell moulding has not fulfilled the overly-ambitious expectations and remains limited to selected castings, particularly those for the motor industries. The extent of utilizing the production method of casting into permanent moulds places our foundries in first place in the world, particularly in regard to gray cast iron castings. In pressure casting, our non-ferrous metal foundries are maintaining the same tendencies which are apparent in the majority of industrially-advanced nations. Incidentally, our foundry workers have a personal relationship with this production method because it was developed in Czechoslovakia in 1925 and later spread throughout the world.

Construction and Equipment of Foundries

Whereas, during the Two-Year Plan and during the initial years of the First Five-Year Plan, preparations for the construction of new foundries rested with the investment components of the individual enterprises, planning institutes were later created (Kovoprojekta, Projekta) which were charged with the processing of plans for new foundries. Many have already been built and their modern designs fully correspond to foundries planned in other countries; some of them are even better (for example, Agrostroj in Roudnice, the Zdar Foundry and Engineering Works, the CZM Works in Strakonice, and others). Most of the new foundries are

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planned and built as large-scale foundries with a capacity of 10,000 tons of castings per year. They are normally keyed to special production of castings for specific types of machines. A very difficult problem however, is presented by the provision of modern equipment for new foundries and the modernization of existing facilities. In many cases, the foundry is equipped with very efficient machines, often purchased abroad, but in such a "non-complex" manner as to prevent the optimum utilization of the equipment. For example, there are semi-automatic moulding machines, capable of producing 120-200 moulds per hour which, due to the lack of auxiliary equipment, are producing only 100-120 moulds per [8-hour] shift. Similarly, installed core-blowing equipment lacks adequate transportation facilities. Our [domestic?] production of foundry machines is inadequate. Only recently has the necessary attention been devoted to assuring the production of foundry machines. A detailed survey of foundry establishments of the engineering ministries, conducted through 1 January 1958, has shown that the age of machines and equipment in very many cases has exceeded its budgetary life cycle.

The construction of new foundries results in certain territorial shifts in the location of these facilities. For the present, we have no documentation regarding the locations of foundries in the new krajs; it is therefore, only possible to estimate that, based on the distribution of foundries in the former krajs of 1958, or the former regions (oblasts) of 1946, the total production of castings of gray cast iron and steel is distributed approximately as follows:

Krajs	Share of Gray Cast Iron Castings		Share of Steel Castings	
	1947	1958	1947	1958
Czech Krajs	50	37	45	37.3
Moravian Krajs	42	52	53	55.8
Slovak Krajs	8	11	2	6.9

The Third Five-Year Plan will see additional changes in territorial distribution of foundry capacities by creating new, and expanding existing, centers of engineering and metallurgical production. This is particularly true of the Slovak krajs whose share in the overall volume of the production of castings is presently exceedingly low.

Despite all difficulties placed in the way of gradual expansion of foundries and equipping them with modern means of production, the Czechoslovak foundry industry has registered many noteworthy successes since the time of its nationalization. These can be seen very specifically in comparing the status during the first post-nationalization year (1946) with the development of production and selected production indexes of the foundries under

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the jurisdiction of the engineering ministries, as listed in Table V according to the official statistical yearbooks from 1954 to 1958. (Statistical Yearbook of the Czechoslovak Republic, 1959, State Statistical Office/Orbis, Prague, 1959). Of particular interest is the constant growth in productivity of labor as one of the basic foundation stones of the success of the socialist economy.

The nationalization of the foundry industry even resulted in the establishment of independent foundry research within the framework of the current State Research Institute of Materials and Technology (Statni vyzkumny ustav materialu a technologie). Since its founding, in 1951, the Brno research facility has engaged in solving numerous material and technological questions and its findings are available to all foundries in Czechoslovakia, regardless of jurisdictional affiliation. Despite the fact that construction of the facility is not completed the results attained by this body are supporting the technical development of our foundries at a constantly growing rate. In the initial years of its activity, the foundry research facility primarily concentrated on research in moulding materials and selected foundry alloys, on research in melting, moulding and casting technology, on research in the final cleaning of castings, etc. Several of the results of its work are utilized, not only in Czechoslovakia but also in countries with extremely advanced metallurgical industries; for example, the production of cast iron castings through autoclave inoculation in the USSR; casting into chemically-hardened mixtures, virtually throughout the world, etc.

