

## TOWARDS THE 22ND COMMUNIST PARTY CONGRESS OF THE SOVIET UNION

The regular 22nd Soviet-Union Communist Party Congress will be opened in Moscow on October 17, 1961.

In the history of the communist party, in the history of our nation, the party congresses have played an outstanding role. At the congresses the party takes stock of the accomplished work, pegs out the path for further triumphant march forward to its sacred goal—communism; it boldly exposes and criticizes the shortcomings and errors, devises the measures for their earliest elimination, formulates the principal foreign and internal policy positions.

Of great importance is the task of providing the national economy with properly assorted high-quality metals. Metallurgical production is one of the decisive branches of heavy industry, and even though the tempo of metallurgical development is high in our country, shortages in metal still continue to be felt. This is the reason why questions concerning the development of the ferrous and non-ferrous industries, and the problems of technical progress in metallurgy occupy an important place in the work of the communist party congresses. Considerable attention was devoted at the CPSU Congress to the matters dealing with the further development of ferrous and non-ferrous metallurgy. The congress resolutions provide for a sharp increase in the output of alloyed and low-alloy steels, electric, transformer, dynamo-sheet steels, and other types of high-quality metal. They formulate plans for a considerable expansion in the output capacity of the industries engaged in the production of stainless and, particularly, heat-resistant alloys; for an increase in the production of refined copper, aluminum, lead, zinc, nickel, and other metals and alloys needed for power engineering, rocketry and jet-propulsion engineering, chemical and radio engineering industries, power-plant and transmission-line construction, cable communication systems, and the other branches of national economy.

The 21st Extraordinary CPSU Congress has paid special attention to the problems dealing with the development of ferrous and non-ferrous metallurgy. In his report to the Congress, Comrade N.S. Khrushchev stated that the 1965 production is slated to attain the 65-70 million-tons mark for cast iron, 86-91 million tons for steel, and 65-70 million tons for rolled stock. In the current seven years it is proposed to invest more money in the construction and reconstruction of ferrous and non-ferrous metallurgical plants than over the entire preceding 30-years period. The preliminary figures of the plan for national economic development of the USSR for the years 1959-1965, as approved by the 21st CPSU Congress, provide for a considerable boost in electric steel production, for a wide application of the vacuum processes in steel manufacture and heat treatment of rolled stock, and for expanded utilization of other progressive methods. Further development of non-ferrous metallurgy is to be achieved on the basis of electrification of technological processes, mastery of new progressive technological cycles alongside with wide-spread introduction of mechanization and automation.

The workers of the metallurgical industry, like all the working people in our country, await with growing expectations the opening of the 22nd Congress of the Soviet Communist Party.

The exceptional importance of the forthcoming Congress is due to the fact that the Congress will consider and adopt the new Communist Party Program.

More than 40 years have elapsed since the adoption of the present CPSU Program. Naturally, it does not reflect the great changes which have taken place in our country and in the world during this period pregnant with great events of universal historical importance.

The new Program which the Central Committee submits to the 22nd CPSU Congress for discussion is the grand program for the construction of communist society.

The draft-program of the Soviet Communist Party embodies a harmonious system of ideas and principles for the creation of a communist society. This is a grand plan of action for the entire people, the communist party, the Soviet state. Characteristic for this plan are its extraordinarily wide scope, exceptional realism, and the precise, scientifically substantiated, design.

How great were the achievements of our people one may judge by the example reflecting the development of the metallurgical industry and the production of metals in the USSR.

Table 1 shows the growth pattern characterizing the production of pig iron, steel, and rolled ferrous metals in our country for the period since 1928 to 1960 in comparison with the 1913 level. The Table also gives the 1965 planned figures for these types of industrial production, as approved by the 21st CPSU Congress.

