

# Medium section mill drive converter set and control system modernisation

*The medium section mill at Corus Scunthorpe has recently been revamped to enable it to roll 120m long rails in addition to its normal complement of sections. As part of this project a new variable speed finishing drive converter set and control system has been installed at the 10 stand finishing mill and flying shear to provide better control and improved product quality across the whole product range.*

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Corus Construction & Industrial and ABB

**A** new variable speed finishing drive converter set and control system has been installed for the finishing stands at the Medium Section Mill (MSM) at Corus, Construction & Industrial, Scunthorpe Works, UK. The modernisation included installation of eleven new converters to ten rolling mill stands and one flying shear. Additionally, the control system consisting of three MasterPiece200 Process Controllers and one MasterView HMI has been migrated to the Industrial IT platform of an AC450 controller with OperateIT as the interface. The shutdown needed for the installation was minimised to 12 days and the commissioning took place in a trouble-free manner. With the modernisation completed, the Scunthorpe mill is the first in the world to be able to roll rail products in a continuous configuration.

The MSM at Corus Construction & Industrial, Scunthorpe, produces medium size sections including channels, joists and angles, flats and other custom sections between 75mm and 200mm cross section (see Figure 1). The capacity of the mill is of the order of 500,000 tonnes of finished steel sections per annum.

The MSM complex consists of reheating furnaces, roughing mill, intermediate mill, finishing mill, flying shear, cooling banks and processing bays. Most of the feedstock is bloom stock from the continuous casters on the Scunthorpe site.

## KEY OBJECTIVE

Prior to enhancement the control system for the finishing mill consisted of the MasterPiece system, which dated back some 30 years and had, by modern standards, severe limitations in functionality. The main drive converters, based on analogue technology, were becoming a maintenance and reliability problem, and the existing converters would no longer meet the requirements of a modern control system.

The key objective for the modernisation was to replace the old control system and drives with modern technology in order to bring all the associated benefits of high reliability, flexibility, easier maintenance and ▶



