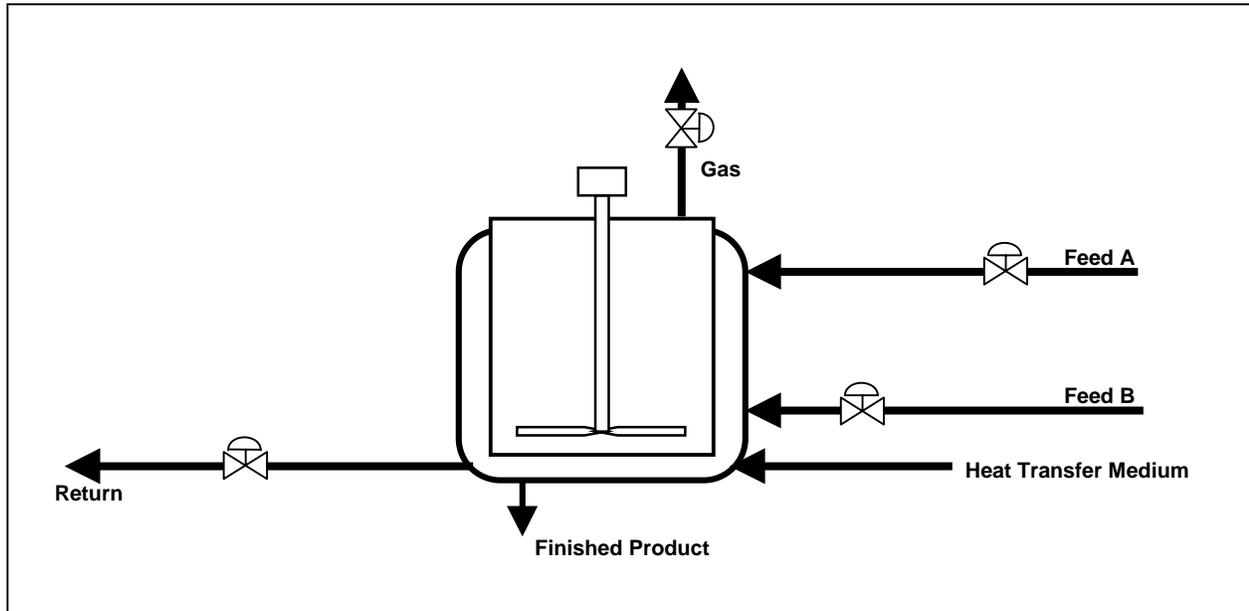# HC900 Continuous Reactor Control

Industry: Chemical

Problem

Because many reactive processes are exothermic or endothermic, temperature control presents no small challenge. Considerable effort in heat transfer depends upon the mass of the reactor as well as both the mass and the flow of the heating/cooling medium.

Quite often the reaction involves gases. Exothermic reactions are usually prone to produce gas, which may either be a useful byproduct or indeed the main product. Sometimes the gas has no commercial value and can be eliminated. Additional monitoring and control may be necessary here if the gases are toxic or pollutant.

The primary function of a continuous reactor is the effort to blend some ratio of ingredients and maintain product quality. This blending can become more challenging if the reaction involves a change in the molecular structure of the product so that the mass/volume changes during the process. This change can sometimes delete one of the additives faster than the other, such as with bioreactions or some hydrogenation processes.

For optimum production, it is desirable to maintain the reactor throughput as high as possible, without endangering good quality or the safety of the plant and personnel. One form of controlling performance however, may be to monitor the heat exchange as an indication of

reaction completion. This factor can then be used to drive the overall feed flow as fast as the reaction allows.

The HC900 Solution

The HC900 Hybrid Controller meets all of the requirements for safe and productive process operation with maximum operator convenience:

- Program control of sequencing and variables versus time

- Proportional (PID) modulating loop control

- Logic functions for equipment and process status

- Alarm detection, annunciation, and logging

- Data acquisition, trending and data logging

- Recipe configuration, local storage and download capability.

The HC900 Hybrid controller provides a cost-effective approach to sophisticated control of continuous reactors. The control of temperature, pressure and flow can be achieved to not only manage the process but to also optimize production.

A single configurable database integrates both the loop(proportional, modulating) functions and

HC900 Continuous Reactor Control

Solution   (Continued

the logic (discrete, boolean) functions required by the process.

Familiar operator displays provide the operator with dynamic information about the status of each run as it progresses. Alarms are announced in color on dedicated displays and can be acknowledged directly from the Model 1042 Operator Interface (OI). Product changeover is simplified as new recipes may be selected by name directly from the OI.

The data acquisition and control capability of the HC900 permits ongoing process analysis to define and implement the control strategies while maintaining high production with safety and at low cost.

Benefit Summary

The Honeywell HC900 provides the following benefits when used in continuous reactor applications:

- Extensive set of advanced algorithms for maximum process performance

- 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 OI minimizing engineering costs.

- Isolated, universal analog inputs allow mix of analog input types on same card, saving I/O cost

- Autotuning and fuzzy overshoot protection for quick startup and proper control operation

- Storage of up to 50 recipes for fast, error-free product selection

- Storage of up to 99 time/temperature profiles. Each profile may be part of a recipe.

Implementation

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

Ethernet
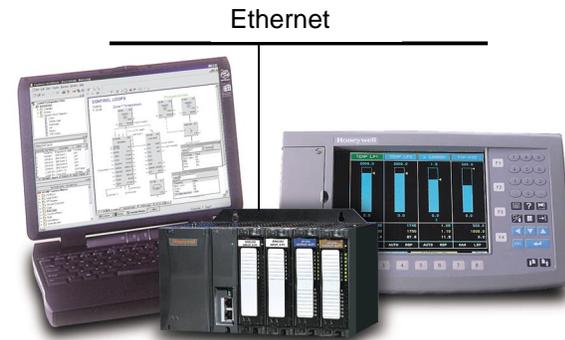
HC900 Hybrid Controller, Model 1042 OI and Hybrid Control Designer Software

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 continuous reactor control functions.

Configuration - The Hybrid Control Designer tool provides advanced configuration techniques allow 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.

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