

Shell Oil's Fieldbus Future Now Includes Critical Control Applications

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Summary

Foundation Fieldbus is finally making inroads into more and more critical applications as it comes into the mainstream of process control. Shell Oil, one of the more recent adopters of fieldbus for critical control applications, believes that the real benefits of using

Shell Oil believes that the real benefits of Foundation Fieldbus will manifest in reduced operations and maintenance costs, increased plant performance and efficiency, and resistance to obsolescence. The company anticipates the combination of Foundation Fieldbus and Asset Management software will yield a significant one percent improvement in operating performance and process unit utilization.

Foundation Fieldbus will manifest in reduced operations and maintenance costs, increased plant performance and efficiency, and resistance to obsolescence. Shell determined that it could achieve a one percent performance improvement in reliability and unit utilization by using Foundation Fieldbus in conjunction with its process automation system supplier's Asset Management application, ultimately resulting in a 600 barrel per day improvement in throughput.

Analysis

This February, Shell Deer Park Refining Company (SDPRC) decided to make a \$32 million commitment for a new Fluid Catalytic Cracker (FCC) automation project at its Deer Park, Texas plant. Deer Park is the fifth largest refinery in America and the FCC processes 67,500 barrels per day (BPD). The initial phase of the project cost \$12 million and involves the installation of Foundation Fieldbus-based control systems and instrumentation from Emerson Process Management. Engineering of the project is already underway, with initial startup expected in October of 2002. Foundation Fieldbus will also be installed on an adjacent gas plant.

Prior to the Deer Park agreement, Shell had installed Foundation Fieldbus on a less critical effluent treatment application. The company had also installed fieldbus at Shell Malampaya, a deepwater offshore gas to power conversion project that provides power to Luzon in the Philippines. Deer Park is the first major commercial installation of

Foundation Fieldbus in a critical process control application and should be a wake-up-call for all continuous and batch process manufacturers.

A Major Legacy System Replacement

Shell was in a position where they had to modernize an old control architecture that had evolved within Deer Park over a 25-year period. The existing Deer Park FCC is controlled by an older system that incorporates a mixture of pneumatic and analog electronics as well as legacy computers. Some advancements have been incorporated into the system over the years. Shell was the company that initially wrote the ROMEO process optimization and modeling software now owned by Invensys/SIMSCI. ROMEO will remain in operation at Deer Park after the Foundation Fieldbus installation. The company also uses collaborative production management (CPM) software from Honeywell, plus a mixture of other applications and ancillary systems from a wide range of suppliers.

Nevertheless, the FCC is long overdue for an upgrade, and Shell was faced with a big decision. Any system they chose would likely be installed for a very long time. Shell requires that any new system be able to easily adapt to future technology changes and upgrades, as well as incorporate any best-of-breed solutions they chose to adopt for collaborative production management (CPM), safety systems, and so on. Shell felt that the open architecture of Fieldbus networks at the instrument and control system levels plus other technologies such as OPC would meet their requirements.

System Reliability Is Paramount

Shell also had to deal with the issues of plant safety and security. The system had to be able to meet their “stress test,” which includes voltage overloads, shorting, exceeding recommended cable lengths, and putting more devices than are recommended on a fieldbus segment. The system exceeded Shell’s expectations in all areas.

Lifecycle Benefits Versus Installed Cost

The decision to go with fieldbus was not exclusively a technical one for Shell. There was also a stringent economic analysis. One of the key early arguments against fieldbus implementation in retrofit projects was the lack of savings in initial installed cost. Obviously, fieldbus offers significant savings in materials and wiring costs in new plant installations, but reduced real estate and cabling costs mean relatively little in a revamp. The learning curve that must also be overcome in a new fieldbus installation means the overall initial cost for Shell will be about equal to that of a conventional installation.

