

Tata Steel sees £500,000 annual savings thanks to advanced arc furnace control technology from Rockwell Automation

Foundries benefit from more affordable and more intuitive technology – replacing proprietary "black boxes" with more open Allen-Bradley solutions

Solutions

A Rockwell Automation solution was installed, which included:

- Allen-Bradley ControlLogix PAC with algorithm control
- FactoryTalk View SE
- RSLogix 5000

Results

- Flexible solution replacing proprietary "black box" technology
- Tata Steel's engineers are now able to undertake maintenance in house
- ControlLogix-based solution very price competitive compared to bespoke alternatives offered by other automation companies



Background

Inspec Solutions Ltd, founded in 2000, has worked in a variety of industries including many projects in the steel industry. The company has worked for most steel manufacturers in the UK and a large number of the steel formers and its website reads like a who's who of leading blue-chip steel, oil and infrastructure companies.

The company was founded with a view to servicing the control and information systems requirements of industry, in projects ranging from automating process and manufacturing processes to web-enabled database systems for the commercial sector. It is often the first contact for companies looking to either install new automation infrastructures, or upgrade existing ones. To either replace older, less reliable legacy control systems, which are hard to find spares for, or simply to make use of more accurate and more efficient contemporary automation equipment... with the directors stating a preference for Rockwell Automation technology.

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Challenge

Considering the scale of many foundries, it is often hard to believe that iron and steel production is actually an incredibly precise process. Process parameters have to be very tightly controlled and the recipes of "ingredients" for all the different grades have to be accurate to help create the optimum end product.

Mark Ritson, one of the directors at Inspec Solutions explains: "We design precision automation and control systems for iron and steel foundries, from the movement of the raw materials (iron ore, coke and coal), to the melting and refining processes right through to casting and product finishing lines, as well as the support processes such as cooling and fume extraction."

In this instance, Inspec Solutions was tasked by Tata Steel (formerly Corus) to upgrade the control infrastructure on three of its electric ladle arc furnaces; one installed in the early 80s the second early 90s and the third in 2004. One option open to Inspec was to use proprietary off-the-shelf furnace-control systems developed by other automation firms. But, being bespoke units, they did not offer the price competitiveness or open architecture of the Rockwell Automation-based solution that Inspec envisaged.

The 300-ton ladle arc furnaces are filled with steel and trimming materials (added as required) and are heated

using three large (600 x 3,000mm) carbon electrodes that are lowered to the steel. Arcs are generated across the electrode gaps through the steel – with up to 60,000A current on each phase – which generates tremendous levels of energy, in order to re-heat the steel in the ladle. It is the control of the electrode movement that has to be precise to maintain the correct arc length and hence the amount of heat going into the ladle.

Solution

Inspec was able to replace three proprietary "black box" electrode regulator/controllers with three identical ControlLogix-based electrode regulator solutions. As well as simplifying the install and cutting the spares inventory Inspec's solution also offered many other advantages, included giving Tata Steel engineers the ability to service the control units in house while offering all the benefits of a seamless interface to the overall furnace RSVIEW SCADA systems.

Justin Hall, technical director at Inspec tells us: "One furnace had an analogue regulator (for which Tata Steel could no longer source spares); one had a digital regulator; and the third a Windows NT based regulator. Regulators are used to control the arc length by using impedance figures to dictate constant movements of the electrodes. They are very specialised pieces of equipment that need specialist knowledge to programme them. We



needed to create something much simpler than the current "black box" that could be both understood and controlled by the engineers at Tata Steel; so we opted for a Rockwell Process Automation System (Logix and FactoryTalk® products) that gave us everything we needed."

Inspec Solutions teamed up with specialists from Sweden to provide the whole engineered package, Hall says "We created the control infrastructure, feeding details to the regulators using I/O and then our Swedish partners provided the control philosophy for each of the furnaces. The arc furnace control philosophy is based on complex algorithmic principles to model the system, replicated in RSLogix™ 5000."

Results

The installs required a two-day shutdown of each furnace, most of which was taken to replace the measuring equipment on the high-voltage (33,000V) side of the

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40MW furnace transformers and the wiring into the new regulators. The system was designed so that only measurements need to be taken from the primary side of the transformer and then the measurements for secondary side are calculated – something that is unique to the new control philosophy, the company believes.

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Ritson concludes: "We have used a lot of different products across a huge variety of projects over the years, and it is fair to say we all prefer to use Rockwell Automation-based solutions. In this particular installation, the BOS plant, there was an incredible array of legacy hardware and suppliers, but as we have helped Tata Steel steadily upgrade its whole automation scheme, the Allen-Bradley name has now become the standard for this area. We like the ease of use, the flexibility and the range of equipment on offer. It is very easy to achieve what you want with Rockwell Automation equipment and it is very reliable – it has never let us down. After all, we would hate to look foolish in front of our customers."

Additional Information

www.rockwellautomation.co.uk

The results mentioned above are specific to Inspec Solutions' and Tata Steel's use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.

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Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846