Fig.1 The MSM, Scunthorpe Works, UK

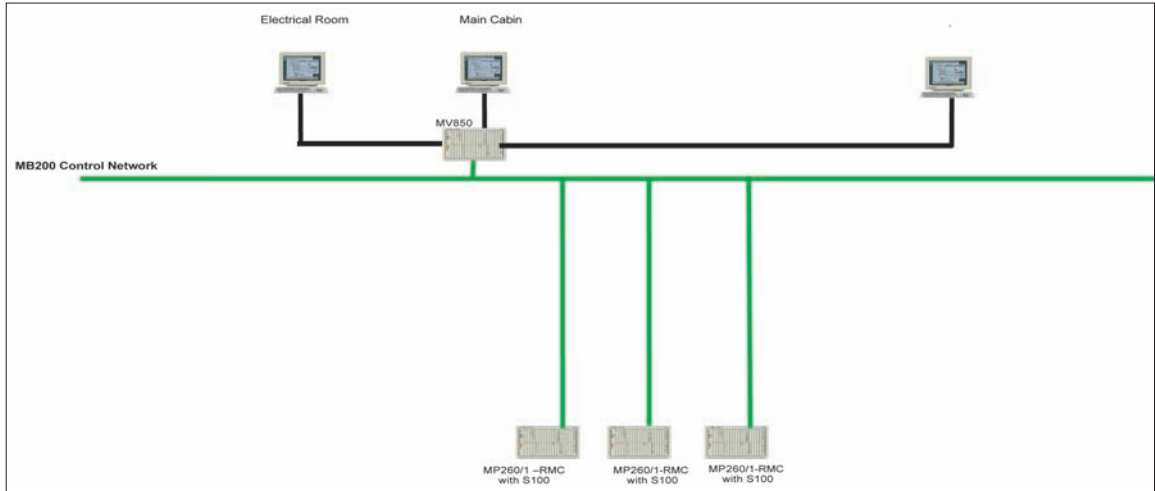


Fig.2 Control system layout before the revamp

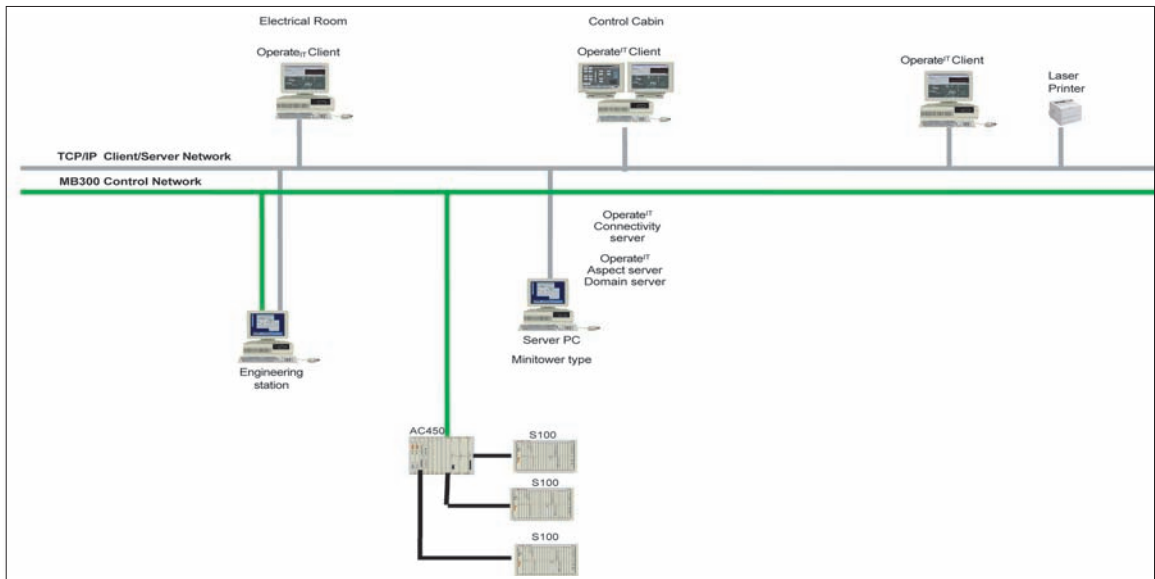


Fig.3 An overview system layout for Operate IT with AC450, Level 1

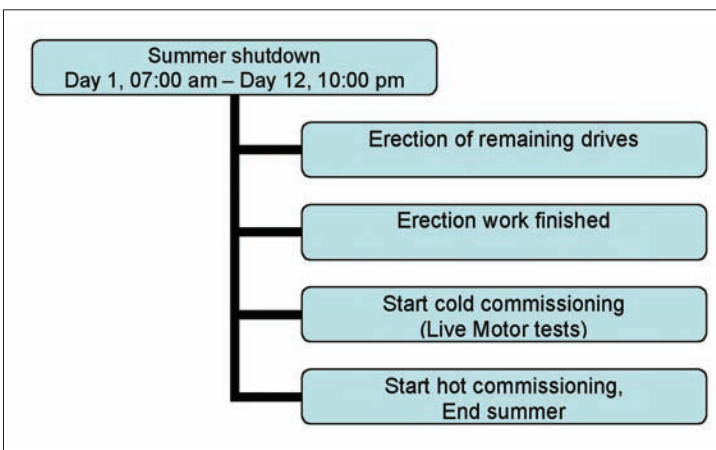


Fig.4 Commissioning schedule of the 12 day production stop

information technology features in association with the implementation of rail rolling.

The revamp of the electrical equipment consisted of seven new converters for the vertical stands, three new converters for the horizontal stands, one new converter for the flying shear and the replacement of three MasterPiece200 and one MasterView with AC450 RMC and Operate IT PPA (Process Portal A).

**Before the revamp** The drive configuration before the revamp consisted of main drives and converters for seven horizontal stands, three vertical stands and one flying shear. The converters had been modified in 1985 to a `current control configuration` only with the current reference being derived in the Masterpiece

DCS110 Control Module. Tables 1, and 2 provide the converter data for both horizontal and vertical stands before the revamp. Also the control system for the finishing mill consisted of three MasterPiece200 process Controllers and one MasterView operator interface. Originally installed some 30 years ago, the system had become obsolete and was presenting problems of functionality limitations and maintainability. Figure 2 shows the control system layout before the revamp.

**After the revamp** The new drive configuration consists of seven direct current (DC) converters for the horizontal stands, three DC converters for the vertical stands and one DC converter for the flying shear. The new control strategy utilises a speed reference and control loop.

