OVERHAUL PREPARATION AND THE OVERHAUL OF A 1300-m$^3$ CLASS-I BLAST FURNACE

L. V. Dovgan', G. N. Kovalev, and K. I. Shashkin

In October-November 1973, the "Donbass Blast Furnace Repair" Trust overhauled the 1300-m$^3$ No. 1 Class-I blast furnace at the Zhdanovsk Metallurgical Plant "Azovstal". In this case, a total of 1748 tons of metal structures was dismantled and 2461 tons assembled, and 3445 m$^3$ of refractory brickwork removed and 3926 m$^3$ placed; in addition, 18,341 m of piping were dismantled and reassembled.

The basic tasks that determined the repair time were:
1. tapping the remaining molten iron ("sow");
2. removal of the brickwork in the stack and well;
3. replacement of the shell of the stack, bosh, tuyere zone, hearth, and a section of the well;
4. replacement of the stack columns and ring platforms;
5. replacement of the skip bridge and runway of the skip pit;
6. replacement of the hot-blast line (the ring and lead-in sections of the bustle pipe), and
7. construction of a new scrubber and drop catcher and reconstruction of the section connecting the dust catcher and scrubber.

Rapid overhaul and high-quality work were realized from thorough and careful preparation. The metal structures and equipment of the evaporative-cooling gallery were assembled with use of a BK-300 tower crane prior to furnace shutdown.

A sectional metal frame for trial assembly of skip-bridge subassemblies, which were consolidated with consideration of the lifting capacity of the BK-300 crane, was fabricated in the region of the stockpiles. The skip bridge, together with the curved section, was assembled using the stockpile bridge crane, after which the skips were installed and the runway of the bridge inspected. After correction of all the defects, the bridge was broken down into ten large subassemblies, which were then positioned by setting planks and devices between them. All subassemblies of the skip bridge weighed 8-14 tons.

During trial assembly, the plates of the stack shell were consolidated and their number reduced to 24. The trial and consolidation assembly of the stack shell was carried out using the electric bridge crane in the cast house. The elemental plates of the stack shell weighed up to 2.5 tons. The shell plates were consolidated in three stages. The three lower belts of the stack (consolidated chart dimensions of 5708 x 4760 mm) were consolidated in the first stage, the four intermediate belts (chart dimensions of 7391 x 4261 mm) in the second, and the three belts of the upper section of the stack shell (chart dimensions of 5168 x 3672 mm) in the third. In each stage the plates were consolidated by butt welding the horizontal and vertical joints of the belts.

During consolidation assembly of the shell, the plate coolers were installed, the gaps between them filled with cast-iron cement, the gaps between the coolers and shell filled with a refractory solution, and the drainage fixtures assembled and welded.

Fig. 1. Pattern of technological openings in furnace shell: I) hole for upper scraper; II) same for lower scraper; III) openings for mapping and dismantling well; IV) openings for removal of coolers and spent brickwork.

During the consolidation assembly of the shell, 168 plate coolers (256 in all) were assembled. Coolers were neither installed over the vertical butt joints of the consolidated charts, nor in the region of the horizontal butt joint between the plates of the first and second stages. The consolidated sections with the coolers weighed 38-42 tons.

During trial assembly of the hearth, tuyere-zone and bosh shell, the air flanges of the tuyere zone were notched and collared. Trial assembly of the ring bustle pipe was accomplished by fitting and adjusting the conical necks.