The publication of the periodical Slevarenstvi (Foundry Practice) in 1953, fulfilled a long-time dream of Czechoslovak foundry workers to have their own specialized periodical. The journal became a platform for foundry workers and assists effectively in raising the specialized level of work in our foundries. The Scientific-Technical Society (Vedecko-technicka spolecnost) became another medium for the exchange of specialized experiences. The creative ability of Czechoslovak foundry workers was then also able to develop fully in the scientific literary field. This is attested to by the considerable number of original publications in the field of theoretical and practical foundry practice which enriched our previously poor specialized literature. Significant attention is devoted to the education of foundry workers in basic schools, at the newly-created Industrial School of Foundry Practice (Prumyslova skola slevarenska), and at the universities.

The results attained in the 15 years of nationalized foundry industry are a firm foundation for further successful growth in the production of castings in the Third Five-Year Plan. The assignments of this Five-Year Plan are truly not insignificant. To fulfill these tasks, it is necessary to increase the production of selected types of castings in 1965, as compared to 1958, as follows:

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Item	Production 1958 (tons)	Plan 1965 (tons)	Increase %
Gray cast iron castings	749,508	1,345,000	80
Malleable cast iron castings	20,757	40,000	93
Steel castings	204,415	408,000	100
Total ferrous metal castings	974,680	1,793,000	84

At that, the required number of castings, in the appropriate assortments, must be produced on a timely basis, at the maximum economic rate, must be of the best quality and require the minimum expenditure in human effort -- to sum up: it must be produced rationally. Toward this end, the foundries must progressively introduce production processes suitable for mechanization and automation. The rational mechanization and automation of production processes will require the utilization of special new machines and equipment which will have to be developed and produced at an accelerated pace.

Conclusion

Our foundry workers are entering the future period of expansion of our foundry industry with the knowledge of existing good working results and shortcomings, but particularly with the awareness of the importance of the need to consistently and constantly increase the technological level of foundry work and raise productivity through mechanization and automation of production processes. Fifteen years after the liberation of Czechoslovakia we review with pride the work which has been accomplished, as well as the determination and strength, resulting from it, to fulfill further and still greater tasks in the future building of our economy.

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TABLE I

Production of Castings in Past Years in Comparative Figures

	Year	Gray cast castings	Malleable iron castings	Steel castings	Total Ferrous Metal Castings
	1937	100	100	100	100
	1946	82	78	85	82
Two-Year Plan	1947	120	117	121	120
	1948	151	122	139	148
First Five-Year Plan	1949	167	124	149	164
	1950	186	216	200	187
	1951	208	266	262	219
	1952	246	311	300	257
	1953	248	342	316	261
	1954	250	344	326	264
	1955	258	356	330	270
Second Five-Year Plan	1956	284	422	348	298
	1957	303	495	388	324
	1958	348	516	438	364

Table I Continued

	Year	Per capita castings in kg (*)	Ratio of Pro- duction of castings to that of steel	Production of Castings from non-ferrous metals
	1937	18.5	11.5	
	1946	18.2	14.1	
Two-Year Plan	1947	26.3	14.1	
	1948	32.2	15.2	
First Five-Year Plan	1949	35.4	15.6	
	1950	41.3	16.0	100
	1951	48.2	16.9	111
	1952	55.5	18.3	122
	1953	56.1	16.0	132
	1954	56.0	16.5	135
	1955	56.9	16.2	152
Second Five-Year Plan	1956	62.2	16.5	177
	1957	68.6	17.1	201
	1958	74.0	17.8	220

(*) Until 1949, only ferrous metal castings; after 1950, including non-ferrous metal castings produced in foundries of the engineering ministries.

