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THE RECONSTRUCTION OF A USSR WHEEL-ROLLING SHOP

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In the reconstruction of the wheel-rolling shop at the Metallurgical Plant imeni K. Libknekht in Dnepropetrovsk, approximately 3,000 tons of industrial equipment were assembled, a considerable part of which had to be rebuilt. Expenditures for this type of repair constituted 47 percent of the total cost of the machine assembly work which was done by an administration of the Soyuzmontazhstroy (All-Union Assembly and Construction) Trust.

The shop was rebuilt in the following order: ingot-cutting, furnace, press, and rolling divisions; the rear section, and the hydraulic accumulator station. As soon as the completely destroyed accumulators were removed, an automatic pneumatic-hydraulic installation was assembled.

The equipment of the main press and rolling divisions consists of (a) three steam hydraulic presses -- 3,000, 7,000, and 2,500 tons -- equipped with intensifiers with a working pressure at 400 atmospheres; (b) a wheel-rolling mill; and (c) auxiliary machines -- gantry and bracket cranes, compressors, pumps, etc. The 2,500-ton press was completely demolished, while the 3,000-ton and 7,000-ton presses were only partially damaged. The rolling mill, although not damaged, was somewhat worn out, so that its parts had to be almost completely replaced.

The Ural Heavy-Machine Building Plant produced the necessary parts for the 3,000- and 7,000-ton presses as well as a new 2,5000-ton press, intensifiers for all three presses, and the hydraulic drives.

When the equipment of the ingot-cutting division was put into operation, it consisted of the two old ingot-cutting machines which were completely rebuilt on the spot, and a number of new machines, called "Krasnyy proletariy," built by the Kramatorsk Machine-Tool Building Plant, the first of their type built by the Soviet machine-building industry. Other equipment of this division includes: an ingot breaker -- a horizontal 200-ton hydraulic press -- ingot cars, cranes, and other auxiliary equipment. A second ingot-breaker should be installed in the future.

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The hydraulic accumulator station, which supplies the press with water at a pressure of 160 and 60 atmospheres, consists of the following equipment: for hydraulic and three plunger pumps with pressure up to 200 atmospheres, two centrifugal multistage pumps with pressure up to 60 atomospheres, a group of hydraulic accumulators at 60 atmospheres (one water and two air tanks), a group of hydraulic accumulators at 160 atmospheres (two water and six air tanks). The entire water supply system has been made completely automatic.

Assembly work was begun as soon as the foundations for the presses were ready. The building of the foundations under the intensifiers and the roof laying and other construction jobs were done simultaneously with the assembly of the presses. The installation of the foundations for the presses was done in accordance with technological demands, accurate within 0.05 millimeter per one running meter of foundation. Inspection of the installation was done by a control level accurate within 0.03 millimeter per running meter, while deviation was permitted at only one section of the level. The foundation was made of quick-drying cement so that assembly could begin on the third day after pouring.

Parts of the main units of the 7,000-ton press, including the sliding crosshead, the foundation, and the architrave, were joined together by 125-millimeter-diameter bolts. Once the foundation was built, the sliding crosshead was assembled on it and the main columns were installed through the openings in the crosshead. A railroad crane was used to install the 30-ton columns, an extremely complex procedure since the structure of the shop and the previously installed columns hampered the movement of the crane boom in handling such large columns; the crane had to be moved to a new position each time one column was to be installed. The columns had to be installed with particular care since the slightest deviation would cause the bushings of the crosshead to jam on the columns.

The most complex operation in assembling the 7,000-ton press was the installation from above of the columns of the architrave, the parts of which weigh 50 tons each. The bushings of the crosshead were put in from below, so that the assembled 250-ton crosshead had to be raised 2 meters.

All that was preserved of the 200-ton wheel-rolling mill were the main bed, reducer with underframe, and the plate of the vertical shaft bearing. All other parts are new. But the preserved parts were somewhat misshapen from wear and long exposure to the elements, so that their final installation could be done only after complete assembly of the mill and alignment of the cardan shaft, the bevel gear drive, and the vertical shaft. The assembly work was considerably complicated by the lack of necessary parts, the production of which was completely unsatisfactory because of the small capacity of the machine shop. It was not until the end of the assembly work that the problem of sending out orders was solved.

A complete inspection was made of all machinery prior to the idling tests. The idling test of the mill at first consisted of the shortest run through, and then gradually prolonged operations from 2 to 20 minutes at low speed. Finally, it was run for several hours at a time, from 4 to 8 hours, with a gradual increase in the number of revolutions from 100 to the maximum. After this, the reducer and main bearings were inspected. The next state was hot testing of both the presses and the mill simultaneously, in the order of operation corresponding to actual production of a wheel. All machinery and equipment for transporting the ingot to the press were tested together with calculation of the pressure volume in the main cylinders and the time needed to process one ingot per operation.

The assembly of the accumulator station units was completed in an extremely short time. The housing of the station was rebuilt. It was necessary to remove a large number of old foundations, thus delaying assembly work for 2 months, during which time ters of the pumps were made. Inspection of the pumps revealed the need for much repair work, particularly new lining of all crank and crankpin bearings of the pumps and all bearings of the reducers, for which one ton of B-83 babbitt was necessary.

The accumulator installation, located in a special annex, consists of 19 hydraulic tanks, of which 11 are for the wheel-rolling shop and eight for pumps of another shop scheduled to be rebuilt after the wheel shop. After the tanks were installed, they underwent hydraulic testing at one and one and a half working pressure, i. e. at 90 and 240 atmospheres, and were inspected by Kotlonadzor (Boiler Inspection).

The automatic control equipment for the station was assembled simultaneously with the installation of the basic equipment. The interlinking of the electric and hydraulic apparatus makes the operation of the pumps completely automatic.

/Diagram showing layout of equipment in the wheel-rolling shop, and photographs of the 7,000- and 3,000-ton presses, the wheel-rolling mill, and the hydroaccumulator station, may be obtained in the original document in the Library of Congress./

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