

Case Study

Honeywell and Shell Show the Potential of HART with Upgrader Expansion Project



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- Andy Bahniuk, Instrumentation Technologist, Shell

Background

Situated among the world’s largest oil sands reserves in Alberta, Canada, Shell’s Scotford Upgrader has processed crude bitumen into a range of synthetic crude oils since 2003. Fed by the Muskeg River Mine, the plant, near the city of near Fort Saskatchewan, sits alongside Shell’s Scotford refinery and a chemical plant.

With an initial capacity of 155,000 barrels per day, in 2011 it was augmented by commissioning of a 100,000 bpd expansion. This project was significantly helped by Shell’s application of HART technology using Honeywell’s Experion® Process Knowledge System (PKS) and Field Device Manager (FDM).

The expansion was given the HART Communication Foundation Plant of the Year award, which recognizes ingenuity in the application of the HART Communication Protocol.

Benefits

Using a flexible instrument asset management solution (IAMS) based on FDM, combined with Experion PKS, Shell was able to safely and quickly program and commission 1,200 HART devices from a wide variety of vendors.

With a solution that enabled it to harness the full capabilities of HART Communication, the team ensured a safe and efficient start-up to the project. It also resulted in safer and more reliable operation, better troubleshooting, and improved predictive maintenance in the future. With all HART data available in the control room, the operations, maintenance and instrumentation staff have access to a mass of valuable information to ensure devices function properly. Benefits were felt throughout the project and beyond:

- Loop function testing and process variable simulation was performed in 30% of the time normally required

- Simulation through FDM of complex safety narratives involving more than 15 inputs and multiple outputs more than halved the time for critical testing
- The need to add external hardware to more than 700 smart valve positioners was eliminated, saving \$2,000 per valve
- Live monitoring of secondary transmitter temperature variables improved preventive maintenance for heated instrument boxes, saving the plant more than \$200,000 per year
- By allowing re-calibration, parameter checks and device diagnostics in the central control room rather than at each individual transmitter location, the plant saves \$100,000 per year.

As Andy Bahniuk, Shell instrumentation technologist, said: “By broadening the application of HART technology beyond handheld device configuration we saved time and money at every stage.”

Challenge

A safe and timely start-up at Scotford required the instrumentation team to work quickly, efficiently and with few mistakes.

The team knew HART technology would help with this, streamlining testing and pre-configuration, but existing experience with HART at Scotford used only some of the protocol’s capability. With the upgrader expansion, the team wanted to leverage the full intelligence of the plant’s HART-enabled devices, taking it beyond handheld device configuration to make device information widely available

In doing so, it faced an aggressive schedule in which to program and commission the 1,200 devices from 26 vendors while gaining the trust of upper management and operations staff during loop checks and control narrative testing. The project also threw up unforeseen challenges: measurement and control devices, for example, were to be shipped pre-configured, but arrived unconfigured. That left the control automation team to download 1,200 instruments with varying ranges, engineering units, NAMUR values, and transmitter body temperature alarms.

Solution

Early on, Shell recognized that FDM and Experion PKS could provide a platform to take advantage of smart HART instrumentation, delivering the benefits of smart field devices with the simplicity and ease-of-use associated with traditional I/O.

FDM is Honeywell's centralized asset management system for remote configuration and maintenance of smart field devices based on HART, PROFIBUS and Fieldbus Foundation protocols. The first in the industry to support the Electronic Device Description Language (EDDL) standard and Device Type Manager (DTM) drivers used by field device vendors without using any conversion tools or add-on devices, it is built from the ground up to conform to industry open standards.

In doing so, it overcomes interoperability issues within open system architectures. The solution requires no point engineering or database building; once the communication networks are configured, FDM automatically detects smart devices and adds them to the database.

Experion PKS, too, through HART enabled I/O modules, enables effective use of HART digital data for control, display, diagnostics, parameterization and asset management with no additional configuration. Plant operators and maintenance personnel have full access to all field device information directly through Experion

"We didn't need to do any special device testing for interoperability," said Mr Bahniuk. "All the HART devices were plug-and-play, connected through the asset management system."

All the HART information in the system is gathered either by a network of MTL multiplexers or the DCS with HART I/O. Loop function testing and process variable simulation was done

through HART device methods using FDM. During narrative and safety cause & effect critical testing, it allowed operators and engineers to simulate and walk through different process scenarios, and also provided a device configuration report, which served as a baseline configuration. This testing saved considerable time, and Shell now uses this configuration for all its changes and device replacements.

FDM also dealt with the problem of the unconfigured measurement and control devices. An offline configuration tool was used for the bulk of the changes and then online configuration for the few remaining. A database was created to provide these values in tabular form and a systematic process of 24/7 transmitter downloading was established to load critical values quickly, with FDM providing a quick and centralized method to ensure accurate field device records that were well coordinated with the testing process. Again, this saved a significant amount of time during pre-commissioning.

Results

Commissioned successfully, safely and on time, the solution continues to be invaluable for device monitoring and maintenance.

Experion PKS provides live diagnostic information for all connected HART devices, and Honeywell and Shell engineers have taken full advantage of the platform. Shell now uses HART status byte information to show device health status on maintenance graphics, while much more HART status information is available than in the past.

As Mr Bahniuk said: "Leveraging HART proved a vital time saver for configuration and commissioning, but the full benefits of this project will be felt over the long-term."

For More Information

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