It may be seen from this Table that after a temporary drop in the years of the Great Fatherland War the volume of pig iron, steel, and rolled stock production has rapidly, and in very considerable proportions, exceeded the pre-war level, in growing persistently from year to year. In 1960 the output of rolled ferrous metals in the USSR was 16 times that of 1913, and almost 4 times greater than in 1940. The production of pig iron and steel increased by a factor of 3-3.5 as compared to the 1940 level.

For purposes of comparison we shall list here the data on pig iron and steel production in a number of capitalist states (Tables 2 and 3).

In the United States of America—the strongest of all the capitalist nations—the production of pig iron was 11.3% lower, and of steel—13.7% lower in 1960 than in 1956. In the USA ferrous metallurgy is the industry which pulls the national economy back. In 1960 an over-production crisis

TABLE 1

Material	Year-by-year production growth for pig iron, steel, and rolled ferrous metals in the USSR, in millions of tons										Proposed figures for 1965
	1913	1928	1937	1940	1946	1956	1957	1958	1959	1960	
Pig iron . . . . .	4,2	3,28	14,5	14,9	9,86	35,8	37,0	39,6	43,0	46,8	65—70
Steel . . . . .	4,2	4,25	17,7	18,3	13,34	48,7	51,2	54,9	60,0	65,3	86—91
Rolled ferrous metals . . . . .	3,5	3,43	13	13,1	9,6	37,8	40,2	43,1	47,0	50,9	65—70

TABLE 2

Steel						
	1937	1956	1957	1958	1959	1960
U. S. A. . . . .	51,4	104,5	102,3	77,3	84,8	90,1
U. K. . . . .	13,2	21,0	22,0	19,9	20,5	24,7
France . . . . .	7,9	13,4	14,1	14,6	15,2	17,3
G. F. R. . . . .	—	23,2	24,5	22,8	25,8	30,3
Italy . . . . .	2,32*	5,9	6,79	6,3	6,8	8,2
Japan . . . . .	5,8	11,1	12,6	12,1	16,6	22,1
Canada . . . . .	1,2*	4,8	4,6	3,9	5,4	5,2

\*In 1938.

TABLE 3

Steel						
	1937	1956	1957	1958	1959	1960
U. S. A. . . . .	37,7	68,9	72,0	52,4	55,1	61,1
U. K. . . . .	8,6	13,4	14,5	13,2	12,8	16,0
France . . . . .	7,9	11,6	12,1	12,6	12,6	14,3
G. F. R. . . . .	—	17,6	18,4	16,7	18,4	22,4
Italy . . . . .	0,9 <sup>±</sup>	2,0	2,07	2,1	2,1	2,7
Japan . . . . .	2,3	6,3	7,1	7,7	9,8	12,3
Canada . . . . .	0,8 <sup>±</sup>	3,5	3,6	2,9	3,8	3,9

\*In 1938.

developed in the steel industry. Steel production for the second six months of 1960 fell 37% short of the output registered in the first six months. In the second half-year period the US steel industry worked at half its capacity, and the US share in the world's steel production continued to decline. The 5.3 million tons increase in the output of steel registered in the US in 1960, as compared to 1959 (see Table 3), will become comprehensible if one considers the fact that some 80-90% of America's steel plant remained idle for almost 4 months in 1959 owing to strikes.

The growth of steel production in Europe (as well as in Japan) is due to a certain extent to the above-mentioned strike of the steel workers, when the consumers of ferrous metals in the US were compelled to import steel on a large scale. At the same time a drastic drop in American steel exports, permitted the West European countries and Japan to penetrate the US markets in Latin America.

However, according to the estimates of the bourgeois economists, a very modest growth in the production of ferrous metals is to be expected in Europe in 1961.

During the first trimester of 1961 the production of steel in the Common Market nations (the U. K. , France, German Federal Republic, and so on) has grown less than 3% as against the same period in 1960. Let it be recalled, that the law regarding the state plan for the development of the national economy in the USSR for 1961, adopted by the 6th Session of the Supreme Soviet of the USSR, envisages a 9% growth in pig iron, steel, and rolled stock production as compared to 1960. This plan is being successfully executed and will, it seems, be over-fulfilled.

