

UKRAINIAN STEEL MILL OVERCOMES CHALLENGING LOGISTICS TO BOOST IRON PRODUCTION & REDUCE COKE COST



Calderys revitalised a medium-sized blast furnace with a working volume of 2700 m³, n°2 tap-holes and daily production of nearly 6000 tonnes of iron.

Background Situation

In Eastern Ukraine, a leading steel producer planned to modernise their blast furnace (BF) against all odds. Because of difficulties in obtaining critical machinery, a BF rebuild required innovative thinking to retrofit. In fact, the work was accomplished with a Blastcrete shotcrete pump, borrowed from a local Calderys client and REED mixers and pumps rented by an installation company.

The residual BF refractory lining was the primary focus, redone from the belly to the middle stack. The Calderys team was able to save part of the original upper lining with silico-alumina bricks.

A return to full production was welcome news for European and global customers of reinforcing bar and wire rod, considering that this mill is an important world-class producer. Their increase in productivity and cost savings will fuel plans for a complete furnace revamp in 2019.



Problems

- Difficult logistical conditions interrupted normal operations
- Critical equipment for retrofit was not available



Goals

- Rebuild and expand BF productivity
- Reduce coke costs



View of BF & platform assembly prior the repair



View of the stave replacement

Actions Taken

The project of the BF relining foresaw the installation of the refractory lining by manual shotcreting from the lower stack up to the armor plates and later the grouting behind the replaced staves.

Two platforms inside the furnace were installed and managed by the engineering company involved in the project. Led by the Calderys Ukraine team, the customer's team and key suppliers provided support as needed.

Initially the install was in total 358t. split in 32t. of CALDE® SPRAYCAST F 50 R; 326t. of CALDE® SPRAYCAST SIC 7R & 4,6t. of the grouting product CALDE® INJECT MF 50 G3. Because of their flat surface, installation of Y shape anchors were welded onto the staves. The lining construction adopted the standard Calderys "panelling" concept using a mobile framework, prepared with wooden panels, including 3mm insulating ceramic paper as compensation joints among the refractory sectors.



The yard installation at casthouse level



Anchors to be welded onto the staves



Operations for lining panelling & shotcreting application

UKRAINIAN STEEL MILL

The machinery allocated at the casthouse level and the installation combined the mixing and pumping steps with the Blastcrete mixer pump and the more powerful Reed pump. A local engineering company led furnace cleaning and staves anchoring.

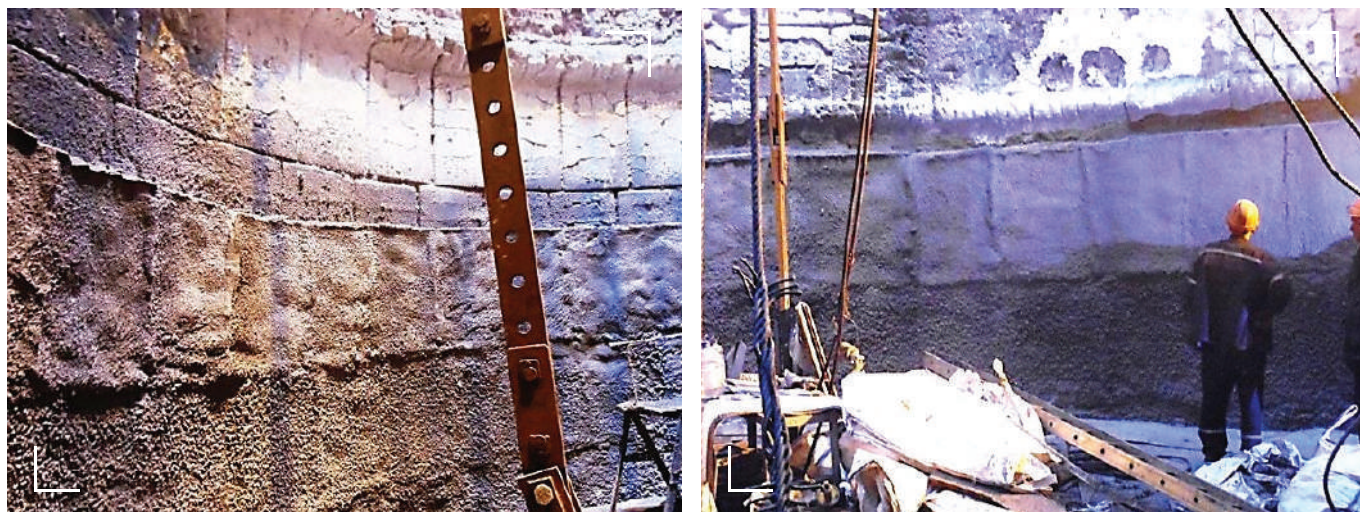
Because of the bad conditions of the lower BF zone, the client requested to start the shotcrete repair at the lower level. This variation led to reviewing the thicknesses of the lining and quantities to apply at the different furnace levels, progressively reducing the lining thickness from the 350mm of the lower stack to 200mm in the middle stack equipped with cooling staves.

The variation required the use of an additional 49t. of CALDE® SPRAYCAST F 50 R, which was luckily in stock and originally devoted to the repair of the Cowper. The shotcreting lining application was performed with a good installation rate up to 9-10 tonnes/h most of the time.

The used refractory materials showed good flowability and sticking behaviors even with water content at the maximum level of prescription to avoid clogging effects during the transport of the wet mix.

Results

The mill completed the retrofit of the BF on schedule. Says Igor Nesterenko, Ukraine Sales & Technical Manager for Iron & Steel, "Even facing many unusual obstacles, execution of the BF#8 relining was properly done, proving once more that a complex project gains from Calderys know-how and professionalism. Lowering coke costs by 10% or more happened because of a partnership effort with Calderys."



BF lining at completion

Benefits to the Customer

- Increased productivity, opening the way for further enhancements
- Increased daily production of iron by 10-15%
- Lower coke costs saving 10% or more
- Enhanced health and safety compliance

Report provided by the Calderys Ukraine Team.