

Tough test for steel



The steel was blasted and coated then craned into position for final fabrication before installation 40 metres above the base of the blast furnace.



Knuckle pieces at installation point.

In a first for Australia a new technical process to extend the life of blast furnaces is underway involving operations on both sides of the continent.

Using a special grade of XLERPLATE® steel, fabrication of the outer dome plate sections for major repair and maintenance work on the No. 5 Blast Furnace at BlueScope Steel's Port Kembla Steelworks is well ahead of schedule. The sections are being fabricated by Wenco at their workshop in O'Connor, an outer suburb of Perth.

This unique project, which will return steel as giant repair plates to the blast furnace which produced it, is well underway. Wenco is carrying out the fabrication work as a sub-contractor to lead contractor, the John Holland Group (JHG). Work on the No 5 Blast Furnace is strategically important for large, steel reliant sectors of Australian industry.

Wenco is supplying fabricated sections of dome plate covers to serve as new outer shells for three stoves which provide super heated air to the blast furnace. "The stoves are crucial pressure vessels which are subjected to enormous thermal stresses over several cycles around the clock each day," Peter Roberts, BlueScope Steel Project Manager explained.

"The No. 5 Blast Furnace was commissioned in 1978 and the remedial work is needed to keep the unit at its designed operating pressure efficiency. Wenco's dome plate structures will form a new outer shell over each of the three stoves which serve the blast furnace. This is new technology for Australia and will provide another 15 to 20 years of useful working life for the furnace."

"Nitrogen Oxide gases that are formed inside the stove above 1350 degrees Celsius condense on the surface and create corrosive nitrates. This attacks areas of high residual stress on the inside of the shell plate and affects the microstructures of the steel, which in turn leads to stress corrosion."

"The special grade of XLERPLATE steel which we have specified for the project is only available in Australia from BlueScope Steel and because of its unique properties is one that is not often used."

"It is known as creep-resistant steel or 16Mo3 steel and its molybdenum content makes it ideal for use in such severe applications. More than 100 tonnes will go into the fabrication of each dome, all transported by rail from the Bluescope Steel mill to Wenco," Peter concluded.

Wenco is fabricating sections of the dome plate covers from plate thicknesses ranging from 20 to 55 millimetres. The fabricated sections are then shipped back by rail to Port Kembla for blasting and coating.

The coating used was Stellatar, a relatively new epoxy coating which protects steel from stress corrosive cracking. Blasting and coating were carried out before installation 40 metres above the base of the blast furnace.

Wenco's Manager/Estimator Paul Peca said the project presented a challenge despite the company's wide experience in heavy engineering work.

"BlueScope Steel gave our staff a complete technical brief on the properties of the steel we were fabricating. One of the challenges on this job was that we had to hot form 55 millimetre XLERPLATE steel to a complex double knuckle. This involved heating the steel up to 900 degrees and welding the two sub-sections of the double knuckle. The finished segment is then normalised."

"The thinner sections were cold formed. Each individual ring was trial assembled prior to delivery. Completing the fabricated sections for the first dome went slowly because we had to calculate and then closely observe every procedure as we progressed," Peca concluded.

Fabricated sections of the dome plate steel travelled by rail from Wenco's workshops to Port Kembla where the steel was blasted and coated then craned into position for final fabrication.

More than 14 kilometres of welding has been necessary to complete each dome. The installation of the three domes will be completed by August this year.



Wenco workers prepare XLERPLATE® steel to fabricate outer dome plate stove sections for the blast furnace maintenance project.



Wenco Manager/Estimator Paul Peca: "Basically, if it can be engineered, we can fabricate it."