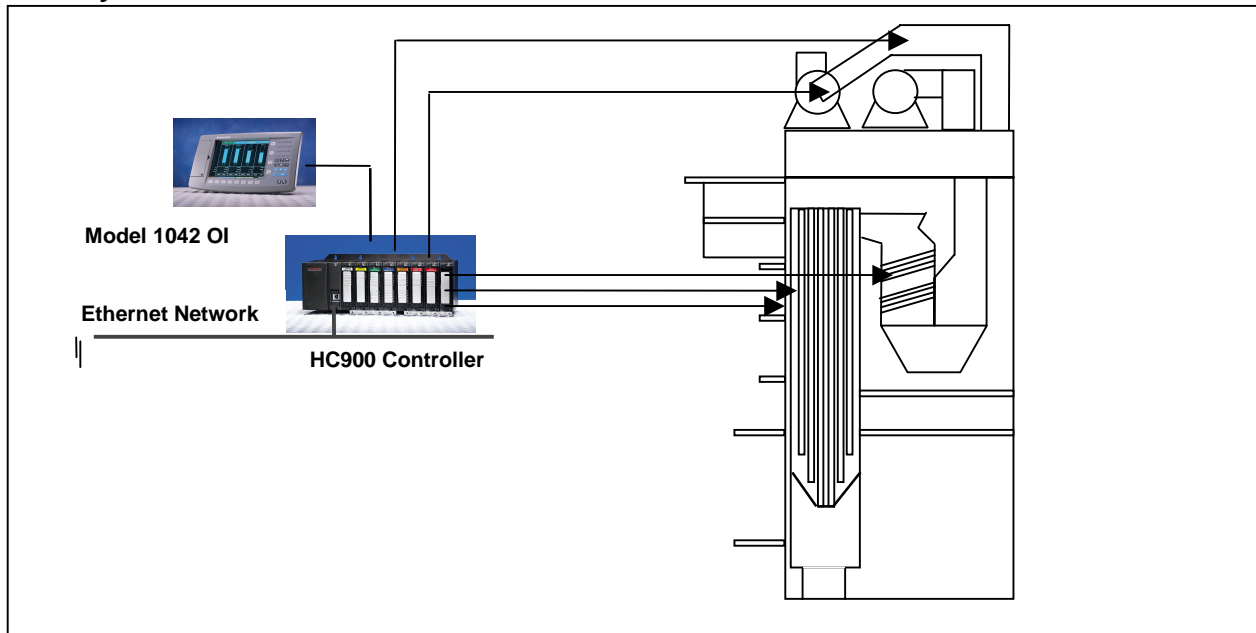


HC900 Boiler Tube Temperature Measurement

Industry: All



Problem

Statistics indicate that 50% of maintenance and forced outages in utilities relate to boiler tube failures. Corrosion due to steam cycle impurities is recognized as a major contributor. Previously boiler tube monitoring was typically required during startup with a log requirement only on alarm. Today, as boilers experience increased cycling or peaking demands, new stress is placed on boiler tubes, with an increased negative impact on heat rate, and the need for continuous monitoring is recognized as a high priority. In addition, accurate monitoring of metal temperatures in utility boilers is essential for increased plant reliability, availability and performance.

Knowledge of tube temperatures in various sections of the boiler can aid in troubleshooting efforts and maintenance planning. These sections include:

- Furnace walls
- Boiler generating tubes
- Superheater tubes
- Reheater tubes

These sections are often further divided into subsections which identify parallel flow loops and areas which may receive varying heat distribution due to the internal layout of burners, dampers, etc..

Tube temperatures are normally measured using thermocouples which are welded to the wall. Type J, K and E thermocouples are most frequently used, due to the range of operation. Continuous monitoring of boiler tube temperatures will aid in identifying problem areas such as:

- Determining safety in pressurized part of the boiler – leakage, breaks, blockage, etc..
- Detecting heat transfer reductions due to deposit and scale buildup by means of temperature differentials and gradients measured through tube walls and inlet vs. outlet sections

Corrosion and wear due to temperature, frictional stresses, and water/steam impurities are natural in every boiler. Temperature monitoring and proper cleaning aided by continuous and increased efforts in water chemistry management and chemical control of the water/steam cycle in the boiler should increase efficiency and longevity of the boiler tubes.

By properly identifying problem areas early, preventive measures can be taken during outages to head off major damage and ultimate replacement of boiler sections. Additionally, improved performance will be realized by eliminating leaks and improving heat transfer and by reducing scaling and deposits with scheduled cleaning intervals.

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The HC900 Solution

The HC900 Hybrid Controller offers an ideal solution to meet the total needs for boiler temperature monitoring. The HC900 architecture provides unsurpassed of multiple thermocouple measurements, with the flexibility to easily add auxiliary parameters such as auxiliary load, feedwater flow, steam temperatures and pressures.

The standard logic capability of each HC900 can be used to enhance alarm strategies to include startup/shutdown and special circumstances.

Computational capability within each HC900 provides the means of executing temperature differentials and temperature averaging, eliminating the need to remotely wire thermocouple networks.

Alarms may be configured for high, low, deviation high/low, deviation band and rate of change. Alarm setpoints can vary based on calculations relating to load, flows, averages etc.. This capability can help prevent nuisance alarms as operating conditions vary.

Benefit Summary

The Honeywell HC900 provides the following benefits when used in temperature measurement applications:

- Low installation cost for retrofits
- Open Ethernet connectivity via Modbus/TCP protocol provides plant wide process access and data acquisition
- Extensive equipment diagnostic and monitoring to maximize process availability
- Isolated, universal analog inputs allow mix of analog input types on same card including RTD, mA, T/C, mV, V, saving I/O cost
- A common configuration tool for both control and OI minimizing engineering costs
- Configurable alarm strategies
- Computational capabilities
- Data collection

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, 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, isolated analog inputs, analog outputs and a wide variety of digital input and output types. In addition, there can be up to 4 remote I/O racks. Up to 512 I/O with 256 analog inputs are supported. This controller will provide all the water monitoring functions including calculations, loop and logic control as needed.

Configuration. The Hybrid Control Designer tool supports advanced graphical configuration techniques to allow a variety of strategies to be easily implemented. The large library of function blocks that are soft-wired (over 100 types and 2000 blocks) support the boiler tube temperature application. The run-mode configuration monitoring and editing capability allows these strategies to be tested and refined on-line 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 via Modbus/TCP protocol.

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