

Automated Temperature Control System Reduces Operating Expenses and Increases Product Quality



Temperature Control and Quality Monitoring System

Project Requirements and Scope

This plant is a fibers plant that makes a fine filament used in the production of man-made fibers for the textile industry. The fibers are made on spinning machines that pump a heated solution through nozzles, called spinnerets, that form the fibers and ultimately feed to spinning frames where the material is wound onto bobbins. Each spinning machine has from 100 to 150 positions that regulate the temperature of the solution as it is pumped through. If temperature control of the solution is lost, the material will still feed through the spinneret, but the end product will not meet production specifications. The result is unsalable product, or worse, product that could get shipped and not meet the customers' requirements.

Our client is committed to quality control and had tried several methods to recognize cold temperature conditions in the past. Individual temperature monitoring using the existing DCS and PLC systems proved to be too costly to justify. An Allen Bradley (AB) PLC was prototyped on one of the spinning machines using a

custom multiplexer design, to multiplex 120 temperature sensors into sixteen analog inputs. This was later abandoned due to inaccuracies. Manual testing using hand-held infrared temperature sensors proved to be accurate but an unreliable method to ensure quality.

The decision was made again to again look for solutions to the problem in 1993, so a specification was written and quotes were taken from various vendors. Opto 22's system was selected because it was the lowest cost "off-the-shelf" industrial hardware, and Opto 22 had a reputation for providing quality I/O. Another quoted system was lower cost, but it was comprised of unproven parts and pieces assembled into a system that did not represent a seamless solution. The Opto 22 solution not only provided the hardware, but also the software required to achieve the objectives.

Opto 22 Solution Description

The Opto 22 point count for this project is nearly 10,000, consisting mainly of thermocouple inputs connected to analog bricks. The I/O data is managed by four G4LC32

controllers that are connected to the plant's AB Data Highway via serial connections through gateways. The data is passed to an AB Pyramid Integrator connected to DEC VAX computers running a UNIX-based SCADA package. There are four Industrial computers with 19" monitors and touch screens running Opto 22 MMI software in the control room.

Opto 22***Easy To Work With***

"The flow chart programming made the system easy to understand and especially easy to troubleshoot and maintain.

"We Found Opto 22 to be excellent to work with, and extremely responsive to requests for help in solving problems."

Alarms from each temperature sensor location are managed by Opto 22's Cyrano software running on the G4LC32 controllers, and are presented to the operators in the MMI software, running on the industrial PCs.

Cost Effective***Let Us Do Things Never Before Possible***

Opto 22's use of PC workstations saved a tremendous amount of money. Our Client was paying \$100,000 for each DCS workstation.

The Opto 22 system was able to enhance the automation of the plant, offering capabilities that were not present in the existing DCS or PLC systems.

Quotes and Benefits from the Project Engineer

"Knowing what I know now about the capabilities of Opto 22, I would have specified Opto 22's system in lieu of the existing DCS and PLC systems in the plant if I had it to do over again."

The advantage of having remote I/O with an FM Class I, Division 2 rating greatly reduced the system wiring, enclosure, and installation costs.

The flowchart programming made the system easy to understand and especially easy to troubleshoot and maintain.

The capability of Opto 22's controllers to communicate with existing PLC systems saved \$45,000 that was quoted by others for software driver development.

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Opto 22's open data philosophy and PC orientation is important and in sync with future automation plans.