

REAL-TIME INDUCTION PROCESS QUALITY CONTROL

With nearly 30 years of heat treat data acquisition experience, United Process Controls engineers have taken their technical know-how and applied it to induction heat treat. The PROTHERM 9800 INDUCTION is a data acquisition and alarm package for induction heat treating equipment that meets industry standards requirements and ultimately provides precise and reliable process monitoring.

Our technical staff is able to integrate this control solution with any induction heat treat equipment regardless of age.



Get Control of Oxidation and De-Carb!

FEATURES

- Full compliance with CQI-9
- Cost-effective module configurations for new installations or retrofits

INDUCTION PROCESS ANALYSIS

Accurate, Continuous, Automatic Measurement

The electrical resistivity of the part and the magnetic permeability of the metal are factors that influence the redistribution of heat within the induction hardened part. This leads to changes of the depth of current in the part at a given frequency.

PROTHERM 9800 INDUCTION monitors current, voltage, and frequency to the coil in real-time, enabling to determine whether or not uniform heating, proper flux density and depth are achieved.

Typical Monitored / Logged Parameters

- Power
- Voltage
- Frequency
- Temperature
- Water Flow
- Scan Rate
- Other signals from the machine that can be measured



PROTHERM 9800 INDUCTION CONTROL SOLUTION

INDUCTION PROCESS ANALYSIS

Parameter Set Points & Alarms

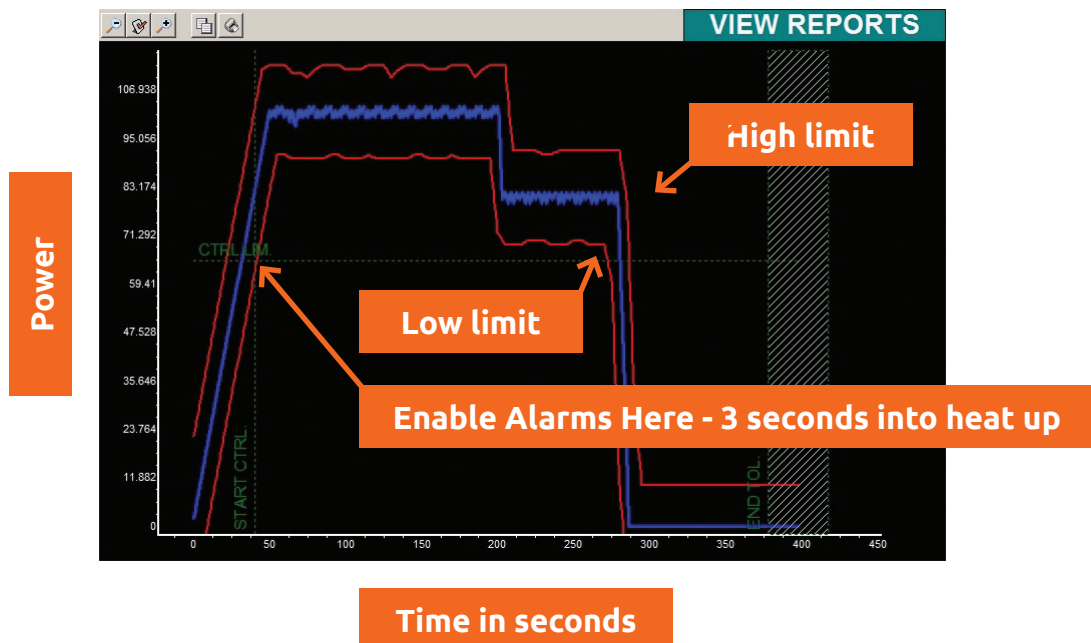
PROTHERM 9800 INDUCTION allows you to enter High, Low, and the number of accepted deviations for each of the monitored parameters. This feature enables the

system to alarm when one of the parameters, established for a particular part, is out of the band. Any action taken, once induction is in process, may be determined by you.

RECIPES		CHANEL(1-6)													
Power(kW)		Voltage(V)		Frequency(kHz)		Water Flow(l/mn)		Water Temp.(°C)							
High	Low	Nb.Dev.	Lim.Ctrl.	Start	End	Tol.	E-Shift	High	Low	Nb.Dev.	Lim.Ctrl.	Start	End	Tol.	E-Shift
0	10	2	65	40	0	20	5	0	0	0	0	0	0	0	0
0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

If the machine has the capability to divert parts to a non-compliant bin, PROTHERM 9800 INDUCTION can send a status output to the material handling of the service machine. You may also program a quantity of out of band runs before the system stops. In each case, the system will alarm and then prompt the operator to decide whether or not to continue with operation of the machine.

A prompt window may also be set up for the alarm function. Alarms are enabled only when the process is inside this window. Additionally, you can set a time delay to activate the alarm function after a process has started, and a lower control limit for any of the monitored parameters. Parameters that are in an out-of-band condition will initiate an alarm. Alarm bands are set as part of the recipe for each part.



