

Harcros Chemicals Increases Plant Performance and Safety with Migration to Integrated Control, Safety Solution

By Lloyd Hale, Director of Manufacturing, Harcros Chemicals, Kansas City, Kansas

RESULTS

- 12%- 15% increased throughput
- Enhanced reliability and safety
- Reduced off-spec product
- Trip check time reduced from six days, to two hours
- Planned down time eliminated
- Reduced maintenance cost



APPLICATION

Specialty chemical batch process by ethoxylation in two reactors.

CUSTOMER

Harcros Chemicals Inc. is a major distributor and producer of industrial chemicals, with 28 distribution facilities in 19 states, and production plants in Kansas City, KS and Dalton, GA. The Harcros Organics Division, in Kansas City, produces surfactants, emulsifiers, defoamers, and myriad specialty products that are used by its thousands of customers who produce materials used in painting, coatings, cleaning products, paper recycling, and multiple applications in agriculture, mining, and oil refining. Kansas City is also the location of corporate headquarters.

CHALLENGE

Reliability is crucial. As a single-source producer of certain raw materials for many of its customers, the plant cannot afford unscheduled downtime.

But the plant had a problem: control was antiquated, using a panel-based system and variety of single-loop controllers that had grown up over the years. Wiring panels were rats' nests. Spare parts were becoming very scarce. Something had to be done.

SOLUTION

It took a while for the board to warm up to the idea of putting in a modern control system, but in 2007 they approved the project. We told the board we were looking to improve reliability and safety, but kept to

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ourselves any hopes for improvements in throughput and process quality. We solicited bids and received bid packages from three control system suppliers.

We then hired the engineering firm of Burns & McDonnell to examine the bid packages and determine if they met our needs. The answer was that all of them did, so the choice was up to us. We picked Emerson Process Control and its local business partner Experitex Inc., largely because many of the plant's control valves, regulators and other final control elements had been made by Emerson, and over the years we had built up a good working relationship with Experitex. They were there every time I called asking questions and wanting information to go to my board, which was crucial.

Putting the project together

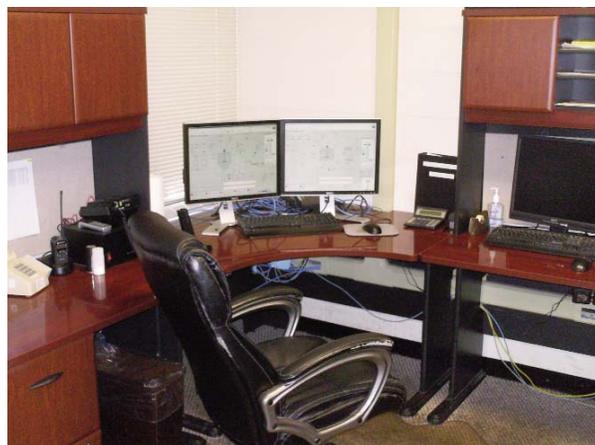
Between April and October of 2007, Experitex installed an Emerson DeltaV™ digital process automation system with one redundant controller and 325 I/O. We placed the main control room in our technical center a quarter mile from the reactor, mainly to reduce crowding in the production areas. We also put a workstation in the plant, so we can run the system from the plant if we were to lose the fiber optic communication link to the remote station. In addition, recipe and batch configuration changes can be made on the fly without shutting down the process. We also installed an application station and an engineering station in the main control room in the technical center.

The comprehensive design and engineering effort thoroughly addressed the control and safety requirements and enabled the project to be implemented smoothly. The system is equipped with Emerson's AMS Suite for asset management and maintenance purposes. This turned out to be quite helpful during the commissioning of the new system. While during the initial project we had kept safety in the forefront, and had addressed all required safety interlocks, we later took a further step and added a DeltaV SIS system controller with the aim of achieving SIL 2 requirements. The integrated yet separate architecture of the DeltaV and DeltaV SIS systems allowed for easy integration of the safety system, including a common database and common operator interface.

By carefully planning, we were able to keep downtime for the changeover to a minimum. We shut the plant down for inventory on Friday, September 21, and worked over the weekend, the following week and the weekend after that, with startup on Tuesday, October 1. We had expected to be down until that Friday, so the actual startup date was a pleasant surprise for us and our customers.

Results

While we had sold the project to the board strictly on enhanced reliability and safety, we did get substantial process improvements. In the first year of system operation we did a great deal of data gathering,



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and estimated an increase of about 12% in throughput, on a total pounds basis. But there were other benefits. We had a substantial decrease in off-spec products and reworked material, so on the basis of reactor time we were probably closer to 15% additional throughput.

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The AMS suite has also been of great benefit, and has saved us a great deal of time. Trend analysis has been especially valuable; the operators keep track of batch durations, and if there is a change they investigate the reason. Sometimes it's necessary to change out a rail car during a batch, for instance, or something else comes up, but before we had the AMS Suite there was not enough data to know for sure, and operators had to depend on their memories. With AMS Suite they can track down problems easily. AMS Suite has been such a useful tool that we are putting together more software to increase its capabilities.

The new control system also made it easy to integrate DeltaV wireless monitoring.

Other savings

The new system saves time (and money) in other ways as well. Trip checks are a good example: Prior to putting the DeltaV system in, we would bring in an outside contractor to do trip checks, and working with one or two of our internal instrument technicians it took six days to verify all the instrumentation on site for this one plant. With the DeltaV system it takes about two hours. That meant that every year the plant was down for at least one full week just to do trip checks. Now we can do this on a Saturday morning and never miss a minute of reactor time. The new system has also saved money for maintenance staffing. In the past we had brought in outside maintenance personnel on a daily basis to supplement our in-house staff. But with the new system we are no longer replacing instrumentation, and our own maintenance people can handle all the work themselves.

Plans for the future

We had such good results with the DeltaV system in the Kansas City plant that we put one into our Dalton, GA plant. We are currently building a new plant in China which will use the DeltaV system and DeltaV SIS control using many recipes from the Kansas City plant, which will save on engineering and testing efforts. We are also planning to expand the Kansas City facility, and will definitely use a DeltaV control system.

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