

Heated System Control Basics

Controls are a primary component of a heated system. Proper selection and application of the controls is the key to optimum performance and efficiency. System design determines the accuracy of control to a much greater extent than the accuracy of the controls themselves. Temperature gradients (differences in temperature from one part of a system to another) must exist to allow heat transfer, however, the presence of extreme or rapidly changing gradients make close control very difficult. The following should be kept in mind when designing a heated product or system:

1. All parts of the system should be insulated where feasible to reduce heat losses.
2. In most applications the system should be as compact as possible with the heat source, material heated, and control sensing as near each other as possible.
3. Consider the possible use of more than one control or anticipating type temperature controls to reduce temperature overshoot and undershoot.
4. Consider the use of more than one heater wattage level or proportional type power control that varies heater wattage output depending on system temperature.
5. Position of the thermal sensor should be considered to balance the need of response to temperature changes in the material including placement of the sensor at a location indicative of the average temperature of the material.
6. Temperature sensors used with cartridge heaters in platens or dies should be located no closer than 1/2 in (12.7 mm) from the heater, or in the middle between heaters.
7. Experimentation in sensor location may improve temperature control depending on application.