
Corus opens a GBP 60 million plant at Port Talbot steelworks

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Corus, part of TATA Steel Europe, has recently opened a new GBP 60 million plant at its Port Talbot steelworks, the largest investment in the UK steel industry since TATA acquired Corus in 2007.

Carbon monoxide gas from the basic oxygen steelmaking process at Port Talbot has a medium to high calorific value and as such is a valuable energy resource. The new plant recovers the CO and reuses it elsewhere across the 5,000 employee steelworks. It is also expected to reduce the emission of dust, known as PM10s, and halve the site's external requirement for natural gas.

For the recovery, cleaned gas is blown through a long 2.4 meters diameter pipe across site, with CO going to a new gasholder that supplies the plant's power station. The CO is mixed with lower CV gas recovered from the blast furnaces to keep the energy value at optimum levels. The BOS gas recovery has, on average, increased the power plant output from 61 MW up to 76 MW, reports Corus, which is now considering extending the process to recover other process gases around the plant.

The successful outcome required overcoming several technical challenges on the project, not least the high dust loadings of the off gasses from the BOS process.

A Corus spokesman explained that "The biggest problem with dust loading is maintaining plant availability, in particular the gas analysis equipment. It is difficult to strike a balance between speed of response for the analyzers and effective filtration to remove the dust and entrained moisture."

Another problem is that dust can build up over time on the induced draught fans, leading to vibration problems, and on the process valve seats, reducing their effective seal. Gas from the BOS process also passes through a scrubber system and becomes saturated with water, so that any dust monitoring equipment quickly becomes contaminated and ineffective.

The approach at Corus has been to remove as much of the moisture and dust from the process as possible. The original system at Port Talbot relied on an elbow separator to remove the scrubber water from the gas stream. On the new system, a cyclonic separator has been added after the elbow separator to reduce levels of dust and water reaching the ID fans.

Corus has also been fitted with automatic cooling sprays to reduce the temperature rise across the fans, which assist with dropping out entrained dust and fan washing to reduce build up. Additionally, fan power was increased to optimize pressure drops for cleaning at the Venturi scrubber in the BOS plant. The project team also installed an electrostatic precipitator after the gas holder, while the CV of the recovered gas is monitored for CO, CO₂, hydrogen and oxygen.

Gas analysis signals and the control software have been optimized to only collect the higher CV gas during the middle of the conversion process; this has resulted in higher CV to the power plant and higher outputs. All aspects of the process are automated and key parts have in line analytical instruments. Data is presented on SCADA displays in the control room, and is also retained for statistical analysis and archiving.

Mr Guy Simms a Corus project manager said that "This was a large project involving a great deal of monitoring and evaluation, as well as automation."

Mr Mike Lewis MD of Baytek said that work on the project was completed over a two year period and involved many contractors the main one being Siemens VAI, while control and automation was awarded directly to Baytek Systems of Ebbw Vale, Wales. The project required significant expertise and technical integration capabilities to make a single system out of so many diverse equipment types. The project work, he noted, had to be executed with plant in production.

Existing hardware at the Port Talbot site included Rockwell Control Logix and Eurotherm T940, together with Wonderware InTouch, Eurotherm E Suite and Proficy iFix SCADA systems. The control system for the gas recovery equipment had also to interface with the existing BOS converter control systems, as well as to new systems installed to control the BOS gasholder and export systems.

Systems were installed into purpose built substations, linked to control pulpits at the site's BOS plant and energy departments. Further changes were made in other gas using areas to ensure the new gas had a higher and more stable CV after the controlled mixing. Additional integration was needed for the plant's OSIsoft PI Historian data storage system and higher

Baytek's remit further included developing the complete functional design and detailed design specifications, with resulting documentation to meet with Corus's standards and safety requirements. To reduce risk and to avoid commissioning errors, Baytek developed a customized simulation scheme within the Wonderware InTouch package

This simulation was also used to train operators and maintenance engineers, said Lewis. The operators, he added, were closely involved in the design, content and layout of the SCADA screens to facilitate both acceptance familiarization. The basic oxygen steelmaking process involves blowing oxygen through molten pig iron to lower the carbon content of the alloy changing it into low carbon steel. The process is autogenous in that the required thermal energy is produced during the process.

The BOS vessel is partly filled with steel scrap. Molten iron from a ladle is then added: the ratio of hot metal to scrap is a critical process parameter. The vessel is then set upright and a water cooled lance lowered into it. The lance blows almost pure oxygen at velocities greater than Mach 1 onto the melt, igniting the dissolved carbon in the melt and oxidizing it to form carbon monoxide and carbon dioxide, causing the temperature to rise above 1,700C. The high heat melts the scrap, lowers the carbon content of the melt and helps remove other unwanted chemical elements. At the end of the blowing cycle, the molten steel is drawn off.

(Sourced from www.theengineer.co.uk)

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