Of great interest is a comparison of the average yearly growth rates and absolute growth figures for pig-iron and steel production in the USSR and USA. The data for the seven-year period 1954-1960 are given in Table 4.

In view of the high development rates of metallurgical production in the USSR, the considerable gap in per-capita metal output between our country and the capitalist nations shows a rapid and persistent decline (Table 5).

According to the 1960 data the per-capita steel production in the USSR comprized 61% of the corresponding USA index.

Such are the figures which characterize the growth dynamics of our economy as illustrated by one of its decisive sectors—the production of ferrous metals.

The CPSU Draft-Program emphasizes the fact that the Soviet Union does not solve the problem of communist construction in isolation, but in concert with the brotherly family of socialist nations.

The laws which operate in the world's socialist system assure a persistent and regular economic growth to all the nations included in it.

The achievements of the world partnership of socialist nations may be judged by the example set forth in steel and pig iron production (Table 6).

TABLE 4

Material	Average yearly growth rates in % values		Average yearly absolute increase in mill. t.	
	in USSR	in USA <sup>1</sup>	in USSR	in USA <sup>1</sup>
Cast iron	+7.9	-1.7	+2.8	-1.1
Steel	+8.0	-1.7	+3.9	-1.6

<sup>1</sup>The minus sign indicates a drop in production.

TABLE 6

Years	Steel	Pig iron
Volume of production in mill. t.		
On the eve of World War II . . .	25.4	20.3
In 1950 . . . . .	36.2	24.9
In 1960 . . . . .	105.2	90.0
Growth in 1960 in % values		
In relation to 1950 . . .	291	362
In relation to the pre-war level . . .	414	443

TABLE 5

Material	Years	Per capita production in the USSR as a percentage of the per capita production in the other leading industrial nations				
		U. S. A.	U. K.	France	Germany	G. F. R.
Pig iron	1913	8	12	12	8	—
	1937	30	48	46	26	—
	1945	15	35	174	—	—
	1953	34	65	71	—	60
	1959	66	83	74	—	58
Steel	1913	8	16	16	9	—
	1937	27	38	56	26	—
	1945	14	30	170	—	—
	1953	32	57	86	—	63
	1959	59	72	84	—	57

The share of the socialist nations in the world steel production amounted to 19.2% in 1950, but in 1960 it had already attained the 31.8% mark. The average yearly growth rate for total industrial production over the period 1951-1960 comprised 13.7% for all socialist countries, and 4.8% for the capitalist countries, or three times less. High economic growth rates are a regular development feature of the socialist system. This predetermines the victory of socialism in the economic competition with the capitalistic system of economy.

"The world socialist system, declares the CPSU Draft-Program, moves confidently forward to a decisive victory in economic competition with capitalism. Already in the nearest future it will affirm its superiority over the world capitalist system in terms of total industrial and agricultural production volume."

All the precedent development of the Soviet socialist society has laid the foundations for gradual evolution of socialism into communism. The building of a communist society has become the immediate practical task facing the Soviet people.

The 22nd CPSU Congress will outline in the Party Program the basic goals for the construction of the communist society in accordance with the need to pursuing their realization by successive stages in harmony with the obtaining material and spiritual premises. In 1961-1970 the USSR will surpass the strongest and the richest capitalist country, the US, in terms of per-capita production. In 1971-1980 the material and technical basis of communism will be created. An abundance will be assured of material and cultural benefits and the Soviet society will be ready to begin realizing the principle of distribution according to need. The main economic goal of the communist party and the entire Soviet people is to create the material and technical foundations for communism in 20 years. The USSR will have at its disposal powerful productive forces, it will surpass the technological level of the most developed nations, and will occupy the first place in the world in per-capita production. On the basis of the subsequent development of heavy industry, all branches of the national economy—agriculture, consumer goods industry, construction, transportation, communication, and so on—will be re-equipped.

