(ATC) Adaptive Thermal Control

Adaptive Thermal Control technology provides an advanced algorithm tailored to meet the requirements of different molding environments by delivering smooth and exact power to each heater in increments which provide the smallest actual temperature deviation.

ATC Technology:

- Advanced Thermal Control (ATC) suite of functions can significantly reduce power usage
- Advanced Thermal Control (ATC) reduces peak current demand
- Balanced power output to improve stability
- Allows customization of the PID to customers exact requirements
- Provides material savings
- Equates to higher profit margins

Individual Heater Auto P.I.D. Tuning:

- Auto Tuning is carried out during the warm up process, by individually tuning each heater to control within .05° F of set point. Auto Tune is carried out each time the controller is turned on.
- To gain an even more precise level of control in the most difficult of situations, users have the option to manually adjust the operating algorithm (for both manifolds & tips) in a range from "1" (very slow) to "5" (very fast).

Balanced Power Output:

Proper balancing of power reduces electrical noise by switching the power to the heaters as the voltage crosses zero. The VISIONS 3000 balances power by spreading the "ON" cycles over a one (1) second time frame. Example, a 50% output on other systems consists of a half second of power on and a half a second of power off. With the VISIONS 3000, the power is on for a half a cycle and off for a half a cycle (as seen in the graph below). This produces significantly smoother power delivery, reduces heater oscillation while increasing reliability and accuracy of the control loop.
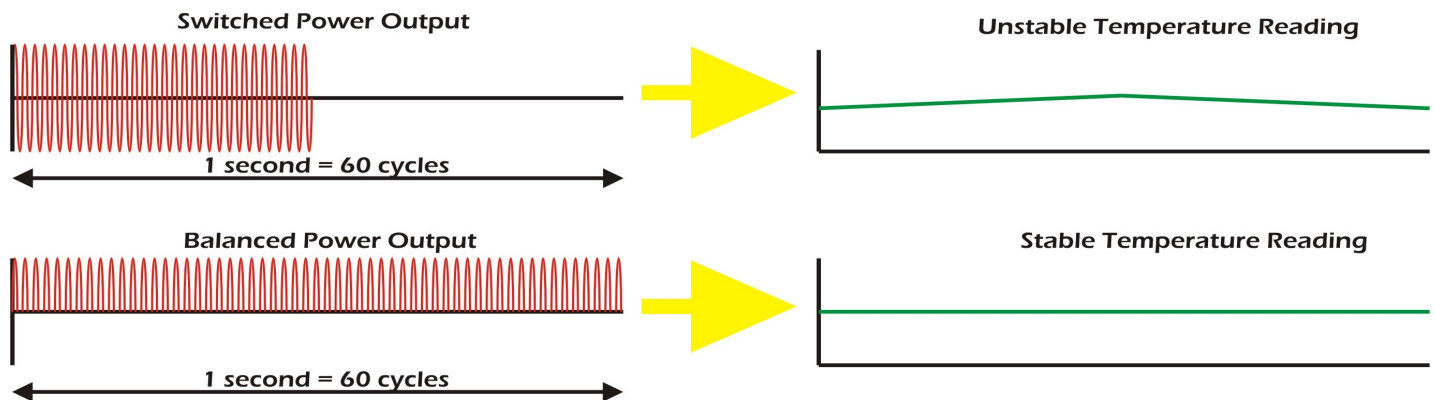
Manifold & Cavity Zone Control:

Because of the differences in mass and operational characteristics of Manifolds & Cavity zones the VISIONS 3000 provides PID algorithms tailored to meet each of there specific requirements. The result of controlling Manifolds and Cavities independently is proper seating of the tip, smooth, efficient and even control of the mold, while minimizing power consumption, increased tool life & faster start-up.

Switched Power Output

Unstable Temperature Reading

1 second = 60 cycles

Balanced Power Output

Stable Temperature Reading

1 second = 60 cycles

For exceptional mold heater requirements, individual settings of the tuning parameters are available using a combinations of fast, efficient tuning algorithm and balanced power output to the heater, almost any heater is capable of being controlled within 1 degree.

Individual Heater Power Consumption Monitoring:

All Cavity heaters power consumption is constantly and individually monitored. Any increase in power demand is the first sign of a developing problem and early detection is vital in preventing avoidable scrap, tool down time and unwanted power usage.

Energy Savings:

In todays world of ever increasing energy cost, efficiency is a necessity. ATC (Adaptive Terminal Control) can adapt power usage to the precise thermal requirements of the tool, balancing the power demand to temperature oscillation of the heater, thus increasing control accuracy whilst also increasing reliability of the heater. Establishing not to exceed power values eliminate excessive power spikes & consumption during the operation sequence, offering the user the most energy efficient method of controlling temperature.

Soft Start:

The VISIONS 3000 has different tool start strategies to satisfy the most demanding production requirements thereby effectively decreasing power consumption and increasing heater reliability. These Include:

- <u>Manual Soft Start</u> - Sometimes referred to as Bake Out, this manually triggered, 30 minute, low power function removes moisture in the mold.

- Automatic Soft Start - When the RUN function is selected, the power of all zones are ramped from zero. Due to their increased thermal mass, the ramp rate for Manifold zones is greater than for Cavity zones. Ramping power has significant advantages to ramping temperature - most noticeable, any thermocouple fault condition that prevents temperature increase in a zone does not prevent the complete tool from reaching production temperature.

- Manifold Pre-Heat - It is widely recognized that heating the Manifold zones before Cavity zones allows the bushings to bed into the mold preventing leakage. The Manifold Pre-Heat option enables the operator to select this function, if required, and by permitting the operator to select the trigger temperature at which the cavity zones start ramping, warm up time is kept to a minimum compared to systems that require the manifold to reach temperature before activating the cavity zone.

Boost:

A temporary rise in temperature normally used to clear a cold slug on start up. Boost operates on Cavity zones only. The increase in temperature (or power if the zone is in manual mode) and the time that Boost is applied are both operator settable. This function can be saved on the tool database.

Stand-by:

Stand-by lowers temperature thereby power consumption of the Manifolds and Nozzles to a safe range when the molding system is at idle. This process can be manual or automatic. If connected to sensors on the molding press and feedback is indicates the molding operating has ceased for a period of time, VISIONS 3000 can place itself in Stand-by mode, lowering the temperature to a safe range thereby preventing the degrading of plastic and saving energy. Stand-by operates until cancelled. This process can be saved in the tool database