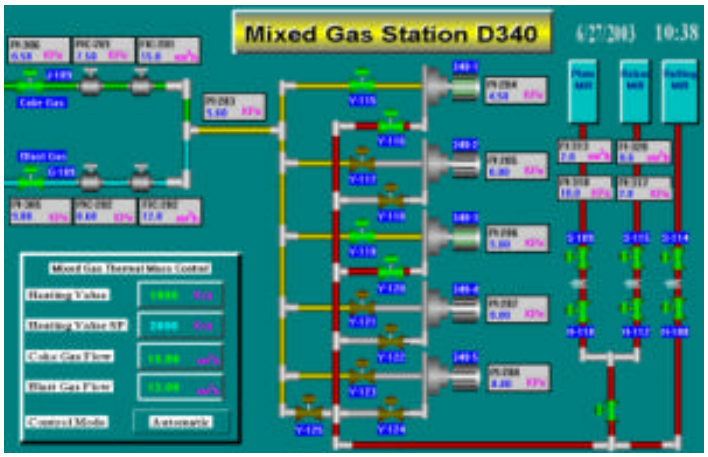
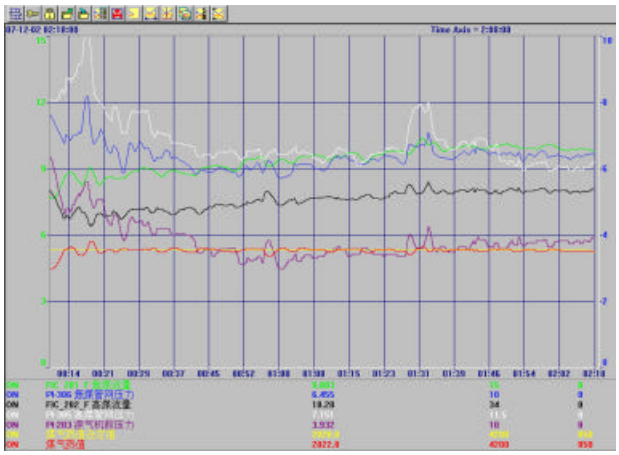
MFA Control and Optimization on Gas Mixing Process

Use of MFA Control	*Benefits*
Soft-sensor measurement of gas heating value in CyboMax to monitor the gas quality.	Monitors heating value online to ensure consistent gas quality for downstream processes.
MFA control of gas flow, gas differential pressure, and mixed gas heating value.	Improved product quality, plant safety, and production efficiency.
Easy integration and startup.	Return on investment in a few months.





CyboSoft's Gas Heating Value Monitoring and Control Solution

Process: In an iron and steel complex, operating units including blast furnaces, basic oxygen furnaces (BOF), and coking ovens all produce gases as byproducts. Many plants discharge these gases into the atmosphere wasting valuable energy and causing severe air pollution. A gas plant mixes these gases to produce fuel for the furnaces in metal casting and rolling mills. The quality of the mixed gas is measured by its heating value. Gases with inconsistent heating value can cause major control, quality, and production problems due to over or under heating.

Challenges: Even during normal production, gas supply and demand can change randomly. Major operating units like blast furnaces and reheating furnaces may go online and offline periodically causing huge disturbances in gas flow, pressure and the heating value.

Heating Value: Online heating value analyzers are available, but not usually used during normal operations because they are difficult to maintain and overly expensive.

Goals: Monitor and control the gas heating value automatically in all operating conditions.

Solution: CyboSoft offers a turnkey solution for heating value measurement and control. Using our special soft-sensor technology, heating value can be accurately calculated online. An offline heating value analyzer can be used to calibrate the calculated value. Using Model-Free Adaptive (MFA) controllers, gas flow and differential pressure loops can be effectively controlled. Robust MFA controllers are also used to handle the constraints and protect the system from running in vicious cycles. An MFA controller is used to control the gas heating value by cascading with the gas flow and pressure controllers.

Application Story: Ling-Yuan Iron and Steel Company in China has deployed a heating value monitoring and control system in its gas mixing facility. A distributed control system (DCS) with CyboCon MFA control software and CyboMax process monitoring and optimization software are used.

CyboSoft Beijing implemented this turnkey system. The trend chart above shows good control of the heating value (red) when there are major gas disturbances from blast furnaces and coking ovens. The user has certified the success:

- Gas heating value within +/-100 Kcal/Nm^3 specification.
- Improved product quality, plant safety, and production efficiency.
- Enables flexible production.

