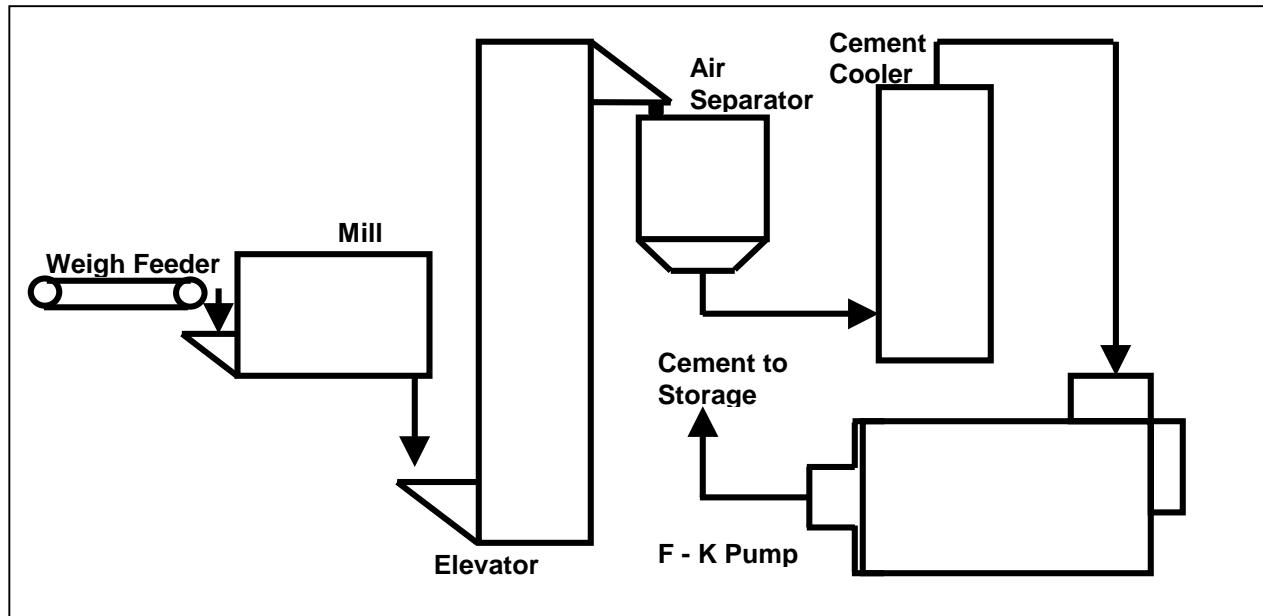


HC900 Finish Mill Control

Application Brief

Industry: Cement



Problem

To obtain maximum production at minimum operating cost, total clinker/gypsum feed – mill load – is a critical variable that must be controlled precisely.

If the mill is too heavily loaded, crowding of clinker and the mill grinding media will reduce the grinding efficiency and more oversized particles will be recirculated.

If the mill is underloaded, it does not operate efficiently and the mill production rate suffers.

In either case, product cost is increased.

The control challenge must consider material blending and regulation of mill feed to achieve a maximum production rate of the desired particle size with the minimum amount of energy.

The HC900 Solution

Control of the finish mill circuit can be separated into two functions:

- Control of the clinker/gypsum ratio
- Control of the mill feed

In order to obtain the proper clinker/gypsum ratio, the tonnage withdrawn from the respective silos is measured and the operator establishes feedrate setpoints which determine the actual feed to the finish mill. The setpoints are

expressed in terms of weight per unit time or as a ratio of one material to another. The HC900 provides automatic scaling of units of measure to assist the operator in the setpoint determination.

Control of mill feed is critical because it has a direct bearing on the finish cement particle rate and mill power consumption. Direct measurement of mill power as an indicator of feed rate is not satisfactory because the grinding media alone accounts for approximately 80% of the mill motor load. The most successful installations use elevator motor load, separator motor load or a combination of the two as a measurement to control mill feed.

Elevator load is very sensitive to changes in feedrate because there is a favorable ratio of product to equipment mass. Also, any increase in recirculation of oversized particles acts as feedback to increase control sensitivity and reduce the time needed to restore optimum operating conditions.

Separator load is the preferred measurement when elevators are grossly undersized or oversized. Some installations may experience separator “choking”. The HC900 can be configured to detect this condition and automatically select and use either the separator load or the elevator load.

HC900 Finish Mill Control Solution

(Continued)

The HC900 uses process variables relating to weight measurements, relative ratios, and material flows to achieve high yield of the desired product characteristics while minimizing energy use to reduce operating costs. The control configuration resident in the HC900 controls the total feed to the mill based on variations in the recirculating load; main feed is adjusted accordingly. As the main feed varies, appropriate control signals are used to adjust clinker and gypsum feed rates to maintain the proper ratio.

In addition to providing continuous process control, the HC900 provides configurable logic functions for safety interlocks, alarms and sequential start/stop operations of mill, conveyors and feeders.

All of the process information relating to feedrates, motor loads, start/stop/running times, and other data and events can be acquired and logged by the HC900. The data can be used for immediate display, for computations, or import to supervisory systems.

Benefit Summary

The Honeywell HC900 provides the following benefits when used in Finish Mill applications:

- Extensive set of advanced algorithms for maximum process performance
- Ethernet connectivity for easy plant wide integration.
- Extensive equipment diagnostic and monitoring to maximize process availability
- A common configuration tool for both control and OI minimizing engineering costs.
- Autotuning and fuzzy overshoot protection for quick startup and proper control operation.

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).

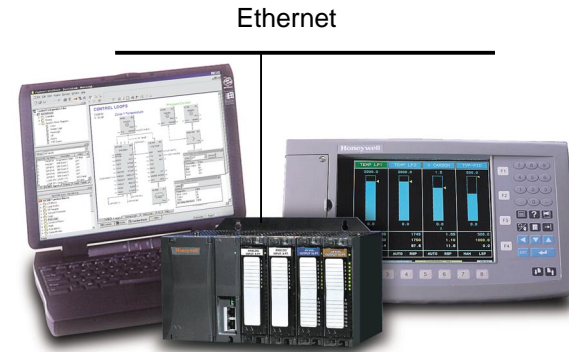


Figure 2: HC900 Hybrid Controller, Model 1042 OI and Hybrid Control Designer Software

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

Configuration. The Hybrid Control Designer 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.