

Case note

Drive control enables load sharing between motors in 200 tonne charging crane



ABB industrial drives with crane control program provide precise control of the 200 tonne charging crane.

Ruukki Production's Raahe steel works in northwestern Finland is the largest steel works in the Nordic countries. With around 3200 employees it has an annual steel production capacity of 2.8 million tonnes, and steel slabs produced at Raahe are processed on site into hot rolled plates, sheets and coils.

The Raahe facility selected ABB industrial drives to upgrade a 200 tonne capacity charging crane. The crane charges the plant's three converters with molten iron from the blast furnace, and therefore plays a crucial part in the steel making process. To charge a converter the crane's main hoist first lifts the ladle, which contains around 100 tonnes of molten iron. The crane is then positioned in front of the converter, and the auxiliary hoist tips the ladle and pours the metal into the converter. Each converter is charged 25 times per day, and the plant operates on a 24/7 basis. The cranes are joystick-controlled by operators via a radio link.

Master-follower arrangement with load sharing

The crane was upgraded by installing ABB industrial drives with crane control program to replace the drives on both the main and auxiliary hoists. The existing drives – from another manufacturer – lacked master-follower functionality, spare parts were no longer available, and there were no standby drives in the system for redundancy. ABB was chosen to perform the engineering, installation and commissioning work, and worked closely with the customer to configure the upgrade.

The main hoist is operated by four 110 kW motors, two on each side of the drum. The existing drives were replaced with three 490 kVA 400 V ABB industrial drives.

Two drives are operated in a master-follower arrangement with a fiber optic link for load sharing. The master drive operates in speed control mode and the follower in torque control. One drive is spare for redundancy: it stands by in case of possible problems with either the master or follower drive. If a problem occurs the spare drive can be connected using manual switches installed inside the drive cubicles to operate either as master or follower. In fact, in an emergency the main hoist can even be operated (at lower speed) using only two motors.

The auxiliary hoist, which is used to tip the ladle, is operated by one motor. The existing drive was replaced by two 130 kVA industrial drives, of which one is used as a standby. All the drives – both on the main and auxiliary hoist - feature inbuilt brake choppers and an external brake resistor.

Accurate slow speed control

The combination of ABB industrial drives and the crane control program provides improved master-follower functionality for crane applications. The program utilizes the drives' direct torque control (DTC) technology to deliver enhanced operational safety and accurate slow speed control with high torque levels.

The upgrade was undertaken in September 2007 and the ABB service team successfully completed the project during the short time period available.

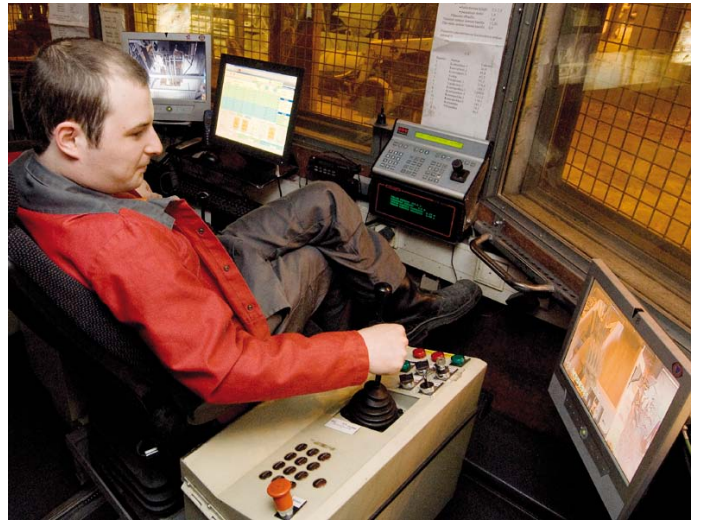
"This is a crucial production phase, where reliability is essential. We've been using ABB drives for many years and we know we can depend on them," says Esa Prokkola, Project Manager at the Raahe works. "We were pleased with the way ABB worked to get the job completed during our plant shutdown, and since the upgrade everything has worked well with no problems. As a result we've asked ABB to upgrade our continuous casting crane."

Challenge

- Need for accurate and reliable operation of main and auxiliary hoists in 200 tonne capacity charging crane

Solution

- ABB's crane control program with master-follower function and load sharing between mechanically connected motors
- Precise mechanical braking controlled by drives
- ABB industrial drives with spare drives for redundancy



The cranes are joystick-controlled via a radio link.

Benefits

- Use of crane control program and master-follower arrangement with load sharing avoids conflicts between drives, which can cause overloading
- Robust ABB industrial drives deliver reliable operation in tough environments
- Back-up drives can be quickly activated in emergency
- Compact drives fit in restricted space of crane's electrical room

For more information please contact:

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