

£200K+ Annual Energy Savings on TATA Steels Rotherham Lead Plant Fume Extraction System



£650K 'Turnkey' Variable Speed Drive project replaces an existing troublesome 3.3kV DOL Extraction Fan Control System and saves over £200K+ in energy annual costs.

Established in 1907, Tata Steel is among the top ten global steel companies with an annual crude steel capacity of over 28 million tonnes per annum (mtpa). It is now one of the world's most geographically-diversified steel producers, with operations in 26 countries and a commercial presence in over 50 countries.

The steel casting plant at the Tata Steel Aldwarke Plant in Rotherham, South Yorkshire now saves over £200,000 a year following the installation of ABB variable-speed drives on its fume extraction system.

Two casting machines and two ladle arc furnaces within the Aldwarke Bloom Caster complex rely on a fully operational fume extraction plant, which removes unwanted fumes from the casting and secondary steelmaking areas. Fumes are a product of the chemical reactions that take place during the steel making process.

The original installation utilised four 3.3 kV motors, two 650 kW and two 410 kW. The two large motors were used as the primary extraction motors, with the smaller motors used to provide additional extraction as required. Ben Holroyde, Planning Project Engineer for the Aldwarke Bloom Caster, states: "Due to motor limitations the fans were restricted to four DOL starts per hour as additional starts would risk

damaging the windings. Due to the starting restrictions, the motors would be forced to run-on for an additional 15 minutes even if demand for extraction was reduced. This resulted in a significant amount of wasted energy." In addition to the motor 'run-on' issues, several of the motors suffered multiple failures over their lifetime resulting in significant downtime and expensive repair costs.

Engineers at Tata had highlighted the potential for a 30 to 40 per cent reduction in energy usage by installing new low voltage motors and variable speed drives. The project would enable the Lead Plant to extract the fumes more efficiently by accurately matching fume extraction to steel making demand. Holroyde states "Fume extraction is a vital part of the process and without it we simply cannot work to full capacity."

Technical Details

- ABB ACS800-17 Low Harmonic Cabinet Inverters
- WEG A.C Motors
- IFM Vibration monitoring equipment
- Allen Bradley PLC 5 System / Panelview / SCADA Upgrades
- New Distribution Transformers by RF Winder Ltd
- New Rolla Distribution board c/w ABB ACBs and switch disconnecter
- New Steelform UK Ltd Inverter Heat Extraction System
- Electrical Installation works by Hesley Electrical
- Mechanical Installation works by Mayflower Engineering



Drives and Automation won the contract through competitive tender. Ian Pickersgill, Sales Manager at Drives and Automation states: "Several companies were invited by Tata to make presentations on energy saving products that could be used to improve the fume extraction system and the DnA solution was selected as we offered a complete turnkey package and a competitive price. The package included hardware supply, a ventilation system, electrical and mechanical installation works, software, commissioning and integration with the existing plant control system.

The existing fixed speed 3.3kV direct-on-line motors were replaced with low voltage motors controlled by four ABB ACS800-17 low harmonic variable-speed drives, two rated at 400 kW and two rated at 630 kW.

The turnkey project included the supply of two transformers, a Form 4 distribution panel with withdrawable ABB Emax ACBs and switch disconnectors, ABB inverter cubicles, vibration detection, electrical and mechanical installation, plant room ventilation and software integration of a PLC /SCADA with the existing plant control system.

DnA employed electrical sub-contractor Hesley Electrical to provide the electrical installation works on the project. Cable routes, tray runs and cable installations were pre-planned and installed prior to the shutdown to reduce disruption and delays.

Mayflower Engineering were employed to provide the mechanical installation works including removal of the existing motors, bedplate modifications and installation of new WEG motors including the provision of new Bibby couplings and laser alignment.

Steelform UK Ltd provided a heat extraction system within the switchroom to extract the potential of 100kW of waste heat produced by the air cooled inverters at full demand.

The new system is far less energy intensive, resulting in the huge cost savings of over £200,000 per year. Ben Holroyde, ACP Project and Planning Engineer, said: "We were really pleased that we managed to complete the project within budget and on time with very little disruption to production. This couldn't have been achieved without the help of everyone involved."

Drives and Automation Ltd were the primary contractor tasked with integrating and installing the new system. Carlo Lunghi, Section Engineer, Aldwarke Bloom Caster, said: "Congratulations to everyone associated with the project, including our employees and all of the contractors involved. We have achieved our objective of

improving plant performance and reducing energy costs."

Phil Banks of ABB stated: "Once Drives and Automation won the contract, they had the ability to get on with the job with the minimum of help from ABB, allowing them to complete the job over the shutdown period and with no effect on production in the New Year."

Ben Holroyde added at the time: "We are well on target to achieve the projected savings of over £200,000 with a payback time of less than three years so we are very pleased with the outcome of the project."

Drives and Automation (DnA), based near Sheffield, provides a comprehensive system design and build or retrofit service for control systems, encompassing drives, PLC systems and complete projects working alongside machine builders or end users.



Problem Solved

- Maintenance on existing motors problematic
- H.V Permits to work required
- Extended motor repairs
- Starting limitations on the existing motors wasting energy
- Extended Downtime and loss of production
- Expensive to Maintain

Solution

- Significant Energy savings
- Fume extraction optimised
- New Low Voltage Motors
- New Low Voltage Inverters
- Updated PLC Control
- Improved SCADA Diagnostics
- Comprehensive Documentation Provided

Benefits

- Downtime Reduced
- Production Increased
- Easy To Maintain and Fault Find
- Energy Savings Maximised
- Easy to Support

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