

Furnace Automation Systems

Introduction & Project Overview

A Reputed Multiproduct, Quality conscious Company manufacturing different steel products with over 40% exports, has one 20 Ton Pusher type Billet Re-heating furnace. This furnace is designed on counter flow principal under which material will be pushed by means of a hydraulically operated pusher mechanism and discharged from the site with the help of electromechanical ejector.

Furnace has Two firing zone with burners located on the front and side walls. To automate the existing 20 Ton Billet Reheating Furnace with PLC & PC Based system,

Masibus offered an unique solution for Combustion Control using Ratio-Controller with over riding O₂ control.

Solution

Scope

Entire scope Involves - Engineering, Supply, FAT, Transportation, Erection, Commissioning, Training & performance Guarantee.

System description

Objective : The process control requirement of this company was : 1) Required Temperature control for the billet heating through correct Air-Fuel ratio for proper combustion. 2) Uniform temperature across the cross-section and along the length 3) correct Oxygen Control to avoid surface De-carbonization of steel containing Carbon. 4) Proper furnace response for variations in loading and intermediate stoppages.

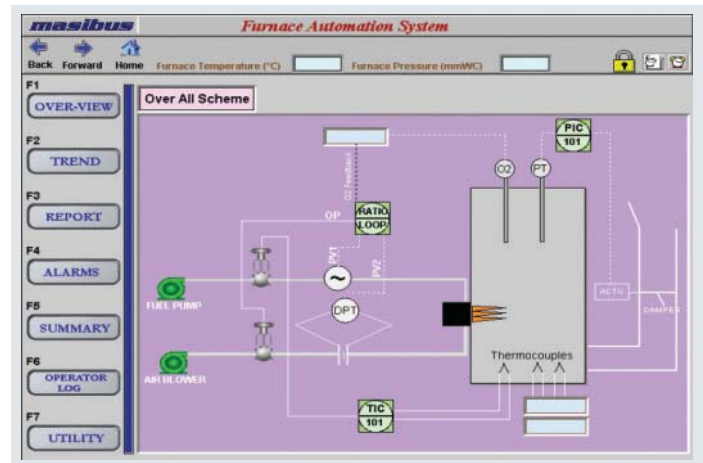
Process : The furnace will have two firing zones with burners located on the front wall as also the two side walls.

The waste gases after preheating the stock will be allowed to escape through flue ports located near the charge end wall and finally through underground flue tunnel to the chimney.

For Auto Temperature Control loop Masibus provided Microprocessor based stand-alone controller to achieve the desired control strategy. The actual programming of the set point and controls were made possible through local keyboard and PC based SCADA, anywhere. Ratio Controller continuously and automatically controlled air and fuel input to each zone of the burner. To provide optimum corrections in the set ratio over-riding control was provided using IN-SITU O₂ sensor data, in Percentage Oxygen.

Provision for local manual control was also provided. Similar custom control strategy was used for furnace draft control.

Real time Trends, Custom Reports, Alarms and Animated Mimics were additionally provided through PC based SCADA system. The project was commissioned in March 2003 with-in 60 Engineer days.



Alliances

- Citect, Australia-SCADA Software
- Sixnet - USA , Control Hardware
- OMRON - Japan, PLC

Communication Standards

- Serial-SysWay (OMRON),
- Serial modbus , Ethernet – TCP/IP

Performance

- 1) Temperature variation were now less than +/- 1%
- 2) % O₂ control was now less than 8%
- 3) Temperature uniformity for monitoring resolution were now better than +/- 2 degree C

Benefits

Lower access of O₂ prevents emission of CO. Uniformity of temperature in process Quality of Metal sheet by way of lower scaling Report generation, Historian and Universal Data Server for other industrial network connectivity.

Future upgrade

The system can be configured for Complete furnace automation inclusive of pre heating and heating zone automation with additional facility for Auto-fuel shut off provision for control cooling , Over pressure & temperature Alarms and shutdown system. More efficient system in possible through variable AC Drives control.

Other References/User of Application

Masibus executed similar application in Panchmahal Steel-Halol, Mahendra & Mahendra-Mumbai, SAIL-Rourkela Steel Plant, Shah Alloys-Ahmedabad, LML Ltd.-Kanpur, Kalyani Breaks Ltd.-Jalgaon, Bajaj Temp-Indore, Electrotherm Ltd.-Ahmedabad and Therelek Furnace-Bangalore. This system finds its application in all major industries where Billet Re-heating furnaces are utilized.

Conclusion

Improvement in reduction of excess Oxygen from Existing 12% to 7% was achieved. Thereby, providing reduced fuel consumption. Conservative payback period of the Masibus system was 3-4 months.