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Tata Steel saves more than £500,000 on fume extraction with ABB drives

A fume extraction system at a steel works is saving £570,000 a year on energy costs thanks to the installation of variable speed drives (VSDs) and high efficiency motors by ABB.

The contract involved the supply of services and solutions from across the ABB group, as well as co-ordination with a number of other subcontractors.

Tata Steel's Aldwarke melting shop, in Rotherham, South Yorkshire, produces 750,000 tonnes of steel a year. The main extraction system of the machine shop was identified by the company as being an area where significant savings could be made. This consists of five main extraction fans, which draw the fumes from the shop via a system of dampers and vanes. These fumes are then sent to the bag filter plant for removal of dust particles.

The common duct pressure was originally controlled to maintain a suction pressure of 21 mBar, using input vanes to the main extraction fans operating at a fixed speed. The fans were driven by direct-on-line, fixed speed, 3.3 kV, 1.2 MW, 740 rpm, water-cooled motors. With no capacity to match speed to demand, these 1.2 MW motors represented a heavy drain on the plant's electrical supply.

Andy Burgar, Department Engineer for Tata Steel, says: "Tata Steel is committed to sustainable solutions to cut energy use. The size of these fans meant they were significant energy users, costing us around £1.5 million a year in running costs. Our internal calculation showed that we could conceivably save hundreds of thousands of pounds a year on energy for the application, cutting CO₂ production by 6,000 tonnes."

Although the motors had suffered few failures, maintenance was a challenge because of the special certification needed for servicing 3.3 kV equipment.

Tata Steel chose ABB to supply a complete solution for the melting shop. This included the supply and installation of five 690 V regenerative drives with active front-end supply units, as well as five 1200 kW, 6-pole, air-cooled motors.

Says Burgar: "We have a limited number of suppliers on our database and we evaluated them for this contract based on their ability to manage a project of this size and their company's proven track record. We took references and ABB satisfied all our criteria."

Also supplied were two high performance pressure transmitters with remote diaphragms. The contract also included the supply of numerous services, including project management and project engineering, including provision of documentation and modifications to existing third party PLC equipment and software code.

Other services supplied were removal of the old AC motors, mechanical installation of the new ABB Motors, drives and control equipment, supply and installation of cables and terminations and commissioning of the new drives and control modifications.

The use of the VSDs allows the company to have far better control of the fan system. ABB adjusted the control loop to allow the VSDs to match the needs of the system. For example, the melting shop has a

certain level of ambient fumes. When another furnace is tapped, in these fumes increase in volume when hot metal is poured. To account for these dynamic changes, the pressure control logic was adjusted and the associated control loop re-tuned to allow for the difference in response between vane control and motor variable-speed control.

Ken Hughes, project manager for ABB, says: “The major challenge was keeping the fans working throughout the project. The extraction system works round the clock for six days a week and needs at least four of the five fans to be working at all times. This required very close liaison with the customer so we could fit in our installation and commissioning work with the shutdowns in the plant. Flexible planning of our activities was essential.”

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Caption: Tata Steel’s extraction system saves £570,000 a year on energy costs with ABB variable speed drives and high efficiency motors.

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