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Steel producer gains extra production days with ABB multidrive

An AC multidrive system applied to Tata Steel's slitting line has eliminated stoppages, increased production and cut costs.

The TATA Steel plant at Shotton has eliminated stoppages and cut the downtime of its steel slitting line by around five days a year following the installation of an ABB variable speed drives system.

The ABB multidrive, coordinated through a programmable logic controller (PLC), adjusts the speed of the uncoiler, slitter, tension unit and recoiler. This ensures correct speed and tension is maintained across the slitting line. The slitting line divides a coiled sheet of metal into smaller widths, before recoiling the sheets at the end of the production line.

The previous multidrive solution, from another supplier, proved unreliable as spare parts were difficult to source and some control boards were suffering failures. Repairs were costly due to the labour required to diagnose the fault, source the spare parts and carry out the repair.

Alun Davies, engineering manager for Steel Processing at Shotton, says: "The line had been in operation at Shotton for two and a half years after relocation from another plant. In that time, we suffered four major failures of the drive system and we were losing two to three days production for every failure.

"We were concerned that we would have a major failure that we could not resolve, making the entire line permanently unusable.

The multidrive solution needed to incorporate automatic diameter calculation as well as accurate tension control at all diameters to ensure a good quality coil. Diameter is calculated from the ratio between line speed and actual motor speed.

There was also a lack of drive safety functions, such as safe torque-off in the previous set up.

Jonathan Taylor, director of Radway Control Systems, the system integrator engaged by Tata Steel, says: "The steel company requested that the old system should be replaced by modern equipment on an open platform, avoiding being tied into a single supplier for support and maintenance.

"We agreed upon an Allen Bradley ControlLogix PLC and an ABB multidrive. We were confident ABB would supply tendering and applications support throughout the lifetime of the project."

ABB supplied Radway with a demonstration rig that incorporated a variable speed drive and a motor to test and verify that the PLC could control the drives as expected. Each of the four drives of the ABB multidrive controls an element of the slitter – uncoiler, slitter, tension unit and recoiler. The first three are run under speed control with the last under tension control.

All the drives are run together when processing a steel coil, with the maximum line speed being 300 metres per minute. The PLC is programmed to interface with the drives and provide a speed reference ramp, as well as tension and diameter set points.

Data sent back to the PLC allows the company to interrogate the drives the following day in the event of a failure.

To improve the safety function of the application, the ABB multidrive solution provides two safety features. The safe stop emergency (SSE) ensures that in an emergency, all drives perform a controlled stop (Category 1 to IEC/EN60204-1), followed by a safe torque-off when the machine has stopped. This means that the machine stops in the shortest possible time, in a controlled manner and is then left in a safe condition.

The safe limited speed (SLS) function is used on the uncoiler and recoiler drives only. The drive will initiate the safe torque-off circuit if the safe speed is exceeded.

“The major benefit of the new solution has been the much improved reliability it offers,” says Davies. “We have had no major failures since it was installed. The PLC offers the flexibility we need in programming, allowing us to get useful information such as line metering and coil diameters.”

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Caption: An AC multidrive system applied to Tata Steel’s slitting line has eliminated stoppages, increased production and cut costs.

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