The Draft CPSU Program proposes to increase the volume of industrial production by approximately 2.5 times in the next 10 years, and to better the present-day level of industrial production in the USA. In the course of 20 years the volume of industrial production will be expanded by a factor of more than 6. Labor productivity will increase considerably: it will double in 10 years and will grow 4-4.5 times in 20 years.

The share of metals and alloys with new properties will expand considerably in overall production. A great and intensive effort should be devoted by the metallurgists, metallographers, furnace operators, casters, forge operators, and welders in the industry and scientific-research institutions to the research of such metals and alloys, to the development of technological processes for their production, and methods of their heat treatment.

A further rapid increase in the production of metals and fuels—which, according to the Draft-Program, constitute the foundation of modern industry—remains as before one of the most urgent problems of national economy. In 20 years time the ferrous metallurgical industry will be capable of turning out approximately 250 million tons of steel yearly, i. e. four times more than in 1960. Moreover, the average yearly increase in the USSR steel production in the next two decades will amount to 9.2 million tons. The output of steel must fully satisfy the requirement of the national economy. The production of light, non-ferrous,

and rare-earth metals will be greatly accelerated, and a considerable growth will be achieved in aluminum manufacture.

In the course of the preliminary discussions of the draft-program, interesting ideas were expressed in the press with respect to the great technological changes which are bound to occur in the next 20 years in the production and hot and cold treatment of metals. Complex automation of production will develop on a mass scale with an ever growing transition to fully automated plants and entire factories. Engineering research institutes are engaged in designing the features of the future totally automatic metallurgical works which will form a complex component of a blast-furnace-and-steel-rolling combine, or of an auxiliary economic unit, with a fully automated transportation system. Conveyer charging systems are already being installed in many industrial plants; experimental pumping aggregates are being introduced to handle liquid cast iron; and the automation of blast-furnace processes with the use of computers has been initiated. Extensive and ingenious research must be carried out in the field of complex mechanization and automation of heat- and thermochemical treatment of ferrous and non-ferrous metals and alloys.

The most urgent national goal to be attained in all fields of economic endeavor, including the domain of metallography and heat treatment of metals, is to achieve the greatest possible acceleration of scientific and technical progress, continuous technological improvement, introduction of the latest progressive processes into production, including the methods of electric treatment, and the procedures assuring greater strength, plasticity, wear and corrosion resistance of metals.

Thousands of researchers in scientific-research institutions—the Central Scientific-Research Institute of Ferrous Metallurgy (TsNIChERMET), the Central Scientific-Research Institute of Heavy Machinery (TsNIITMASH), the Scientific-Research Institute of Chemical Engineering (NIKhIMMASH), the Polzunov Central Institute of Boilers and Turbines (TsKTI im. Polzunova), and many others—and in numberless industrial laboratories are engaged in studying and perfecting the existing metals and alloys, the technology of their casting, forging, welding, thermal treatment; they strive to increase reliability and durability of these materials under exposure to high temperatures and pressures, constant and variable loads, aggressive media, and so on. A considerable progress was achieved in this field during the recent years. Alloys were synthesized for artificial Earth satellites, inter-continental rockets, cosmic ships, atomic devices, for new super-powerful turbines, for diverse types of sophisticated machines, instruments and equipment created by our national industry.

Our scientists-metallographers must work even harder, even better, in developing broadly their theoretical research while remaining in continuous touch with the creative work of the people. The role of science is evaluated thus in the Draft-Program: "Science will in full measure develop into a spontaneous productive force". It is a matter of honor for the scientists who work in the field of metallography and heat treatment of metals to see to it that the achievements in the science of metals can be evaluated by so high a standard.

