Abbott Furnace Company, a manufacturer of custom industrial furnaces located in St. Mary's, Pa., is implementing a value-added preventative maintenance program based on RACO's Catalyst® data logging and alarm notification system. This new service will provide Abbott's customers with meaningful, accurate and timely data regarding various operational aspects of the furnaces they purchase, as well as analysis and recommendations on preventative and corrective actions.

Abbott Furnace Company partnered with Allen-Bradley distributor B&R Electric Company, also of St. Mary's, Pa., AB Encompass partners ProSoft of Bakersfield, Ca., and RACO Manufacturing and Engineering Co. of Emeryville, Ca., to design this system.

One of Abbott's customers — Clarion Sintered Metals (CSM) of Ridgway, Pa. — is currently using this service to monitor electric current flow through the heating elements of two of Clarion's Abbott sintering furnaces, 24 hours a day, seven days a week. Sintering furnaces use temperatures, often in excess of 2,000°F, to heat powdered metal placed in a mold to form thousands of small, intricately designed metal parts that would be prohibitively costly or impossible to machine on a mass basis.

Part of the standard maintenance of these furnaces is the adjustment of the power transformers. Sintering furnaces utilize heating elements called Glo Bars that require step-down transformers with multiple secondary taps. With this type of heating element (made from silicon carbide), resistance increases with age. As this happens — referring to Ohm's Law when the voltage stays the same and your resistance increases — the amperage decreases, as does the heating capability of the element. When the amperage decreases to a level that it can't heat the product, a transformer tap change is needed to boost the voltage and get the amperage back up to an acceptable level.

The problem has always been predicting when a tap change will be needed. In the past, it was not known until a furnace full of bad product disrupted production and alerted operators that the furnace couldn't come up to or hold the desired temperature setpoint. The furnace then needed to be powered down to change the taps during normal operating hours.

Abbott uses the data logging function of the Catalyst to measure 30 variables relating to changes in current flow, such as actual usage, 100% available power at the

present transformer tap setting and balance of currents. This information is now being used to make needed adjustments during non-production hours and before heating problems begin.

The system comprises the following components:
A dedicated Allen-Bradley MicroLogix 1500 PLC is installed in each furnace to monitor current levels. The PLC's Modbus ports are connected to a ProSoft Communicator Gateway model 4102-MCM4-DFCM4, which serves as a hub, allowing for the information from the two furnaces to be logged by a single RACO Catalyst. The Catalyst communicates via modem over a standard phone line to a computer at Abbott. This ProComm Plus-equipped computer calls the Catalyst daily, during off production hours, to download two separate sets of data. The data is then used to generate the monthly reports that are sent back to Clarion engineers. The ability of each component to understand Modbus is essential for the function of the system.
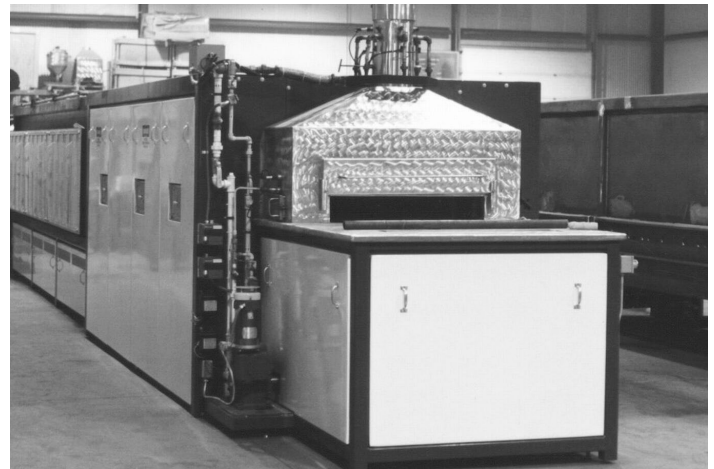
The data reports generated at Abbott Furnace are transmitted via email to the engineers' desktop at Clarion. Information includes raw data, notes on alarm conditions and suggestions on optimizing operational efficiency. With these reports, the signal conditions are brought to the attention of Clarion engineers, who can then take the proactive steps that drastically reduce unscheduled downtime and costly waste.

The test system, which was set up at Clarion in September of 2002, has been a success, and Clarion has added a second furnace to the monitoring program. Maintenance has been performed in advance and furnaces have been running more efficiently, saving Clarion money in operating costs.

Abbott Furnace is now ready to offer this Catalyst-based service to all of its clients.

Although the Catalyst does have alarm capabilities, the alarm features are not being used in this instance. This service utilizes the Catalyst's monitoring and data logging capabilities to prevent alarms. They allow engineers at Abbott to review data and detect situations before they become alarm states.

The Catalyst is RACO's first integrated, interactive data logging and alarm notification system. It has four standard internal inputs that can be configured to sense digital or analog signals and can monitor up to 256 points to provide extensive data and event logging capabilities. Featuring up to five megabytes of onboard memory, the system can monitor data samples, alarms, channel state changes and configuration changes.

The Catalyst is accessible at any time and can be interrogated via the integrated keypad, or remotely using RACO's Alarmware® Software or any standard touch-tone telephone. Alarmware can also be used to configure the Catalyst, monitor alarms, observe channel values and status, download and review log files, and perform diagnostic procedures. The Catalyst provides up-to-the-minute, two-way communication through traditional telephone, pager, cell phone, email or fax machine. A PIN-based security system safeguards all settings and information access.

Furnace Monitoring System Diagram

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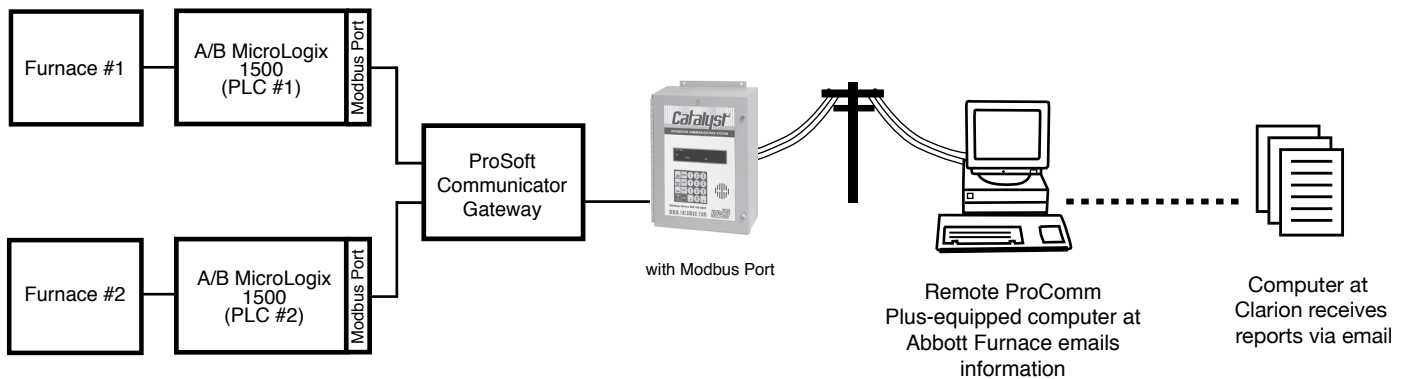
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