Based on ABB's Industrial IT technology, it consists of an open control system (OCS) the Advant Controller 450 rolling mill controller (RMC) platform performing all of the logic control, data handling and closed loop controls. The operator interface to the new system is via ABBs Operate IT Process Portal. An overview system layout is shown in figure 3. The 450RMC also performs the mill's overriding controls Table 3 list the new drive details.

#### Single ended with a field reversal system, six pulse

Type	ASEA RTMR 120-7
DC volts	600V
DC current	3200A
Max current	5320A
Power	1920kW
AC input volts	570V
AC Input current	2160A
Power kVA	2130
Number of SCRs in series	1
Number of SCRs in parallel	1 - 7
Total No. of SCRs	42
Thyristor type	TY 500 voltage class Pr 20
Peak reverse voltage non-repetitive	2000

Table 1 Converter data for the horizontal stands before the revamp

Features of the new control system include:

- The ability to provide operators with a familiar functional layout to the previous system
- The ability to trace operator keyboard commands for improved diagnosis
- A modernised display layout
- The integration of the Pilz safety system signals into the operator interface alarm system

#### Four quadrant unit with integral field converter, six pulse

Type	ASEA YOMB
DC volts	440V
DC current	1190A
Max current	1980 for 10 seconds every 20 seconds.
Power	520kW
AC input volts	410V
AC input current	810A
Power	570kVA
Number of SCRs in series	1
Number of SCRs in parallel	3 - 1
Total No. of SCRs	24
Thyristor type	TY 500 voltage class Pr 16
Peak reverse voltage non-repetitive	1600
Field converter rating	4.6kW

Table 2 Converter data for the vertical stands before the revamp

Converter data						
Item	Description	Qty.	Power kW	Speed 1/ min	Qty.	Type
H1-H7	Main drive	1	0/1500 /1500	0-300- 825	1	DCS602 RTM R
V3	Main drive	1	0/400 /400	0-300- 825	1	DCS602 YOM B
V5	Main drive	1	0/400 /400	0-300- 825	1	DCS602 YOM B
V6	Main drive	1	0/400 /400	0-300- 825	1	DCS602 YOM B
	Flying shear	1			1	DCS602

Table 3 List of speed controlled drives after the revamp

## COMMISSIONING

Revamps, by their nature can be challenging and customers are looking for the supplier to provide a high degree of technical competence and an extensive knowledge of the technology and the application. Any delays or lost time in production can be extremely costly, therefore, on-time delivery of the project with a trouble-free commissioning stage is the most critical factor to the success of a revamp project. For this revamp, ABB was challenged to undertake the engineering, installation and commissioning during a 12 day production stop in the summer shutdown period.

The project's challenges were successfully met and one of the major contributions to the outcome was the co-operation, open communications and team spirit between Corus and ABB. Team work, detailed planning and phased installation of key drives in the pre-shutdown were the decisive factors to the success of this trouble-free commissioning.

## CONCLUSIONS

As a leading global supplier of rail products, Corus experience and expertise in R & D are utilised in all known rail applications. Its reputation for providing tried and tested technical solutions means that Corus rail products are used extensively in many of the world's major railway networks.

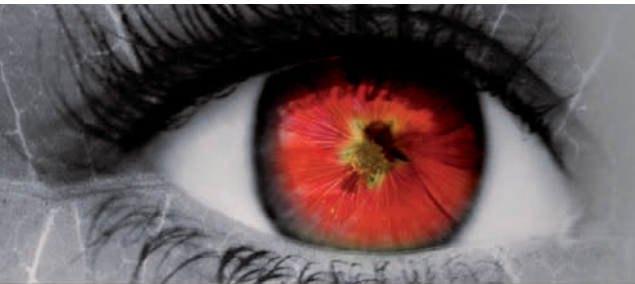
The revamp of the MSM has resulted in better control and improved product quality. After its modernisation, the Scunthorpe mill is the first in the world to roll rail products in a continuous configuration. The new drives demonstrate a step change with their control characteristics and capability and will be an essential component in the mill's ability to roll rail products.

Corus Construction & Industrial's strategy is to

continue developing its core products in medium sections to maintain and grow its position as a leading European supplier in Great Britain and North Europe. The strategy is to continuously improve competitiveness product range and quality and customer service.

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