YASKAWA

A World of Automation Solutions

VAV Systems. System optimization can be used to reduce building energy consumption by optimizing operation of the HVAC system at part-load conditions. The system optimization concept simply means that each subsystem is operated in the most efficient manner possible while continuing to satisfy the current building load.

To accomplish this in a VAV system, the temperature in each of the building's occupied spaces is monitored, along with operation of the VAV terminals, to identify which zone is the "worst case." The supply fan is then unloaded accordingly to keep the VAV terminal serving this zone fully open.

Reducing the supply fan speed is the most energy efficient means of unloading and minimizes supply fan energy consumption by moving only the volume of air required by the cooling load. Reduced fan rpm also reduces the system noise level.

As the load drops and the fan is at a predetermined minimum flow, the system resets the supply air temperature upward, so less chilled water is needed. In a variable-flow chilled water system, this reduces water pumping energy significantly by reducing the distribution pump rpm and decreasing chilled water flow.

If the system load continues to drop, the system will reset the chilled water supply temperature upward which will, in turn, reduce the energy requirements of the chiller(s). The resulting changes in chiller head pressure and system loads can then be used to reset the cooling tower fan speed for additional energy savings.

The key to this control strategy is information-sharing throughout the system to assure that operation is truly optimized — a capability that has long been desired and discussed. Today, with advanced microprocessor-based controls, system optimization is a viable, cost effective option.

Application Considerations

To implement a system optimization strategy, the control system specified must be capable of monitoring and controlling all areas of the HVAC system.

Benefits are maximized in chilled water systems when two-way water valves are used, and chilled water is distributed using primary/secondary (decoupled) pumping with flow modulation through distribution pump speed control in response to changing system load.

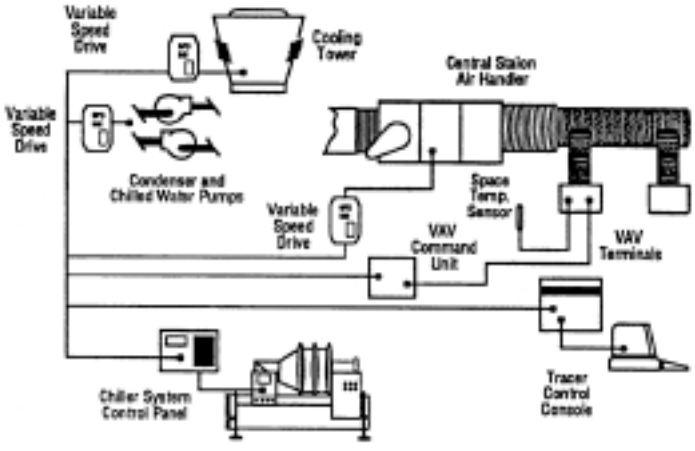

Figure 1.