

# Reheating Furnace On-Line Model Based Control Systems



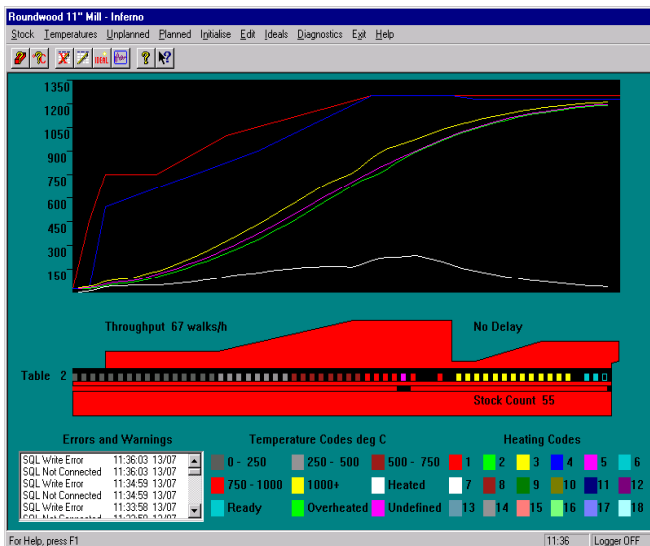
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The Corus Technology Centres have considerable experience of developing computer control systems, involving on-line stock heating models, for continuous and batch reheating and heat treatment furnaces. The systems incorporate multi-tasking, real-time, furnace monitoring and control programs designed for general applications, with individual site tailoring.

Facilities available are:

- General system arrangement specifications
- Design, development and installation of furnace control systems and SCADA systems
- Furnace evaluation
- Evaluation of existing and alternative systems
- Training.

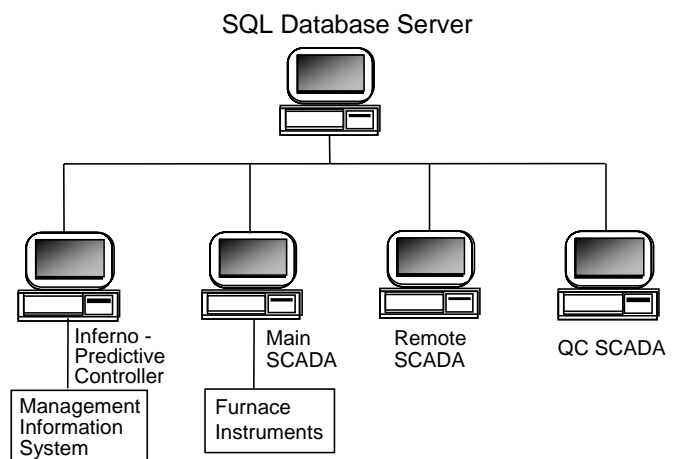
On-line model computer control systems can be considered as incorporating two aspects, feedforward and feedback control. Feedforward control is based on system tables and algorithms developed off-line, resulting in a first order selection of furnace zone temperatures.



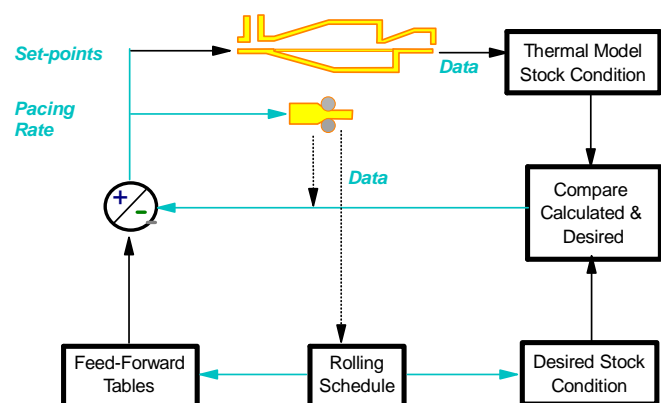
The aim of feedback is to provide predictive control of furnace zone temperatures. This is achieved by use of a mathematical model to calculate and download suitable zone temperature set points to dedicated plant controllers such that material is heated to its required discharge temperature, with an acceptable temperature level and distribution across and through the stock, whilst utilising the minimum amount of energy. Pacing of the furnace and mill can be incorporated as part of the closed loop control.

An important feature of predictive control is the handling of system delays, generally accounting for a high proportion of overall energy savings. Furnace temperatures are automatically reduced by the predictive controller to lowest possible levels at the onset of a delay and returned to rolling levels prior to termination of the delay, whilst ensuring that stock discharged will achieve required discharge temperature conditions.

## Typical System Configuration



The systems are Windows NT based and interface to plant through a supervisory control and data acquisition (SCADA) system, which can also be provided if required (based on either InTouch or FIX).



The benefits to be gained using such systems are:

- Consistent heating of slabs, reducing rejects and rolling problems.
- Maximising benefits from hot charging.
- Increased throughput (up to 5%, if furnace constrained), by minimising heat stops and overheating.
- Reduced decarburisation, by minimising overheating.
- Pacing of material supply to the mill.
- Energy saving (typically 5% to 15%) by optimised heating.
- Improved yield (up to 0.5% has been achieved), through lower scale formation.
- Minimum operator input.