The Application

A glass toughening furnace with 24 heater zones is used to strengthen standard sheet glass by subjecting it to high temperatures. Problems arise when certain parts of the glass are not heated to the correct temperature, in these circumstances the finished product will have weak areas. If the glass is heated for too long a period it will begin to warp and the glass will be unusable. Therefore it is critical to have a system that can ensure that the glass is correctly heat treated but without subjecting it to heat for too long a period that it becomes damaged.

The glass also varies in type and thickness so the controllers require reconfiguring when changing between materials. It is time consuming when faced with changing the settings for 24 zones manually.

Once the glass has been successfully treated it is passed through a cooling tunnel to speed up the process of bringing the glass temperature back to ambient.

Why CALogix?

CALogix can integrate PID functionality and logic, therefore it was possible for the temperature of each zone to be monitored so that when the last zone reached the minimum temperature the process could be completed before being subjected to an excessive amount of heat.

As CALogix is a modular product it was also possible to build a system specifically for the customers’ application in a simple way that is also compact. As each base-unit has RS485 communications they can be networked by using preformed ‘daisy chain’ cables back to a CALopix operator panel.

The operator panel can be configured to display important and relevant information for the application. Access is also restricted to other parameters within the system that are not required by the user, hence preventing inadvertent modifying of settings that could affect the operation of the system. The recipe handling feature within the panels allow a number of parameters to be downloaded to the controller by a single action such as a pushbutton or selector switch. Reconfiguring controllers for different products can be carried out almost instantaneously.

The facility within the CALopix operator panel to add Ethernet connectivity also gave the customer the ability to log system data on a remote PC running CALgrafix process monitoring and configuration software.

The system developed by the customer is shown below.
The solution

6 base units with 4 PID modules are used to control the 24 heaters zones in the furnace. 12 zones are used to heat the underside of the glass and 12 zones the top. Once the glass is fed into the furnace an integral timer ensures that the glass is treated for the correct time. Even if the glass has been in the furnace for the required time it will be held in the furnace until the temperature of each zone is above a temperature setpoint, this ensures that the glass is completely heat treated. The logic capability within CALogix is used to monitor each of the zones and provide an output to the drive system to remove the glass once the toughening process is complete.

The setpoint of each zone varies according to the glass type and thickness but is generally in the region of 600°C, the recipe function is used to select the material type on the HMI by pressing a button labeled for the glass type and the settings are then downloaded into the CALogix units. This process takes a matter of seconds saving around 20 minutes that it used to take to reconfigure the controllers manually within the old system. In addition to setpoints, fan speeds are selected as part of the recipe to ensure that the glass is cooled at the optimum rate for the material. By restricting the user from adjusting setpoints the possibility of incorrectly using a wrong setpoint is eliminated.

Bargraphs are used to display all the zones on a single page, they provide the customer with a visual indication on whether all the zones are the correct temperature.

The CALopix operator panel real-time clock starts the system before a shift starts. As the system is prewarmed production efficiency is improved as glass can be toughened at the beginning of the working day. The system automatically shuts down at the end of the day which has safety and energy saving implications as the system cannot be left running overnight.

As the glass manufactured is used on large construction projects, the customer also wanted the ability to demonstrate to his clients that the glass had been properly treated. By fitting an Ethernet card to CALopix, he is able to log the temperature from each zone on a PC via CALgrafix process monitoring and configuration software. An additional advantage is that the customer has full visibility of the process from a PC in his office.

CALogix was an ideal solution for this customer's application for the following reasons:

- Fast system configuration for different products
- Remote logging of data
- Modular system simplified installation
- Simplified operator control (HMI)
- Logic control for optimum process timing
- Automatic starting of system