



CORUS

CONTROL OF WALKING BEAM FURNACE

INTRODUCTION

Kværner has installed a Walking Beam Reheat Furnace at Corus, Scunthorpe Heavy Section Mill. They subcontracted the plant's process control and electrics to HG Systems Limited.

The system supplied is designed to work in either automatic or manual modes and interfaces with the Davy on-line modelling system for calculation of setpoints and furnace residence times.

PROJECT DESCRIPTION

Corus, Heavy Section Mill at Scunthorpe previously took its feed stock from hot ingots which are reheated to rolling temperature in soaking pits. The soaking pits, which have been in operation for a number of years, have been refurbished due to fuel efficiencies being below current day expectations. Operational changes have been made which allow the mill feed stock to be taken from cold concast slabs. These changes required a new furnace arrangement to re-heat the slabs to the correct rolling temperature.

It was decided that the most effective way to cater for these changes would be to incorporate a walking beam furnace. The furnace has 'multizone' temperature control performed by an on-line model able to calculate temperature setpoints and zone residence temperatures against mill pacing, rolling schedules, steel grades and slab sizes.

The walking beam furnace and associated plant was supplied by Kværner and consists of the following:

- * A walking beam furnace
- * Hydraulics
- * Charging/discharging roller tables
- * Electrical Equipment
- * Process and Plant Control Systems
- * Process Control Computer with on-line models for calculating process variables

The control system supplied by HG Systems Limited consists of two *Allen Bradley 5/80E PLCs*, to perform combustion control and mechanical handling, two *Pentium 120 PC* computers running a *Factory Link SCADA* package and Man Machine Interfaces (MMIs) and the associated MCC control boards and panels.

The process control computer supplied by Kværner consists of one *DEC Alpha Server 400 4/233* and one *Pentium 90 PC* as Level 2 MMI.



Communications

The PLC's and SCADA communicate via an Ethernet LAN (Local Area Network). The LAN will connect, not only the equipment supplied by HG Systems Limited, but also two DEC computers supplied by Kværner and Corus, allowing access to the PLCs for extracting data for mill management and production control. The use of an Ethernet LAN for the data highway allows a wide range of industrial and office equipment to be connected to the control system and offers a fast, standard communication highway.

Control Scheme

PLC 1 controls the combustion of mixed gas and all the ancillary equipment associated with the burner control. This is achieved using the in-built PID function and allows close and integrated control of the combustion process. PLC 2 controls the roller tables, walking beam movement and bloom tracking through the furnace.

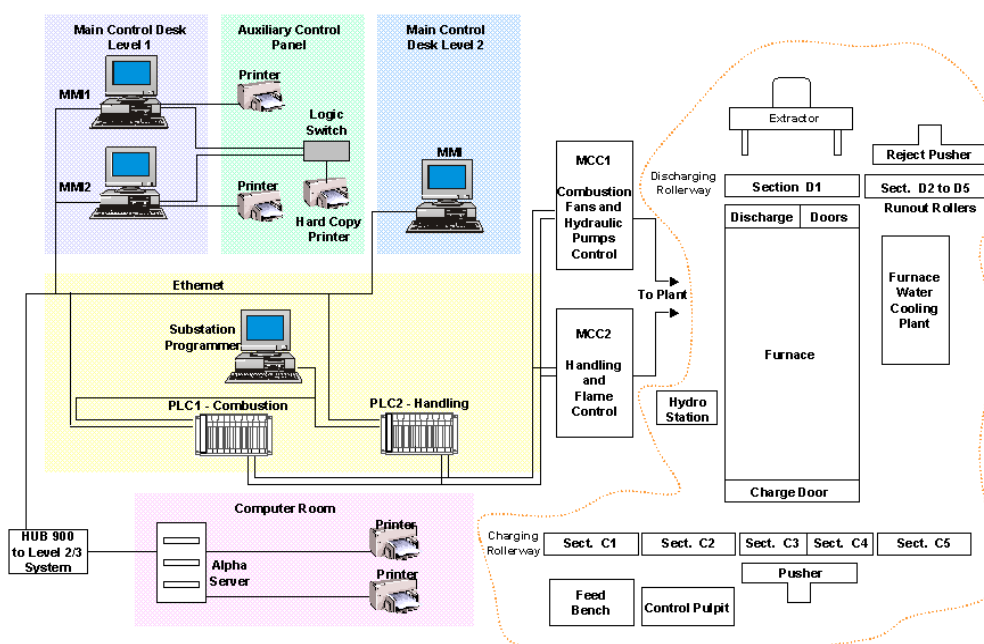
The Factory Link SCADA is configured to offer a 'user friendly' interface and provides a number of functions for the operator and engineer to enable them to control and monitor the furnace. These comprise of facilities such as process overview mimics, real time trends, set point manipulation, data logging (historical) and alarm printing and logging. All changeable parameters are protected by a multi-level password system which allows different levels of access for different personnel.

Furnace Operations

Under normal control the furnace will operate fully automatically whereby slabs are loaded onto the charging roller table and individual slab ID numbers entered into the system. The slabs will be tracked through the furnace until they are passed to the mill for rolling. The furnace model will receive all the tracking information and ensure that each slab is at a temperature suitable for rolling. The model receives all the information relative to planned production delays and will ensure that the furnace can be put into a holding condition with minimum burner setpoints while ensuring that slabs are at the correct minimum temperature for rolling on start-up.

Facilities also exist to allow manual control of all the furnace operations and entering temperature setpoints into the system. These control facilities can be carried out both at the main control desks and plant mounted operator stations.

SYSTEM OVERVIEW



Layout of the control system for the reheat furnace at Corus, Scunthorpe Works.



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