A Comparison on DCS Architecture with Opto 22 Architecture

Today, control technology does provide commercially-available off-the-shelf products that can be economically integrated into smaller refineries. These technologies provide the full functionality of all major DCS equipment, including the power to provide advanced controls, and optimizaton rendering significant cost savings while maintaining the sophisticated functionality of traditional high-end DCS systems. This consultant successfully implemented a very flexible, open-architecture distributed control system using Opto 22 hardware and software at the Flying J refinery in Utah.

Process control technology for the oil and gas industry, in the past, was limited to large prepackaged Distributed Control Systems (DCS) for large applications utilizing several thousand points . Smaller plants were seldom viable candidates for distributed control due to limited funds. Programmable Logic Controllers (PLCs) were not capable of adequately handling analog control functions to a satisfactory level of sophistication. Although there has been significant migration between the two technologies, neither DCS nor PLC manufacturers could effectively satisfy the requirement of a cost-effectivelow-end DCS for the many smaller plants that need high-level automation technology.

In June 1992, Flying J, Inc. embarked on an automation modernization program at its 25,000 BPD refinery located at North Salt Lake City, Utah. Initially, the plan for implementation was to use a prepackaged, high-end, DCS from a major control vendor. However, this was not economically feasible for a facility of this size.

As the chief engineer for conceptual design and implementation of the control system for the refinery, Jena selected the OPTO Mistic system from a group of five DCS and three PLC vendors based on the following major features:

Keep It Simple
The system must be simple enough for the present plant operations and maintenance personnel to operate and maintain (with minor training) and suspend any need for ongoing expensive maintenance contracts with the vendor.

Open System
The system must provide connectivity and inter-operability using hardware and software compatible with and capable of being purchased off-the-shelf from the third-party vendors. At the rate current hardware and software technologies were advancing, it was presumed that the near future would provide opportunities to implement new schemes at a minimum cost for integration. The system should, therefore, incorporate hardware and software representing current trends with long-term adaptability to new trends.

Operator Interface
The system should be easy to operate using a state-of-the-art graphical interface (GUI) with multiple stations (separated by units of operation) to prevent crowding the information and causing the operator to go through several motions to resolve process upsets and impacts on related units of operation.

Minimal Failure
The system hardware and software should provide sufficient reliability to prevent a single device failure from causing a total system failure.

Advanced Control Functionality
The system must include advanced control functionality sufficient to handle customary refinery process application problems.

MIS Interface
The system must be capable of a management information systems (MIS) connection allowing for direct reporting from data accumulated within the process control system.

Upgradability
The system must be capable of being upgraded at nominal cost as technology changes.

Low Cost
The fully implemented system must be low-cost for installation, operation, and maintenance. Low cost is of primary importance in the evaluation criteria.

After three years of operation, Jena found that the initial assumptions were correct. While PC power is doubling every three years, Microsoft Windows-based software still remains the standard for PCs and is gaining momentum over proprietary software and some Unix systems. This will continue as a trend for the foreseeable future where vast amounts of third-party inexpensive and user-friendly software will continue to be available for the benefit of all.

Rabi Jena has worked as a principal control engineer for Honeywell, Inc. and as a marketing manager for Bailey Controls Company. Jena has vast experience with major DCS hardware/software control products across a variety of industries. Jena was the lead engineer on the Flying J refinery project described in the Flying J Oil Refinery case study .

For more information on the refinery application, please visit Rabi Jena's Web site at:

http://www.aros.net/-jena

Rabi Jena can be reached via e-mail at

jena@aros.net.