Glass Optimization Series: Model Based Control

ACSI's Model Based Control

ACSI is able to provide customers with it's advanced Model Based Control within the PLC. It is an advanced regulatory controller that has the capability of learning how equipment responds to process variations and is then able to change the way it reacts to those variations in order to improve it's responses. The model based controller has two main components to help anticipate and maintain glass temperature: **the adaptive model building component** and the **predictive controller**.

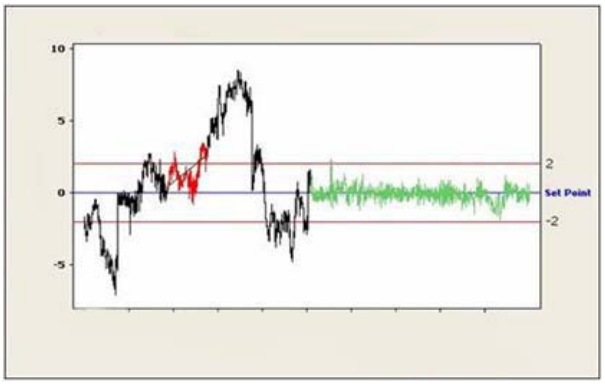
Conventional methods of process control require that an operator adapt to variables in the manufacturing environment such as changes in the ambient air temperature, process upsets, and pull rate which can all affect the efficiency of output and product quality. Rather than asking an operator to adjust the changes, it is more efficient to have a model based controller adapt automatically for better control without requiring loop tuning. In addition to adapting to changes, the controller models feedforward inputs and updates control actions to quickly stabilize temperature variation. Signals are fedforward into the control model to provide advanced warning of process upsets. The model can then make the necessary changes before the upset reaches the local zone, and in most cases, it can completely eliminate the upset before it is sensed by the local zone. Predictive control allows the controller to predict what actions are needed to reach setpoint both quickly and without overshoot. ACSI brings extensive experience from over 700 installations worldwide in the Glass Industry and is a recognized leader in development of advanced control techniques.

Benefits	**Actual Customer Results**
Increased production	10 TPD
Reduced Energy	2 month payback

Features

Reduced variability of Canal Temperature	72% reduction
Reduced variation of Glass Level	58% reduction on Error from setpoint
Reduced variation of Melter Crown Temperature	

Gob Temperature Control Variation Before and After MBC



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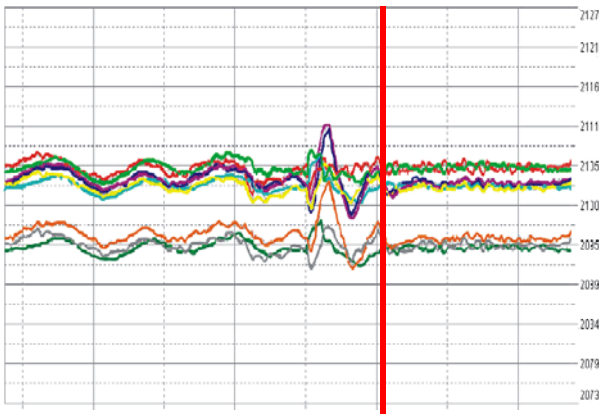
Application Strategy

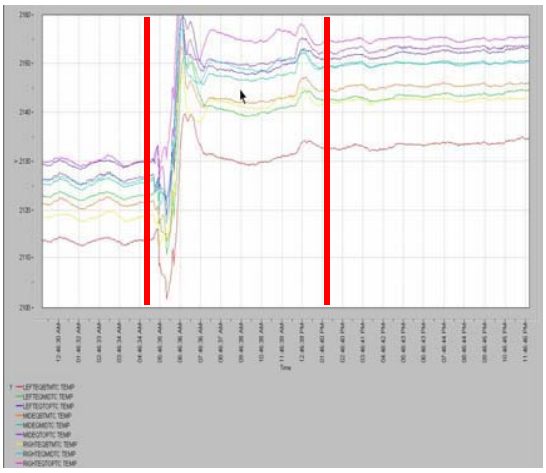
ACSI brings an additional level of control the existing control system. The ACSI Model Based Control System with Brainwave has the ability to track process dynamics, predict actions, and drive temperature quickly to setpoint while avoiding overshoot making Model Based Control more efficient than traditional PID.

Nine Point Grid Before and After MBC

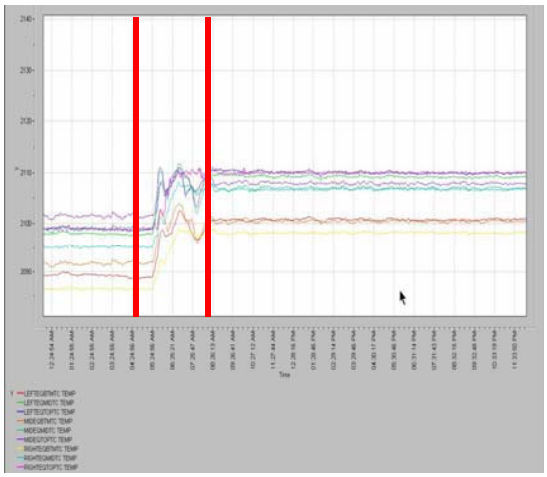


The controller learns process transfer function, adapts to process changes, understands dead time and never requires tuning. With tighter control, deviations from setpoint are greatly reduced which in turn leads to increased product consistency and quality. Adaptive control minimizes job change time by reacting quickly

Job Change with Optimized PID Tuning took 7 hours



Job Change with Model Based Control took three hours



ACSI's implementation methodology brings together the tools and know how to quickly adapt Model Based Control to your existing control system. A detailed site assessment will determine the necessary hardware, software and instrumentation required.

As an integrator of information and control system solutions, ACSI engineers in both Europe and the United States are able to provide customers with quality technical engineering, as well as exceptional glass process knowledge. ACSI's goal is to provide not only control expertise, but also process knowledge gained from over 350 years of combined experience from our 30 engineers. With our global presence increasing rapidly, ACSI currently services over 40 customers located in 26 different countries. As a company, we have engineered over 700 successful installations worldwide, including more than 100 Batching projects and over 500 Melter applications.