

Arizona Chemical Reduces Installation Costs And Eliminates Downtime With Siemens TIASTAR Motor Control Centers



Background:

Downtime from an outdated Motor Control Center line-up controlling 194 water-feed pumps was costing Arizona Chemical over \$50,000 annually. The installation of the Motor Control Center line-up had to take place within a two week time period, with all required interconnections to the DCS system.

Solution:

The Siemens TIASTAR Motor Control Center with Profibus communication significantly reduced the amount of control wiring, allowing the user to meet the required timeframe for upgrade and save over \$30,000 of labor and material costs for wiring. Since the original installation in 2002, our heavy duty design and detailed diagnostics have allowed Arizona Chemical to avoid any unexpected downtime.

When Thomas Roe was hired as maintenance supervisor at the Arizona Chemical plant in Panama City, Florida, the company's management had already decided to upgrade the plant's electrical system.

The project started in early 2000 and included a Moore APACS distributed control system (DCS) to help operators refine crude sulfite turpentine. Many of the products from the Panama City plant are used in fragrances, personal care items, adhesives, plastics, household cleaners, soaps, inks, paints, rubber products, hydraulic fluids, and roofing materials.

Among the challenges for Roe, who has since been promoted to senior energy engineer, was to replace an antiquated motor control center (MCC) lineup controlling 194 water-feed pump motors used in the turpene process. Some of the MCCs were installed in 1958. The rest dated back to the 1940s.

Meeting the Challenges

The original MCC installations were causing big problems. Downtime, from coil malfunctions and insulation failures, cost the company more than \$50,000 annually. Interfacing the MCCs with the DCS promised to be a monumental and expensive task. Employee safety while servicing the MCCs was a growing concern.

Roe decided that the new MCCs must be "smart," providing historical information to improve predictive maintenance. The lineup should be easy to wire, commission, and maintain in conjunction with the DCS. In addition, minimizing exposure to electrical hazards by isolating the power bus bars was essential.

In his search for a MCC vendor, Roe also addressed a corporate caveat. Arizona Chemical had Class A buying agreements with two well known MCC and automation vendors.

Roe said neither vendor provided him with the solution he needed to complete the MCC replacement project.

"Siemens was the only company that had a dependable interface with the approved DCS," Roe said. "The other companies' recommendations involved too much wiring, their communications systems had too many restraints, and they just couldn't give us the data we needed on the motors."

Success Breeds Success

Roe selected Siemens' TIASTAR MCC for the upgrade. The entire installation was completed within a planned two-week outage, primarily because Roe eliminated hundreds of hours of wiring and commissioning time by choosing PROFIBUS and AS-Interface communications instead of conventional hard wiring.

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The installation was complete by January 2002. Since then, the plant has recorded no MCC-related downtime. Before the upgrade, the plant experienced two to three outages per month because of problems caused by the old gear. Each outage cost the company up to \$9,000 per hour in labor and material costs. The average outage lasted four hours.

The success of the first MCC replacement project has led to a growing relationship between the two international companies. Siemens has recently completed a similar, and larger, MCC replacement project for the Panama City plant controlling 350 motors in various areas of chemical production. Another renovation is underway.

In addition, Siemens SIMATIC S7300 PLCs and ET200 I/O are now specified for multiple automated processes throughout the plant.

Smart Siemens MCCs

The 2002 installation included five TIASTAR MCCs. The lineup includes, 158 full-voltage, non-reversing starters (FVNR) with AS-Interface Slim Line modules, and 43 FVNR starters with SIMOCODE overloads.

The second installation, completed in 2004, included seven TIASTAR MCC line-ups with, 108 FVNR with AS-Interface Slim Line modules, and 92 FVNR starters with SIMOCODE devices.

The microprocessor inside the SIMOCODE device communicates via PROFIBUS to provide more than 40 different readings, including current, motor protection, fault codes, shutdown explanations, the day's highest current, and extensive historical data. The communication was configured within the DCS with links to the individual cells in the starters in each MCC.

When Arizona Chemical's operators do not require this level of information, 31 AS-Interface blocks may be connected to each PROFIBUS drop. "This gives us the ability to bring out a lot of I/O inexpensively into the MCC, including start and stop functions", Roe said.

The AS-Interface Slim Line modules act as remote I/O devices inside of the starter units and communicate back and forth over the AS-Interface bus. The SIMOCODE device, an intelligent overload relay, provides operators with detailed information regarding the

process over PROFIBUS-DP protocol. The AS-Interface network acts as a slave network on the PROFIBUS network.

"When we weighed everything it just made sense to go with Siemens," Roe said. "The combination of PROFIBUS and AS-Interface bus interface work well together and give us intelligent MCC options."

PROFIBUS Reduces Installation, Start Up Times

Roe said the decision to go with PROFIBUS for field bus communications immediately paid dividends. He said if the plant chose a standard, hardwired MCC lineup, eight wires would be needed to be connected to each of 194 motor starters -- going back and forth from the MCC to the control room 100 feet away.

"We had only two weeks to complete the entire MCC upgrade," Roe said. "We installed only four, 1/2" diameter PROFIBUS cables," Roe said. "If we hardwired, we would have had to pull 1,552 wires and drill through concrete to access that much conduit. Hardwiring would have taken seven electricians more than two weeks to finish 3,100 terminations. Also, hardwiring would have cost an additional \$30,000 in labor and material costs if we had chosen conventional MCCs. We tore out the panelboards, put in the DCS, replaced all of the existing MCCs, removed all the wires and installed PROFIBUS, and tied it all back into the DCS in those two weeks."

John Richardson, automation specialist with Siemens Energy & Automation, said Arizona Chemical realized immediate and significant time and labor by using PROFIBUS during the check out and start up phases.

"Checking out the PROFIBUS communications was simply a matter of making sure the green indication light was on," Richardson said. "In fact, the Panama City plant technicians started the MCC twice, and went through the complete check out twice, because they didn't believe it could check out so fast."

Richardson also said Arizona Chemical saw the value in AS-Interface bus. He said the option of having power and communication over two wires further reduced wiring time and costs of the new MCCs. In addition, AS-Interface bus has enabled Roe and technicians at the plant to perform remote start/stop with just those two wires.

Enhanced Safety

Every time a problem arose with the old MCC line up, technicians were exposed to danger when buckets were replaced. The decades old MCCs were designed without protective barriers.

"The TIASTAR MCCs are fully insulated so that when the panels were opened, all of the bus was not staring right at you," Roe continued. "They have shutters so when electricians pull out a bucket out, the bus is not exposed, which was a major improvement."

Looking Ahead

Roe says a number of other upgrades have recently completed, are underway, or planned for the near future. A recent project involves not only Siemens control and distribution equipment, but advanced automation technology as well.

"We just installed SIMATIC S7300 PLCs on a waste water treatment system to help settle the solids, control the PH levels, and other functions," Roe said. "We used to have full time operators assigned to these areas. Now we are saving considerable costs by controlling these functions remotely."

The SIMATIC automation system controls multiple starters with a complicated pump sequencing operation, ensuring the pumps experience uniform wear.

"When we get a lot of rain water from hurricanes and other storms, we have to maintain proper levels or everything backs up into the plant," Roe said. "When all four of those 150 HP screw pumps are running, they can remove 30,000 gallons of water per minute."

"The TIASTAR smart MCCs, communications via PROFIBUS, and our experience with Siemens' automation technology have eliminated plant downtime and saved labor and material costs," Roe continued. "We now have more options to migrate to a more sophisticated DCS system, like Siemens PCS 7, when the time is right."

