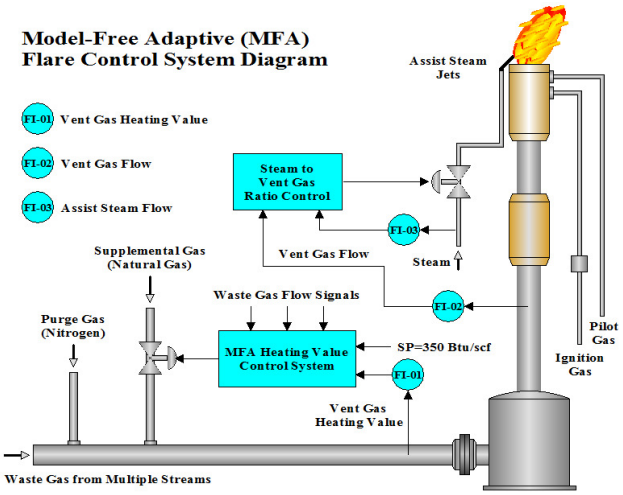
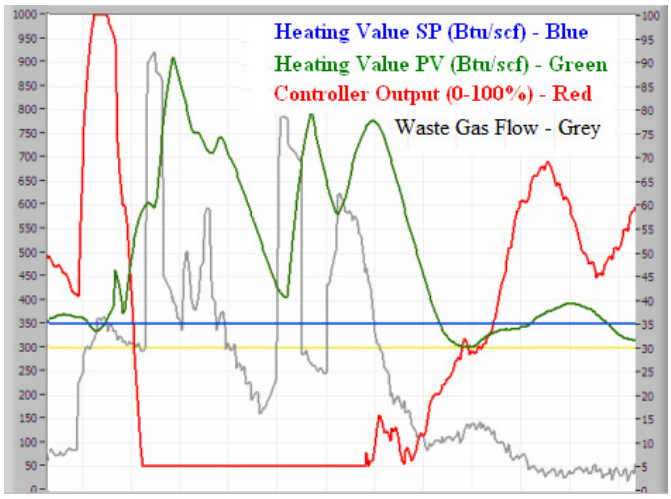
Model-Free Adaptive (MFA) Control of Flare Heating Value Process

Problems	*Solution and Benefits*
Flare vent gas heating value (HV) needs to be monitored and controlled per EPA 40CFR60.18 rule above 300 Btu/scf.	MFA control solution can control vent gas heating value under all operating conditions.
Flare process is difficult to control, causing natural gas waste.	Robust performance and natural gas savings.
There is a sense of urgency to comply with EPA rules and be ready for Clean Air Act (CAA) section 114 investigation.	Working with our partners, we can offer a complete solution to meet your needs.



Flare Process and Control System Diagram



MFA Flare Vent Gas Heating Value Control

Flare Process: Most refinery and chemical plants operate flares to burn off waste gas. The vent gas heating value of a flare must be monitored and controlled based on EPA 40CFR60.18 rules.

Flare Control Challenges: (1) There are large and varying time delays in the HV control loop; (2) The HV process is nonlinear in different operating conditions; (3) Multiple waste gas streams in a plant are sent to the flare stack, where stream flows can vary widely causing big disturbances to the heating value; (4) The HV of each waste gas stream may change widely under operating condition changes; and (5) Nitrogen is often used as purge gas to keep positive pressure in the vent pipe, making the process more complex.

MFA Flare Control System: The flare vent gas consists of waste gas from multiple streams and purge gas. Its heating value is measured with an online calorimeter. CyboCon MFA control software is installed in a PC interfacing to a DCS through OPC. A special Anti-delay Feedforward MFA controller controls the heating value in real-time by manipulating natural gas flow. The trends show a typical condition where the waste gas flow (gray) swings causing heating value to change while MFA takes quick control actions (red) to assure HV is in control.

Case History: An MFA flare control system has been running in a petrochemical plant in Texas for 1.5 years. Due to its robust control performance in varying operating conditions, the customer is able to lower the heating value setpoint from 400 to 350 Btu/scf to reduce natural gas consumption and still meet the EPA's 300 Btu/scf low limit. The control system achieved substantial economic benefits for the customer.

Solution: CyboSoft is working with leading companies in the industry to offer a complete solution that the customer wants. CyboSoft can provide: (1) consulting service and design support, (2) MFA flare control solution implemented in CyboCon MFA control software, (3) CyboLink interface software to a specific DCS or PLC, (4) on-site control system commissioning and training, and (5) annual support services.