The 22nd CPSU Congress is being convened at a time when our country has won tremendous victories affecting the history of the world. The seven-year plan is being successfully fulfilled and over-fulfilled. The prestige of the Soviet Union and its role in the world arena have grown higher than ever before. The untiring and persistent struggle for peace, against the unleashing of a

new war, has won for our party and the Soviet government the profound esteem and gratitude of the entire progressive part of mankind. The peoples inhabiting our planet enthusiastically hail the outstanding victories of Soviet science and technology in the conquest of outer space.

The Soviet people welcomes the 22nd Communist Party Congress by offering the Fatherland the gifts of its labor. The first half-year plan for 1961 — the third year of the septennial — was successfully fulfilled. Comrade N.S. Khrushchev in his radio and television speech on August 7, 1961 said that in the two-and-one-half years of the septennial the industry has turned out 15 billion roubles

worth of goods more than scheduled for this period of the seven-years plan. The surplus production includes 7.6 million tons of steel and 6 million tons of rolled stock.

The 22nd CPSU Congress will approve the grandiose peaceful plans of our future life. It will make a priceless contribution into the great repository of the eternally living and continuously developing creative doctrine of Marxism-Leninism. The Congress will enter into the history of our party and our country, into the history of the struggle for a brighter future, for the happiness of mankind, for communism, as one of its most luminous and glorious pages.

## HEAT-RESISTANT STEELS AND ALLOYS

### OBSERVATION OF THE MECHANISM OF FAILURE IN SHORT-TIME TESTS OF AUSTENITIC STEELS AT 1100°C

I. A. ODING, Corresponding Member, Academy of Sciences of USSR;  
M. G. LOZINSKIY, Doctor of Technical Sciences;  
Ye. I. ANTIPOVA and V. N. STEPANOV, Engineers

Institutes of Metallurgy and of Mechanical Engineering,  
Academy of Science of USSR.

This report gives the results of an investigation of the failure of specimens of two steels—EX18H9 and 4X14H14B2M—during tension under constant load at a temperature of 1100°C in vacuum. The time to failure was 3–30 minutes.

The composition of steel EX18H9 was: 0.07% C; 18.0% Cr; 9% Ni; 1.56% Mn; 0.31% Si. The composition of steel 4X14H14B2M was: 0.45% C; 14% Cr; 15% Ni; 2.3% W; 0.6% Mn; and 0.34% Si.

Fig. 1 shows a specimen (a) and the arrangement (b) of the indentions made by a diamond pyramid on its polished surface prior to testing. The indentations were made along the axis of the specimen at intervals of  $50\mu$  and served as a basis for determining the amount of deformation during the experiment. The field of vision of the MVT microscope was such that about 10 indentations could be seen simultaneously.

In order to conduct the experiment, some of the elements of the IMASH-5M unit [1], [2] were modernized. In order to increase the sensitivity of the loading system, the unit for transmitting force from the lever to the upper clamp of the specimen was changed.

The new elongated tombac-alloy syphon of small diameter (replacing the previously used shorter one with large diameter) increased the mobility of the system transmitting the load to the specimen. The influence of variations in atmospheric pressure on the total load applied to the specimen was reduced.

Fig. 2 shows the modernized operational chamber of the IMASH-5M installation. The evacuated chamber (1) is fastened to the frame (2). The pull rod (3) of the loading system is connected via the syphon, which is covered by a protective jacket (4), with the clamp holding the head of

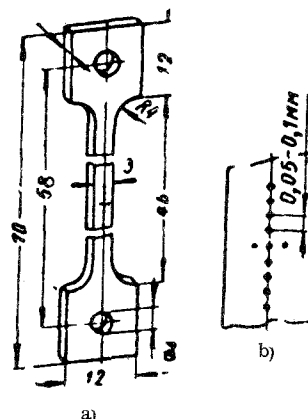


Fig. 1. Specimen used for testing on IMASH-5M installation.