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ABB drives give greener steel transport for Corus

Two ABB drives, using fibre optic communications and Profibus DP, are helping Corus to accurately position two coil shuttle cars ahead of the hot dipping production lines, enabling the company to reduce the need for road haulage, providing a far more efficient steel coil delivery systems.

The automatic coil transport systems, installed at Corus' Shotton steel works, transfer steel coils arriving by rail from South Wales, from a new railhead building into the existing coil coating bays.

The benefits of the new system include improved quality due to less coil handling, a safer workplace with less coil movement using overhead cranes and there is an environmental improvement due to reduced road transport.

Each of the coil transport systems has a coil-carrying car with two axles, each driven by a 45 kW induction motor. These motors are driven by ABB industrial drives, linked together in a master/follower arrangement using the fibre optic communications features of the drive. The shuttle car has an onboard PLC system, which controls the shuttle car's automatic sequencing and communicates with the drives using Profibus DP.

A speed reference is sent to the master drive over the Profibus DP link. The PLC calculates the required speed according to the distance yet to be travelled. Using the ABB drives, the cars achieve a positioning accuracy of +/- 5mm. With encoder feedback, accurate dynamic control of the motors can be achieved, especially at low speeds, which was a requirement for accurately positioning the cars at the stations

The master drive is configured to run in speed control mode. The master sends a second reference signal to the follower, which is configured to run in torque control mode. This allows load sharing to be achieved between the two axles. An equal load ensures that the motors do not overheat and trip out, disrupting the transport of the coils. Using a fiber optic link between the drives ensures a fast response from the follower when it receives the signal from the master, ensuring the two drives are in step and keeping the motors running at the same speed.

Phil Tomkinson of Radway Control Systems, the ABB drives distributor, which designed the car control system for Corus, in conjunction with BWG Engineering Ltd, says "We used the drives' Profibus option to communicate with the inverters to maintain commonality with the communication used in the rest of the system."

The Profibus DP link also sends diagnostic and status information about the drive to an operator's SCADA screen.

The drives are also fitted with brake choppers and dynamic braking resistors, allowing the cars to be decelerated at 1.0m/s^2 if an emergency stop is needed.

Radway was also responsible for the electrical installation and system commissioning. Says Tomkinson: "Although we are very experienced with ABB inverters, we also called on ABB for advice. Its engineers were very helpful, assisting us with all our technical queries. The drives were supplied to us via ABB Drives Alliance member Central Electrical in Liverpool."

When a new coil is required by the hot dip galvanizing lines, the shuttle car automatically moves to the next coil pick-up point in the railhead building and loads the coil on to the car. The car then takes the coil back to a lowering table ahead of the galvanizing line and unloads the coil ready for use. All these operations are fully automatic and take place until there are no more coils on the railhead pick-up points. At this point, an overhead crane reloads these and the whole sequence starts again.

The PROFIBUS-DP (Decentralized Peripheral) fieldbus is designed specifically for communication between automation control systems and distributed I/O at the device level.

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Caption: Two ABB drives, using fibre optic communications and Profibus DP, are helping Corus to accurately position two coil shuttle cars ahead of the hot dipping production lines.

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