PROTHERM 9800 INDUCTION CONTROL SOLUTION

INDUCTION PROCESS ANALYSIS

Recipe Management

PROTHERM 9800 INDUCTION allows the creation of recipes for each part. Parameters are entered for power, voltage, frequency, scan rate and quench. Recipes may

be named by part number, customer, or process. There is no limitation to the number of recipes.

The screenshot shows a software window titled 'RECIPES | CHANEL(1-6)'. It features a search bar with 'Ph233542234Q' entered. Below it is a 'Recipe list' containing 'F&P Ph233542234Q Test'. To the right, 'Cycle Max. Time (s)' is set to 20, and 'Comment(s)' is '10 mm Shoulder Bolt'. A 'Recipe info' table is displayed with the following data:

Power	100
Voltage	20
Frequency	50
Water Flow	1.5

Buttons for 'SAVE', 'COPY...', and 'DELETE' are visible on the right side of the interface.

Recipes are stored and retrieved, and parameters are viewed, modified and saved from this screen

Recipes are easily copied, modified, and saved. New recipes are created simply by copying an existing recipe and changing the necessary parameters.

The screenshot shows a 'UNITED PROCESS CONTROLS | RECIPE VIEW' window. The 'Recipe Name' is 'test' and the 'Comment(s)' is 'Monday run'. 'Cycle Max. Time (s)' is 20. The 'Recipe info' table is as follows:

Power	Batch 1
Voltage	Test Recipe 2
Frequency	Test Recipe 3
Water Flow	Test Recipe 3
Water Temp	

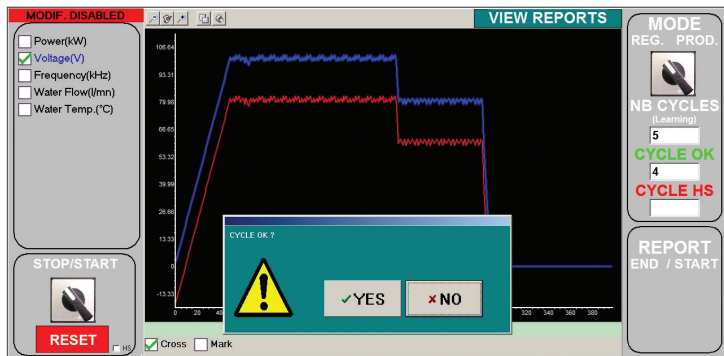
The main parameter table is titled 'CHANEL(1-6)' and is organized into columns for Power (kW), Voltage (V), Frequency (kHz), Water Flow (l/mn), and Water Temp. (°C). Each parameter has 'Lim.' and 'Env.' sub-sections with input fields. For example, Power (kW) has High/Low values of 0 and 10, and Nb.Dev. of 2. The 'Lim.Ctrl.' for Power is 65. The 'Start.End Tol. E- Shift. E' row shows values like 40, 0, 20, 5, 5 for Power.

An 'OK' button is located at the bottom center of the window.

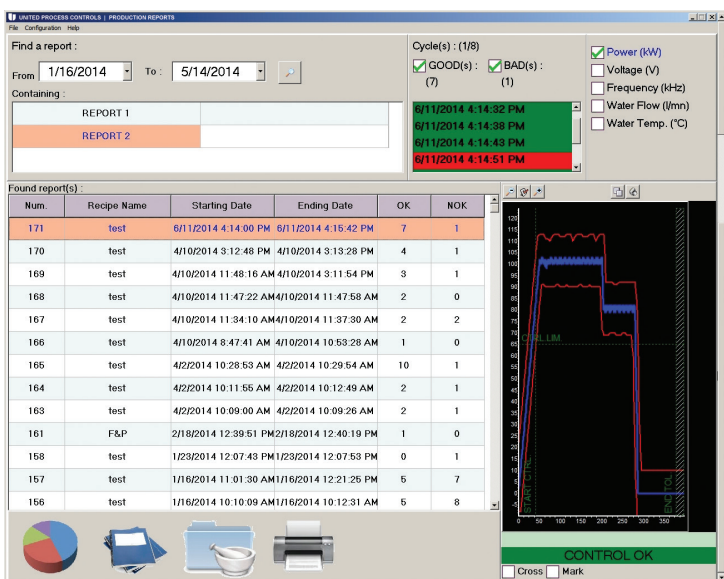
INDUCTION PROCESS ANALYSIS

Learning Modes & Reports

PROTHERM 9800 INDUCTION can run in Learning mode. In this mode, basic parameters of the part are entered into the system, and the part is processed accordingly. If the results of metallurgical test performed on the hardened part are not favorable, the parameters are corrected, and the next part is processed. When uniformity is attained, the optimal recipe is saved for that part. PROTHERM 9800 INDUCTION can also be configured to interface with your equipment to start trial runs or production runs.



PROTHERM 9800 has an extremely fast sample rate : 2 ms for digital inputs and 10 ms for analog data collection. Historical reports are available for each part run and can be exported to PDF format.



OTHER CONTROL SOLUTIONS



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