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SCIENCE AND ENGINEERING NEWS FROM SOVIET TECHNICAL PERIODICALS

Uzbekenergo has become the heavy-duty power system of Central Asia. In the production of electric power, the Uzbek SSR now ranks fourth after the RSFSR, the Ukrainian SSR, and the Azerbaydzhan SSR. After World War I, the largest electric power station in the whole Central Asia was a DC Diesel station with a capacity of 1,475 kilowatts.

In April 1926, the Bozsuysk Hydrostation began operation. This provided the first hydroelectric power in Uzbekistan, where at present 11 hydroelectric stations are in operation. Five of these were built during World War II.

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The electrification of Uzbekistan is being carried out on a high technical level.

In May 1946, the Burdzharsk Hydrostation was made completely automatic. In the same year, the Uzbekenergo system was enlarged by the addition of a new automatic remote-control hydrostation. The remote control panel is located 7 kilometers from the station.

Works of the central industrial research laboratory and the mechanical repair plant of Uzbekenergo are manufacturing automatic station apparatus, such as automatic synchronizers, automatic frequency regulators, flow relays, float relays, pressure relays, zero-rotation relays, remote control indicators of water level, etc.

During the first postwar Five-Year Plan, all hydrostations of Uzbekenergo will be automatized. Work on the remote control of the system's hydrostations from the main stations and central control point of Uzbekenergo will be completed in 1950.

Up to the beginning of World War I, electric power in Armenia consisted of ten small electric power stations with a total capactiy of 3,100 kilowatts. The yearly output of all these stations was 5.2 million kilowatt hours. But in 1947, the engineers of Soviet Armenia, successfully completing their obligation for the 30th anniversary celebration of the Great October Revolution, supplied their country with 20 million kilowatt-hours above the quota.

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In pre-Revolutionary Armenia there were two electrical engineers. Now there are some 400 engineering-technical workers in the field of power engineering.

Since the beginning of the Armenian SSR, the capacity of its electric power stations and its electric power production have increased a hundredfold.

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The Kashirskiy Electric Power Station, mastering the industrial use of low-grade Moscow coal on a wide scale, has played a special role in the history of power engineering in the USSR.

In a relatively short period, this station has achieved high economic indices for its work in spite of a number of very difficult conditions, in particular, the great moisture and ash content of this low-grade coal. Where, in 1922, specific fuel consumption was over 1.5 kilograms per kilowatt-hour of electric power produced, in 1940 it had been reduced to 0.52 kilograms. By 1947, the specific consumption of second-class fuel by the Kashirskiy Electric Power Station has been reduced to 0.48 kilograms per kilowatt-hour of electric power.

For its successful work in wartime, the collective of the Kashirskiy Electric Power Station, by decree of the Presidium of the Supreme Soviet of the USSR, was awarded the Second Order of the Labor Red Banner.

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During the years of Soviet authority, large heat and power plants to supply heat to industrial and residential consumers have been built in Moscow, Leningrad, Khar'kov, Kiev, Rostov, Novosibirsk, and many other cities. In 1947, the capacity of central-heating turbines had been increased 6.5 times in relation to 1932.

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In the locomotive with a chamber superheater, such as the one suggested by inventor I. V. Pirin, a constant superheating temperature of up to 500 degrees can be obtained in the same time that a conventional boiler with a fire-tube superheater reaches a moderate superheating temperature. Moreover, the latter depends on forcing. The capacity of such a locomotive exceeds that of the conventional type by 25-50 percent, and its efficiency is increased by 30 percent.

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Processing the feed water for locomotives with boiler compound (an antisediment compound composed of phosphates, alkalis, and organic colloids) proved to be a very important measure in increasing locomotive mileage between boiler flushings.

Locomotive mileage on the roads in 1935, was, on the average, from 1,200 to 2,500 kilometers [per month?]; and in 1940, 5,800 kilometers.

In addition, this processing of the feed water made it possible to achieve cleaner boiler operation, which fact contributed to a reduction in costs for heating and locomotive repair.

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The capacity of the locomotive fleet of Tsarist Russia on the eve of World War I was 10 million horsepower, while up to 1941 one group of new FD, IS, and SO locomotives, constituting only a small part of the national locomotive fleet, by itself totaled 13 million horsepower.

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During the current Five-Year Plan, the railroads will receive 6,165 locomotives. The level of locomotive construction in the USSR in 1950 will be twice as high as the prewar level.

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In July 1926, traffic was opened on the first electric railroad in the USSR, linking Baku with the Petroleum industries in Saburchi and Surakhany. In 1926, the total extent of electric railroads was 20.5 kilometers. In 20 years it has increased 100 times.

The length of electric railroad lines in operation in the USSR will be 7,500 kilometers by 1950.

In one year alone, the introduction of electrification on lines with freight traffic was responsible for a saving of 430,000 tons of fuel and 26 million rubles. In the Moscow-Zagorsk district each motor coach section has replaced an average of 14 coaches of the suburban type.

The number of servicing personnel has been reduced 24 percent, on the average, through the introduction of electrification.

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Although the over-all length of electrified lines at the end of the Five-Year Plan will total only 6 percent of all the lines, in volume of work, the electric railroads will carry 13.9 percent of the total railroad tonnage of the USSR.