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TABLE II

Progressive Concentration of Ferrous Metal Foundries

Annual Production (tons) (Size of Foundries)	Gray Cast Iron				Malleable Cast Iron				Steel			
	1946		1956		1946		1956		1946		1956	
	A	B	A	B	A	B	A	B	A	B	A	B
Small, up to 500 t/year	49	6	30	2	33	5	12	2	--	--	20	0.8
Medium, 501-1,000 t/year	31	18	17	3	42	45	12	5	17	3	3	0.5
Large, 1,000- 5,000 t/year	17	42	40	29	25	50	76	93	61	30	43	23.7
Maximum, over 5,000 t/year	3	34	13	66	--	--	--	--	22	67	34	75
Average t/year	850		3260		400		2100		2200		5510	

Note: A -- Number of foundries, in %;
B -- Share in production, in %

TABLE III

Distribution of Employees in Engineering Foundries in 1957

Type of Foundry	Work- ers	Individual Skills					Others	ITP	A
		Melt- ers	Mould- ers	Core Makers	Clean- ers				
Gray cast iron	90.2	2.6	26.8	10.6	10.0	40.2	8.0	1.8	
Malleable cast iron	93.3	1.7	16.7	10.3	5.6	59.0	5.2	1.5	
Steel	90.0	4.1	12.3	5.5	10.3	57.8	8.9	1.1	
Non-ferrous metals	91.2	5.5	26.0	6.4	11.8	41.5	7.4	1.4	
Total	90.4	3.4	22.2	8.4	10.0	46.4	8.0	1.6	

Note: ITP -- Inzenyrsko-technicti pracovníci (Engineer-technical workers);
A -- Administrative personnel

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TABLE IV

Share of Various Production Methods in Total Production
of Castings in Engineering Foundries

Type of Casting	Year	% of total production			
		Sand Moulding	Machine Moulding	Frame Moulding	Green Sand Moulding
Gray cast iron	1955	95.8	44.3	79.4	52.1
	1956	95.6	46.1	81.0	56.2
	1957	95.2	47.4	82.3	59.9
Tempered cast iron	1955	99.5	92.8	75.2	86.5
	1956	99.5	94.0	77.4	78.2
	1957	99.4	92.8	84.1	93.4
Steel	1955	98.6	34.8	75.3	48.8
	1956	98.0	35.9	74.7	54.7
	1957	98.6	34.2	77.5	63.2
Non-ferrous metals	1955	30.0	31.4	32.5	11.7
	1956	25.2	32.4	28.8	9.5
	1957	26.0	30.6	26.6	12.3

Table IV Continued

Type of Casting	Year	% of total production			
		Shell Moulding	Casting in- to [perma- nent] Moulds	Centrifugal Casting	Pressure Casting
Gray cast iron	1955	--	3.0	1.7	--
	1956	0.1	3.2	1.5	--
	1957	0.4	3.6	1.4	--
Tempered cast iron	1955	--	--	--	--
	1956	--	--	--	--
	1957	--	--	--	--
Steel	1955	--	0.9	0.4	--
	1956	--	0.1	0.7	--
	1957	--	0.5	0.3	--
Non-ferrous metals	1955	--	35.9	1.1	15.4
	1956	--	30.0	1.2	16.6
	1957	--	33.6	1.4	19.3

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TABLE V

Comparison of Selected Production Indexes of Foundries
Under the Jurisdiction of the Engineering Ministries

Type of Casting	1946	1954	1955	1956	1957	1958
	<u>Production in tons</u>					
Gray cast iron	175,500	535,628	549,354	610,983	680,972	749,508
Malleable cast iron	3,800	16,840	17,427	20,657	24,484	20,757
Steel	40,400	154,144	156,316	164,905	180,422	204,415
	<u>Utilization of moulding area (tons/m²/year)</u>					
Gray cast iron	--	1,941	2,327	2,598	2,898	3,243
Malleable cast iron	--	1,681	1,882	2,266	2,766	2,823
Steel	--	3,143	3,274	3,181	3,573	4,163
	<u>Utilization of metal charge in production of good castings, in %</u>					
Gray cast iron	--	62.3	64.2	64.0	64.4	65.7
Malleable cast iron	--	41.3	40.7	40.1	43.2	44.4
Steel	--	48.0	47.5	48.1	48.6	50.0
	<u>Productivity in tons per manyears</u>					
Gray cast iron	12		24.2	25.1	25.8	27.5
Malleable cast iron	8		13.9	14.9	15.9	16.2
Steel	10		17.4	17.8	18.7	20.1

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5911

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