Introduction

In the past, boilers in an industrial complex were considered a necessary evil. However today's business managers know this is no longer the case. Boilers are required to maintain maximum steam generation efficiency, maximum reliability, and comply with both stringent air emission and safety regulations. To achieve this goal you need modern control hardware and software.

In today’s competitive market minimization or reduction of operating costs is a valid method to increase profitability. Reducing fuel expenses associated with your boilers can directly impact manufacturing costs. In general, for each 100,000 LB/hr of steam production you can anticipate a fuel bill reduction of over $100,000 annually with the implementation of Honeywell’s modern control solutions.

Honeywell has a full portfolio of solutions for the industrial powerhouse. Boiler control is the most commonly implemented solution. Honeywell has developed a control system standard for coal-, oil- and mixed-fuel-fired boilers, which allows the expertise gained from the implementation of hundreds of boiler control projects to be made available to Honeywell customers.

Description

The Industrial Boiler Control solution implements the following major control strategies:

- Steam Header Pressure Control
- Combustion (Fuel Flow and Air Flow) Control
- Furnace Pressure Control
- Feed water/Drum Level Control
- Superheat Temperature Control.

Not all units will require all five control strategies, or will need all the capabilities available. For example, many industrial boilers don’t require superheat temperature control and/or furnace pressure control, and many do not have the capability for multiple fuel firing.

The following is a quick overview of each of these five control strategies.

Steam Header Pressure Control

The Steam Header pressure control system monitors the common steam header pressure to generate a load demand for each of the boilers. To provide stable control and uniform response the control system recognizes each boiler’s contribution to the steam load and its ability to respond to load demand requests.

Combustion Control

Combustion control regulates the fuel and air for the boiler - making it the most complex and important of the control loops. The fuel/air mixture must be just right under all dynamic load conditions. Too much air results in decreased efficiency, while too little air is unsafe and even less efficient. To insure the proper ratio of fuel and air, the controls incorporate both fuel/air cross limiting and O2 trim. Other combustion control system features to insure safe, efficient operation include:

- Gas BTU adjustment
- On-line switching between fuels (when appropriate)
- Capability for dual fuel firing
- Low gas header pressure override
- Control loop hierarchy for permitting automatic control
- Interlocking logic for the FD fan inlet vanes and fuel valves during purge and light off per NFPA requirements.

The following diagram provides an overview of the combustion controls.
Furnace Pressure Control
The furnace pressure control loop regulates the ID fan inlet vanes to maintain the furnace pressure setpoint. The furnace pressure signal is the process variable for the furnace pressure controller, and the ID fan is operated in coordination with the FD fan. Like the FD fan, appropriate interlocking logic is provided for the ID fan inlet vane for use during starting/stopping of the fan - also per NFPA requirements.

Feedwater Control
The basic control strategy implemented is a three-element system using drum level, steam flow and feedwater flow to regulate the feedwater control valve. Both accuracy and stability are improved through the addition of density compensation calculations for both drum level and steam flow. Since flow measurements are typically inaccurate at low values, feedwater flow is regulated only on drum level (single element control) during startup and low load operation. The transfer between single and three-element operation is of course both automatic and bumpless.

Steam Temperature Control
The Super heat steam temperature control loop is straightforward, regulating the superheat spray water control valve to maintain the main steam outlet temperature. For more dynamic steam temperature circuits, attemperator outlet temperature is also measured and controlled.

Control System Architecture
The boiler control solution executes primarily in Honeywell's C200 Process Controller. Auxiliary systems may also run in C200 controllers, or network-integrated PLCs. The solution includes a standard set of HMI Web displays, which run in the Experion Station.

Options
Honeywell offers a complete portfolio of Industrial Power solutions, ranging from regulatory control solutions such as Boiler Control, Burner Management, and Turbine Control, to advanced control and monitoring solutions, such as those provided in Honeywell’s Unified Energy Solution: Advanced Combustion Control, Economic Load Allocation for Boilers and Turbines and Tie Line Control. The TotalPlant Performance Monitor is also available to provide efficiency calculations for the boiler and other steam system elements. Additional application notes describing these solutions are available.

Getting Started
Industrial Boiler Control is offered on Honeywell’s revolutionary new Experion PKS™ Process Knowledge System platform. Our Project Services personnel are ready to assist you in getting your boiler control project started. For more information, contact your local Honeywell representative, or call 1-800-288-7491 in the U.S.A.

Experion PKS is a registered trademark of Honeywell, Inc.
More Information
For more information on Industrial Boiler Control PKS, visit www.honeywellprocess.com, or contact your Honeywell account manager.

For more information on OPC Server for Modbus, visit www.matrikonopc.com

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