AUTOMATION ENGINEERING
EXCELLENCE IN ENGINEERING

Furnace Control System

A manufacturer of gas turbine components uses vacuum casting furnaces and vacuum heat treat furnaces in their operation.

Vacuum furnaces use pumps to maintain an operating pressure less than 10 microns absolute pressure. These pumps are specialized and require extremely rigid control.

Induction heaters are required for melting of alloy. Non-contact temperature measurement instruments are required to measure molten alloy temperature.

Melting and pouring of molten super-alloy requires interactive, multi-axis motion control.

The components produced are subject to lifetime audit. The process must be thoroughly documented during every thermal manufacturing operation.

Objective

Provide an automatic control system for furnaces used in the casting and heat treat of super-alloy. Provide indisputable process documentation throughout component production.

Solution

Furnace control system includes 480 VAC distribution, instrumentation, inputs and output system, vacuum producing equipment, heating equipment, temperature measuring equipment, safety equipment, and Operator Interface.

Sequence of Operation, motion, heaters, and all equipment are controlled by PLC. This control system permits unattended operation of the furnace.

Hydraulic servos and electric servo motors move the crucible and the mold ram.

Motion control is implemented in a Teach / Playback form. Using custom PLC and PC logic, Operators can manually "teach" the coordinated-axis motion sequence required to properly pour molten alloy into a crucible with a joystick.

Certain components require coordinated motion of indefinite length (sometimes lasting several hours). A means of transferring motion profiles between PC and PLC, in real-time, permits Teach and Playback of pours of unlimited duration (limited only by the size of the PC hard drive !)

Casting performance is logged to a network database.

First generation Operator Interface was developed using Professional Basic. Later generations of this Operator Interface were developed with WonderWare InTouch.

AEC Scope of Supply

System Design	Database programming	Control Panel fabrication
Electrical design	Instrumentation Design	PLC programming
Operator Interface	Installation	Startup