NTMK NIZSHNIY TAGIL TURNS UP THE HEAT TO CONSTRUCT BLAST FURNACE IN ICY WINTER

BF-7 EVRAZ NTMK, Nizshniy Tagil, Russia

Spraycast and injection of newly constructed blast furnace, by Calderys Russia Installation Team

Background Situation

Russia's NTMK Nizshnly Tagil, part of the global Evraz Group, decided to schedule Greenfield construction for a new blast furnace in the deep freeze of icy winter in the Ural Federal District. The Calderys team needed to find a way to help the customer build the stack for NTMK's BF-7 on time and within budget. With Calderys expertise and support, NTMK's new blast furnace is now continuously producing 7000 tonnes of high-vanadium iron - one of only two mills in the world to do so.

Problems

- Harsh winter conditions to overcome
- Shortage of experienced specialists in a remote area

Goals

- Running the Greenfield BF at full production before the end of winter
- Building the Greenfield BF within strict budget and time constraints
- Optimising human performance and equipment during the installation

Actions Taken

In late January of 2018 NTMK Nizshnly Tagil and the Calderys team brainstormed options to create normal working conditions in hostile weather. This resulted in a novel breakthrough. The BF shell would be insulated from the outside in, enhanced by heating fans in tuyeres. The result was a leap from - 25ºC to + 25ºC inside the furnace shell.

Construction and installation productivity was optimized, and all equipment was easier to handle, being arranged on casthouse with a unique wooden cover built around it.

This way heating fans could easily create the desired temperature inside, so that working conditions were normal, and materials warmed up.

Another novel idea was having a truck-crane on the casthouse at all times, as well as providing helpers for big-bag operations to minimise the number of platform lifts.

Winter in the Urals is a wonderland, unless you are trying to build a Greenfield blast furnace in –25ºC

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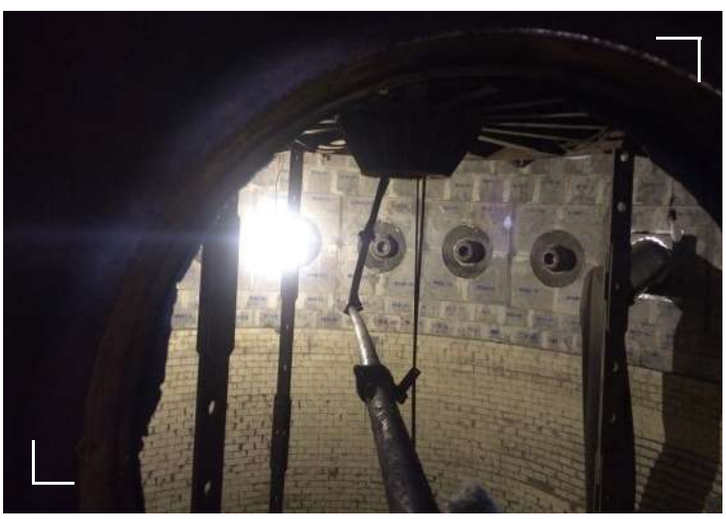
The solution was implemented consisting of the following elements:

Project scope of installation from level +14890 to +37200 with thickness from 475 to 120 mm required the following quantities of castables:

- 290 tonnes of CALDE® SPRAYCAST SIC 15 R in bosh, belly and lower stack;
- 121 tonnes of CALDE® SPRAYCAST SIC 7 R in upper stack by manual shotcreting;
- 171 tonnes of CALDE® INJECT MF 50 G3 injected in the gap between staves and BF shell.



Window into BF from tuyere hole. The NTMK Nizshnly Tagil Greenfield BF is the second constructed in Russia by Calderys; the first being BF -7 in Lipetsk.

Spraycast was installed onto the surface of staves equipped with metallic anchors, using standard Calderys technology. Cards were wrapped with 3-mm ceramic fiber paper in order to create compensation joints and allow for free movement of each separate card. For the whole stack, 1500 V-shaped alloy steel anchors were installed into grooves of cooper staves, 960 Y-shaped metallic anchors were welded onto iron staves and 360 m^2 of Ceramic fiber paper for compensation joints.

Rebound was collected in empty big bags on the platform by the Calderys team. The quantity was less than 2% against a declared limit of 5%. Spraycast of the whole stack required only 12 movements of the platform inside the BF, both a productivity and safety advantage.

Installation is running well when everybody on the team knows his function: installation by panels with compensation joints, working from stalls to make to rows of panels from one movement of the platform in order to save time, very little rebound (less than 3%) which proves lining quality

The platform was lifted up during the night shift, as the Calderys team worked only during the day. This working schedule was accomplished by only ten members of the Calderys Russia installation team, including supervisors - with no sub-contractors.

Says Calderys BF -7 Project manager, Dmitriy Povalyaev, "Our schedule required more time for everyday preparation work and equipment washing. But we did not need make stops for platform lifting."

Safety the Calderys way

Povalyaev notes "Access for our people inside BF -7 was organised via a maintenance door with a bell-less top. The ladder coming down to the platform was equipped with a safety guard and intermediate landing platforms. Regular safety inspections were held by NTMK EHS services with no remark or penalty written to Calderys. We can say that our team followed the high safety standards of Calderys and Evraz NTMK."

Injection was done from outside BF -7 from down to upper nipples welded in accordance with Calderys scheme for better control of the gap filling.

Project documentation like drawings, plan of job organization (the main document regulating project realization and its safety aspects), requirements and measures for works in severe winter conditions; executive project were developed by Calderys and agreed with NTMK.

Compact arrangement of mixing and pumping equipment in temporary organised covered space

Following safety rules: correct PPE, heating fan to create positive temperature

Results

- EVRAZ NTMK met their objective for quality of lining and rebound (2% against 5% acceptable limit)
- EVRAZ NTMK gained from Calderys' ability to adjust and find a solution in situ based on strong technical background, installation skills, and project management
- BF -7 started up in February 2018, ahead of schedule

Benefits to the Customer

- Acceleration of greenfield BF, overcoming extreme winter
- No premium paid for creative work methodology
- High quality of end products right from the start