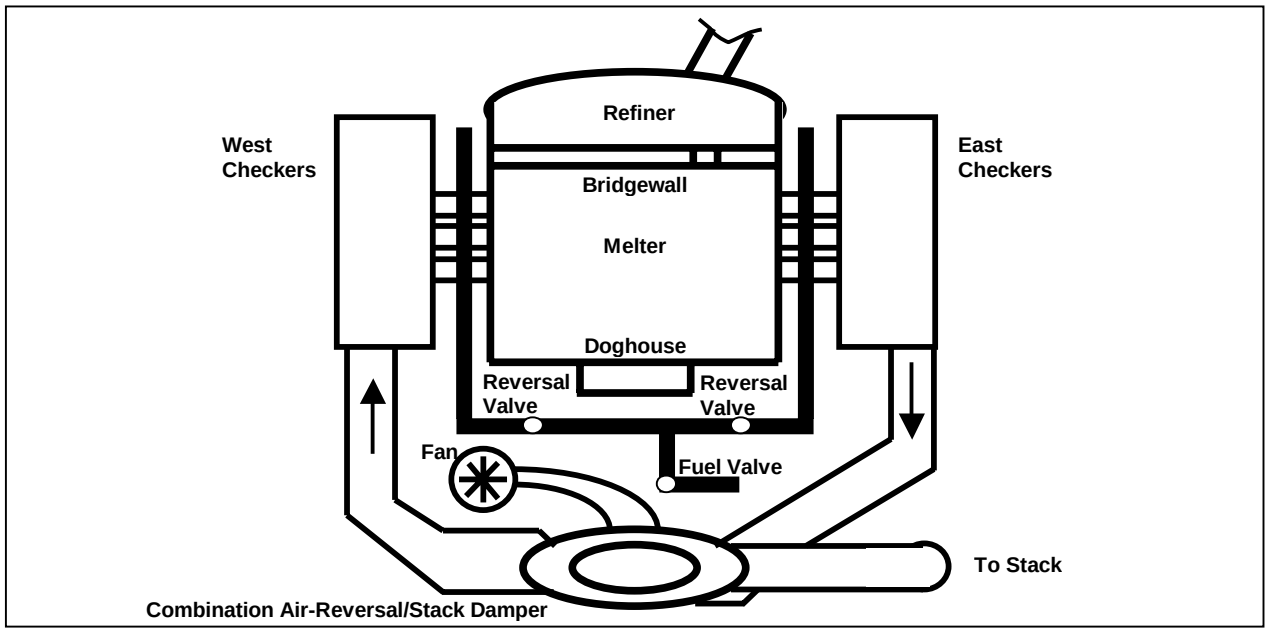
Honeywell

HC900 Glass Furnace with Checkers

Application Brief

Industry: Thermal



Combination Air-Reversal/Stack Damper

Problem

High tonnage multiport glass furnaces consume large volumes of fuel. They depend on correct adjustment of the individual ports for efficiency and to achieve a correct temperature profile across the furnace.

Reversal of the furnace – changing energy flow from West-to-East to East-to-West – must be done at the correct time to prevent upsets to the furnace temperature profile.

Continuous monitoring is required to protect the equipment and large volume of material. Data must be stored for quality control and process analysis.

The HC900 Solution

A HC900 Hybrid Controller with integrated continuous control and configurable logic/sequence capabilities can manage furnace reversal and maintain the temperature profile of a multiport glass furnace on a continuous.

The HC900 maintains the temperature profile by continuously measuring the total fuel flow to the furnace. Fuel flow, if gas, is corrected to mass flow terms. Differential pressure measurements are taken across each individual burner port.

The logic capability of the HC900 makes it possible to use a sequencing valve arrangement such that only one differential pressure transmitter is needed for each pair of corresponding east and west burner ports.

During the firing cycle each burner on the firing side is monitored and controlled to maintain the proper fuel flow. Control of the fuel valve may be accomplished using Position Adjusting Type (PAT) electric valve actuators using the output capability of the HC900. Each burner is monitored, typically for 30 seconds, and then a final control point is established. This process continues until the furnace is reversed. When that happens, the same process is implemented for the new firing side to maintain the desired furnace temperature profile. Because the control strategy is based on a measurement of total fuel flow, changes or fluctuations in fuel flow do not affect the furnace temperature profile.

During the period of time that the operator is making adjustments, the HC900 enters a manual mode. Once the percentages are changed and brought equal to 100%, then (and only then) can the control system be returned to its Automatic mode.

The Model 1042 Operator Interface provides familiar displays to inform the operator about fuel flows, port ratios, and pertinent temperatures. Process information can be stored on floppy disc making it available for use in spreadsheets reports, and analysis.

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Benefit Summary

The Honeywell HC900 provides the following benefits when used in glass furnace applications:

- Extensive set of advanced process, calculation and logic algorithms maximizes process performance
- I/O and configuration capacity support complete furnace and forehearth control plus monitoring points
- Fuel/Air ratio control and Mass Flow algorithms support combustion control
- Isolated, universal analog inputs allow mix of analog input types on same card, saving I/O cost
- Open Ethernet connectivity via Modbus/TCP protocol provides plant wide process access and data acquisition.
- Extensive equipment diagnostic and monitoring to maximize process availability
- A common configuration tool for both control and local OI minimizing engineering costs.
- Logic and timing functions can be used for furnace reversal

Implementation

Overview. The HC900 as shown in Figure 2 consists of a panel-mounted controller, available in 3 rack sizes along with remote I/O racks, connected to a dedicated Operator Interface (OI).

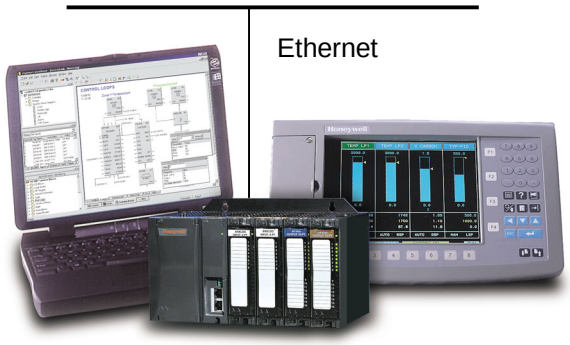

Figure 2: HC900 Hybrid Controller, Model 1042 OI and Hybrid Control Designer Software

All field signals terminate at the controller. The controller has universal analog inputs, analog outputs and a wide variety of digital input and output types. This controller will provide all the glass furnace control functions.

Configuration. The Hybrid Control Designer software, operable over Ethernet, an RS-232 port, or via modem, provides advanced configuration techniques allowing a variety of strategies to be easily implemented. The run-mode configuration monitoring and editing capability allows these strategies to be tested and refined as process knowledge is gained.

Monitoring. The complete operation can be monitored and controlled from the easy to use, familiar displays of the Model 1042 OI.

Data Storage. The data storage feature of the OI can be used to log process information during the cycle to an integral floppy disk for a permanent record.

Open Connectivity Over Ethernet. Use popular HMI, data acquisition, OPC server, and HC900's HC Designer configuration software over an Ethernet LAN concurrently to access HC900 controllers over local LAN connections or your Intranet.

Peer to Peer Communications. Any HC900 can support up to 8 peer controllers for exchange of analog or digital data over Ethernet