Honeywell

HC900 Batch Retort Control

Application Brief

Industry: Food

Problem

Canning, which includes cans and jars, is a process for packaging of food products in hermetically sealed containers. The increasing number of food products and can sizes presents a control problem to the canner during the thermal processing which is done in a vessel called a retort.

Both batch and continuous equipment are used in the canning industry. This application note will cover batch retorts.

There are different specifications on both temperature and time that must be adhered to for each product and can size. The retort processing must assure a sterile product of uniform quality from batch to batch while minimizing energy consumption and processing time.

The HC900 Solution

The canning industry uses a batch vessel called a retort to heat the food containers to a specified temperature for a specified time period. The time and temperature will vary depending on container size and product.

Modern controls such as the HC900 can provide the most efficient retort operation.

Batch Retorts - There are two types of batch retorts - horizontal and vertical. These terms refer to the position of the long axis of the retort.

A horizontal retort is loaded with baskets of cans or jars from the end, whereas the vertical retort is loaded from the top.

Methods of Heating - Also, there are two methods of heating used in retorts. In the steam cook retort live steam is used directly, and in the water cook the steam heats the water in the retort.

Figure 1 is a typical cycle in a steam cooking retort.

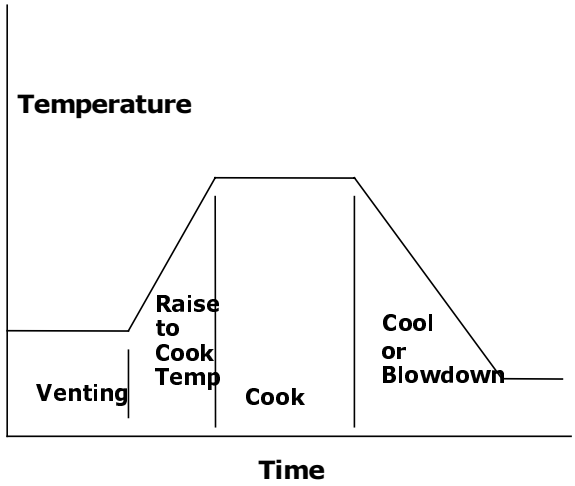

Figure 1—Retort Time/Temperature Cycle

Canning Process. The process consists of the following steps:

- Load cans into the retort
- Close lid and fasten cover
- Turn on steam and vent retort
- Raise retort to cooking temperature
- Hold cooking temperature for specified period
- Blowdown - Release of pressure
- Unload Retort

Venting - After the retort is loaded and closed the steam valve is opened and the retort vented by purging with steam through the vent valve. This eliminates the air in the retort that acts as an insulator and causes slower heat transfer. The end of the vent period is determined by the programmed vent time and a temperature setpoint.

HC900 Batch Retort Control

Solution, continued

Cooking Period - After the vent valve is closed, the temperature is raised as rapidly as possible to the cooking temperature and held at this temperature for a period of time. The temperature is usually in the range of 240 °F to 250 °F. Over cooking can cause a poor quality product, excessive steam use, and loss of production time. However, the minimum time and temperature must be met.

Pressure Reduction Period - Following the cook period, the pressure in the retort developed during the cook cycle is released. This pressure reduction period is referred to as blowdown. If there are small cans in the retort the pressure can be released as rapidly as possible. Larger cans and jars require a pressure controlled cooling period.

Unload Retort - Following the blowdown period, the retort is unloaded and prepared for the next cooking cycle. After removal from the retort the small cans will be routed through a water-filled canal for cooling.

Honeywell's HC900 Hybrid Controller can initiate the venting of the retort, raise the retort to cooking temperature, adjust the cooking time for temperature deviation if necessary and then control the blowdown.

Benefit Summary

The Honeywell HC900 provides the following benefits when used in retort control applications:

- Storage of up to 50 product recipes for fast, error-free product selection.
- Storage of up to 99 time/temperature profiles. Each profile may be part of a recipe.
- The ability to automatically adjust cooking times to assure the product is cooked at the correct temperature for the correct amount of time.
- A common configuration tool for both control and OI minimizing engineering costs.
- Autotuning and fuzzy overshoot protection for quick startup and proper control operation.
- Isolated, universal analog inputs allow mix of analog input types on same card, saving I/O cost.

Implementation

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

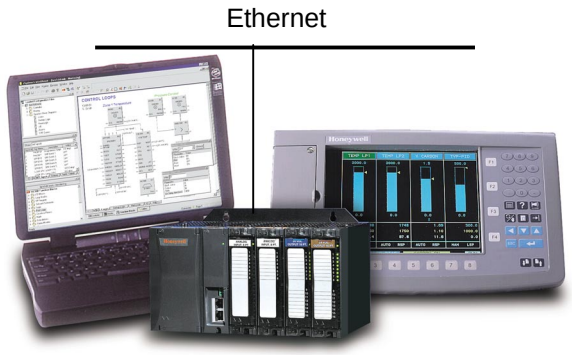

Figure 2: HC900 Hybrid Controller, Model 1042 OI and Hybrid Control Designer Software

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 control functions for the cook cycle. The setpoint programming feature of the HC900 permits the storage of 70 different profiles to accommodate a wide variety of products.

Configuration - With Hybrid Control Designer the HC900 can be configured to automatically adjust the total process time, based on product selection and the minimum retort temperature attained during its cycle. This is accomplished by tracking the lowest temperature attained and determining its deviation from the desired temperature. The product cook time is then automatically extended to compensate for the temperature deviation.

Cook Cycle - The cook cycle is started from the Operator Interface (OI). The recipe selection feature of the HC900 allows an operator to easily select the correct product to be processed. Once the product recipe is loaded, the cook cycle can automatically begin.

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