So why bother if fieldbus costs the same or more to install in a replacement application? Shell believes that the real benefits of fieldbus will manifest in reduced operations and maintenance costs, increased plant performance and efficiency, and resistance to obso-

Reduced Maintenance & Operations Costs
Improved Throughput
Positive Return on Investment
Ease of Use/Training
Improved Data Flow
Increased Diagnostics Information
Improved Reliability
Resistance to Obsolescence

Fieldbus Benefits for Shell Deer Park

plant asset management (PAM) applications are a key source of reduced lifecycle cost of fieldbus-based systems. In Shell's case, they believe that implementation of Emerson's Asset Management Solutions PAM application will be a major source of maintenance and operations cost reduction. The improved flow of data from fieldbus-compatible devices to PAM applications means that devices can report impending maintenance problems and instruments that need no attention are not needlessly checked in the field.

OPC Plays an Enabling Role

Shell will install a Triconex safety system using a redundant OPC server from Stratus to integrate the safety system's time stamped alarms and events with Emerson's DeltaV control system's Plantwide Historian. They will be included in the alarm list along with all the DeltaV alarms, providing a single database for sequence of events monitoring. Other products that will be connected to the DeltaV control system include Bently Nevada condition monitoring equipment and the Honeywell PHD historian.

Fieldbus Benefits Must Match Corporate Objectives

Management buy-in is just as important as plant operations buy-in for fieldbus implementation. Shell's project leaders believed that the benefits of fieldbus matched their

Get Management/Employee Buy-in
Meet Corporate/Manufacturing Objectives
Find the Right Partners
Focus on Lifecycle Benefits
View Fieldbus as an Enabling Technology

Keys to Fieldbus Project Success

corporate objectives, which are to "engage efficiently, responsibly, and profitably" in all their businesses. Shell's vision is to leverage the best technologies they could find to create the "refinery of the future."

According to Shell, all of its large, new grassroots plants are being specified to include fieldbus not just at the instrument level but also at the system level. Shell's faith in the reliability of the system is also reflected in its plan to do a "hot cutover" from the old system to the new system, avoiding any plant downtime.

Shell determined that it could achieve a one percent performance improvement in reliability and unit utilization by using fieldbus in conjunction with Emerson's Asset Management Solutions PAM application, which means a 600 barrel per day improvement in throughput. Shell's best estimates indicate they will easily meet their net present value (NPV) objective for the first five-year period.

Fieldbus as an Enabling Technology

The advanced capabilities that fieldbus provides to

Employee Buy-in Is Critical

Shell would not have chosen fieldbus for this project if it were not for the buy-in of plant operations personnel and management. The enabling technology of Foundation Fieldbus would provide no benefits for Shell if their employees were not willing to use the tools. After the benefits of Foundation Fieldbus had been communicated effectively, employees were eager to try it out in real world applications.

Finding Right Engineering Partner Is Crucial

Having the right partner for a fieldbus implementation project is also important. One of the reasons Shell went with Emerson Process Management was because of their track record in Foundation Fieldbus projects. Just as important was the relationship with Fisher-Rosemount's local representative Puffer Sweiven.

Recommendations

- In ARC's opinion, users need not limit themselves to using Foundation Fieldbus only in ancillary, non-critical applications. The implementation of Foundation Fieldbus at SDPRC is a major milestone in Foundation Fieldbus implementation and stands to confirm this.
- As Shell observed, most fieldbus installations may not offer big savings in installed cost, despite the reduced wiring and real estate required. There is still the "learning curve" issue that must be overcome. The real benefits of Foundation Fieldbus occur in reduced lifecycle costs and improved plant performance and efficiency. This can be a powerful argument for selling fieldbus solutions to both your management and operations personnel.
- ARC views Foundation Fieldbus as an enabling technology, not as an end in itself. Fieldbus enables superior plant asset management capabilities and improved data flow from the process to the system and the rest of the plant. Shell's use of OPC server technology to link their Foundation Fieldbus-enabled control system to their safety system, plant historian, and condition monitoring systems – all from different vendors – is a good example of this.
- Manufacturers should choose their fieldbus implementation partners carefully. Is your supplier really committed to supporting fieldbus in the long-term?
- Many other industries outside of the traditional continuous processes stand to benefit from Foundation Fieldbus. Users in the hybrid and batch industries should be evaluating fieldbus for new projects. With Shell claiming to plan all new projects to include fieldbus, the door is open to all process and hybrid industries to do the same.

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