The number of passengers hauled by the electrified lines will be over 30 percent of the total number of passengers hauled on all lines.

During the Five-Year Plan, along with the electrification of isolated sections and lines, the large railroad trunk line from Belovo to Novosibirsk to Omsk to Chelyabinsk to Dyema, a total distance of over 2,000 kilometers, will be electrified.

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As early as 1909, advanced Russian engineers, both in the Kolomenskiy Machine Construction Plant and on the Tashkent Railroad, almost simultaneously set out to develop the construction of the first heavy-duty Diesel locomotives in the world.

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Therefore, Russian engineers are the pioneers of Diesel locomotive construction. However, under the conditions of Tsarist Russia, the Diesel locomotive was not put into operation.

The following data tells the efficiency and value to the national economy of Diesel locomotives: The efficiency of the Diesel locomotive is 25 - 30 percent, whereas the efficiency of a conventional steam locomotive is no more than 8 percent. The consumption of fuel in the Diesel locomotive is 4-4.5 times less than in the steam locomotive.

The Diesel locomotive can be used on railroads in arid regions and in districts where the water is unsuitable for supplying steam locomotive boilers.

It was only in 1924 that the first Diesel locomotive, the ShchEL-1, at that time the first heavy-duty freight locomotive in the world, was put in operation. The Kolomenskiy Plant imeni V. V. Kuybyshev, where the idea of a Diesel locomotive was first born became one of the national bases for series construction of Diesel locomotives.

The Five-Year Plan calls for the conversion of 7,000 kilometers of railroad lines to Diesel locomotion, and also for the construction of 865 locomotives of the new, improved TE type.

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In 1937, Prof A. P. Gulyayev established that treating steel at below-zero temperatures, 70 below and lower, increased its hardness and durability. Engineer I. B. Levin has constructed an apparatus for treating tools of high-speed steel with the aid of liquid nitrogen at an initial temperature of minus 187 degrees.

Tests show that with this method the durability of the tools is more than doubled. Thus, for example, one of the treated thread-milling cutters will process 62 parts instead of 29.

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In the first Ural Tube-Rolling Plant, a method for rapid drawing of the tubes on drums was used for the first time. This method made it possible to attain a rolling speed up to 80 meters per minute for small-diameter tubes as contrasted with the conventional 18-20 meters per minute with the old technological process.

In this same plant, as a result of rationalizing production in one plant unit for breaking billets, it was possible to decrease the staff of the section which prepares the metal for rolling by 32 men. At the same time the quality of the work improved.

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The Molotov Hydroelectric Station will be the first spillway-type hydroelectric station in the USSR. It has no conventional separate machine building; the units of the plant are housed directly in the spillway dam, the basic feature of this type station.

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Calculations have shown that under the conditions at the Molotov Station, a direct-flow unit with a capacity of 21,000 kilowatts (the turbine and generator are combined in a single construction unit and placed directly inside the water conduit of the hydrostation) and an operating wheel diameter of 5 meters will be little more than half of the weight of the conventional hydro unit.

Great economy in construction operations is also being achieved on this project.

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The use of domestically constructed steam boilers, turbines, and auxiliary equipment designed for super-high parameters (160 - 180 atmospheres and 500 - 600 degrees) assures a fuel saving of 10 - 15 percent in comparison with standard units of high parameters (90 atmospheres and 480 degrees).

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During the first postwar Five-Year Plan, the USSR steam-turbine industry should manufacture steam turbines with a total capacity of more than 9 million kilowatts. Three fourths of the manufactured power equipment will have high steam parameters (100 atmospheres and 500 degrees). The 100,000-kilowatt turbine put out by the Leningrad Metal Plant imeni Stalin holds the world record for high-speed single-shaft turbines.

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In 1947, the "Krasnyy kotel'shchik" Plant manufactured the first high-pressure boiler (100 atmospheres and 500 degrees) in the USSR with natural circulation (with forged drums).

The plant also mastered production of all auxiliary elements of the turbine apparatus and high-pressure feed pumps rated at 270 cubic meters per hour at 150 atmospheres.

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Up to 1941, a US-made water turbine with a capacity of 91,000 horsepower and an efficiency of 90.4 percent was used at Dneproges. In 1947, the Leningrad Metal Plant imeni Stalin manufactured, according to the specifications of Dneproges, a water turbine of 102,000 horsepower and an efficiency of 93 percent.

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Tye Tyrny-Auzskiy deposits are located in the Northern Caucasus, 3,000 meters above sea level. Development of these deposits creates considerable technical difficulties. Mining engineers F. T. Kulik, E. K. Il'nitskiy, and V. V. Kurteyev, and others have suggested exploitation of the upper parts of the beds, by resorting to blasting in the passages already worked.

Productivity of the drillers has been increased more than four times while for the miners, it has been doubled. The consumption of ammonite has been reduced from 0.46 to 0.37 kilograms per ton of ore.

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The Magnitogorsk Plant has mastered the production of terracing plows. Introduction of these plows in surface mining works is freeing a very large number of workers usually employed on the terraces. One plow replaces 50 men.

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