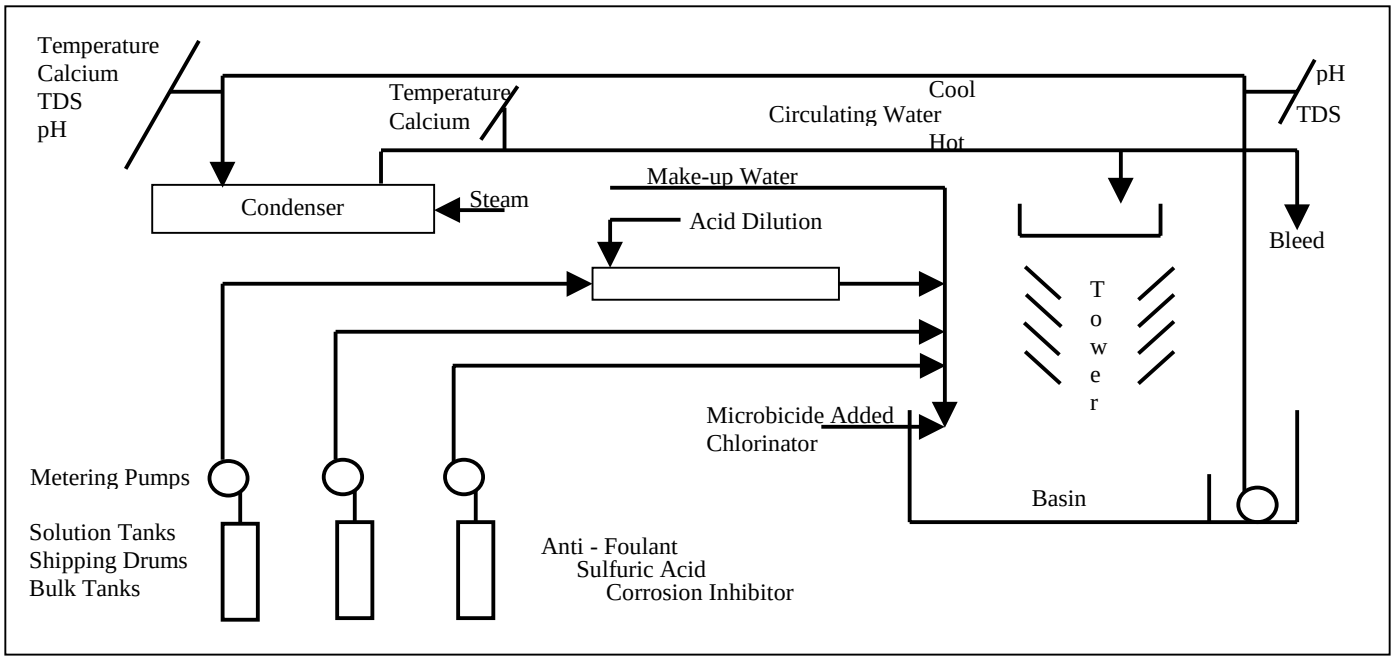
Honeywell

HC900 Cooling Tower Water

Application Brief

Industry: Utility



Problem

The primary function of a cooling tower is to cool water from the condenser by absorbing heat through evaporation. Water losses require the addition of make-up water based on a "Cycles of Concentration" calculation:

- CC = TDS in cooling water/TDS in make-up water

Or:

- CC = cooling water chlorides/Make-up water chlorides

Where:

CC = Cycles of Concentration

TDS = Total Dissolved Solids

The main concern in any cooling system is to maintain the integrity of the condenser. The cleaner the surfaces, the better the vacuum that can be obtained, improving turbine efficiency. Continuous evaporation of water causes concentration of dissolved and suspended solids to remain in the recovered cool water. Over a period of time, due to maximized solubility limits, deposits will begin and increase at a steady rate.

Corrosion and scaling, being the major deterrent to condenser cleanliness, dictate monitoring of many water quality parameters and implementing many levels of control to assure optimum water quality.

Corrosion and scaling potentials of the cooled water are measured and controlled based on the "Langlier Saturation Index" (LSI) calculated from pH, Total Dissolved Solids (conductivity), calcium, M – alkalinity, and temperature.

"Bleed Off" controlled based on variables such as Cycles of Concentration and Langlier Saturation Index varies the level of concentration in the cooling tower by replacing certain quantities of concentrated water with make-up water.

The HC900 Solution

In the past, cooling towers were controlled manually or with simple and limited automatic control. This was due to the large number of parameters and calculations needed for automation and the associated high costs for acquisition, installation, and maintenance of large control systems.

Today, rising energy costs and increased cycling/peaking operation are driving the need to implement life extension and unit performance improvement programs.

The HC900 Hybrid Controller has the capability to monitor all standard parameters such as pH, conductivity, calcium, alkalinity, and temperature. In addition, auxiliary parameters such as tank levels, hydrazine hardness, dissolved oxygen, and chloride concentration are easily handled.

HC900 Cooling Tower

The HC900 can manage up to 32 loops in each controller and remote I/O racks can be interconnected to minimize hardware and installation costs, even for very large numbers of measured and controlled points.

The HC900 combines analog control functions for continuous variables such as temperature with logic functions for discrete functions such as starting and stopping motors. The system can also perform Cycles of Concentration and Langlier Saturation Index calculations without additional equipment. The results of calculations are readily integrated into the automatic control strategy. Further, HC900 can acquire and log data for display and analysis.

A single configurable database integrates both loop (proportional, modulating) functions and logic (discrete, boolean) functions.

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).

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

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).

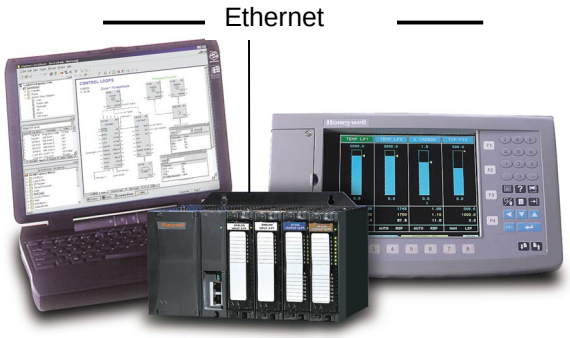


Figure 2: HC900 Hybrid Controller, Model 1042 OI and Hybrid Control Designer Software

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 monitoring 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.