“Petro-Canada has implemented an Experion PKS based training system using UniSim® Operations software, which we utilize to reduce process upsets and incidents, increase operator confidence, test new and modified operating procedures, and train engineers on unit response.”

- Mark Pingal, Applications Engineer, Petro-Canada Lubricants

**Background**

In 2009, Suncor Energy Inc., marketing under the Sunoco brand, merged with Petro-Canada to form Canada’s premier integrated energy company. For the commercial and industrial marketplace, Petro-Canada offers Canada’s largest network of truck stops with more than 200 bulk fuel plants. The company also provides terminal locations, on-site refueling, bulk fuel delivery, home heating fuel, and packaged and bulk lubricants.

As a Suncor Energy business, Petro-Canada Lubricants’ product line encompasses over 350 premium quality lubricants, specialty fluids and greases. Its world-class refinery in Mississauga, Ontario, has an annual capacity of over a billion liters.

Petro-Canada Lubricants recently executed an Operator Training Simulator (OTS) project on a Hydro Treating Unit (HTU) at the Mississauga site. This project was intended to accelerate the capability development of operations, transfer best practices with hands-on experiences, and assist with knowledge retention.

The scope of the OTS project at the Mississauga refinery was to:

- Accelerate capability development of operations
- Transfer knowledge and best practices with hands-on experiences
- Aid knowledge retention

Petro-Canada’s secondary objectives were to:

- Reduce process upsets and incidents
- Increase operator confidence
- Test new and modified operating procedures
- Train technical services engineers on unit response
- Provide steady-state #1 HTU model

**Benefits**

Industry experience has shown that operator training simulators are a best practice for instructing operators on “real world” plant scenarios and improving their overall performance. With this approach, operator skills are reinforced through refresher training, workforce flexibility is increased through cross-trained personnel, trial modifications to controls and configurations are easily tested, operating procedures are further developed and refined, and APC strategies are more effectively implemented.
Petro-Canada’s experience demonstrates that OTS solutions offer significant operational and economic benefits, even for existing production facilities. At the Mississauga refinery, Tech 5 operators have recognized advantages of simulation-based training. Availability of the OTS has also motivated younger operators to pursue advancement in their skills, while senior operators have used the simulator to make “discoveries.” In addition, process engineering has employed the OTS for maximum throughput scenario testing.

Challenges

The National Institute for Standards and Technology (NIST) and the Abnormal Situation Management (ASM®) Consortium estimate U.S. process industries lose over $20 billion each year from abnormal situations. A significant portion of losses are directly attributable to insufficient employee knowledge, as well as operator and maintenance worker errors.

Despite losses related to human error, process plants continue to rely on operator intervention during start-up, shutdown, and abnormal situations. It is one thing to know the correct action to take in an abnormal situation, but it is another to identify the situation, determine the correct action, and then respond in a timely manner during a real-life crisis.

In a typical processing facility, operator training challenges can result from new construction and control system upgrades. Drastic changes in control facilities can also take time to adapt to, even for experienced operators. In some cases, operators may have no prior experience with a modern DCS.

Other challenges result from the need for qualification programs that are objective, consistent, and easy to document.

Process industry manufacturers stand to lose half or more of their skilled personnel to retirement during the next five to 10 years. As such, companies are exploring ways to capture or replace valuable experience before it leaves the workforce. With baby-boomer retirements, manufacturers are looking to OTS systems to quickly bring new operators up to speed.

Solution

With advanced OTS technology, plant owners can turn good operators into great operators in a shorter period of time. Trainees receive instruction in a safe environment with the actual dynamic response of the real plant.

OTS-based training enables faster skills development, better long-term skills retention, and deeper process understanding than conventional methods. High-fidelity OTS solutions are designed and structured to address a wide range of operator training scenarios, such as:

- Full process start-up from cold and empty or hot stand-by
- Process shutdown to stand-by or fully shutdown state
- Emergency situations
- Arbitrary faults with equipment and instrumentation
- Interlock status tracking and reset/bypass of operating areas

At facilities such as the Mississauga refinery, OTS usage extends beyond plant start-ups to help keep operations running smoothly and more productively. Strong OTS program helps eliminate errors by even experienced operators that can lead to accidents, product loss, or costly plant shutdowns. Refresher training can keep operators’ skills up to date for infrequently performed tasks such as start-ups and shutdowns, and also prepare them for the unexpected.

A key application for OTS systems is training operators in safety scenarios and upset conditions that you hope will never happen in the plant. Simulator training is also useful for practicing plant turnarounds—performed less frequently than in the past—as a way to keep operator skills from getting rusty. Plus, OTS technology is beneficial for troubleshooting, engineering studies and continuous improvement.

Petro-Canada is upgrading the Honeywell TDC2000 control system at the Mississauga refinery to the Experion Process Knowledge System (PKS). The first phase of this project involved the Experion front-end and human-machine interface (HMI), and the second phase addresses legacy controllers. Honeywell’s UniSim® solution will help maintain reliable and optimal plant operations through informed decision-making. UniSim® technology is used to present realistic operating scenarios in the process training program before operators enter the control room. Plant simulations are real-time dynamic models of the process equipment and automation system. First principle engineering and thermodynamic relationships represent plant
behavior and automation software/configurations found in the control room.

For Petro-Canada, the simulator allows processes to be operated repeatedly so operators can improve performance under normal and abnormal situations prior to live production. Refinery engineers can also use simulator scenarios to support plant optimization strategies such as:

- Tune regulatory controllers
- Validate safety system performance
- Rationalize alarms
- Optimize process operating procedures
- Ongoing operator training plan

Preparations by Petro-Canada at the start of the project proved valuable, with much of the configuration data collected and ready for use in the early stages of work. The site kick-off meeting included a tour and explanation of the HTU, which further enhanced Honeywell’s understanding of the system and expectations. Early preparations also helped ensure the schedule was maintained.

In addition, the flexibility shown by Petro-Canada and Honeywell representatives helped accommodate constraints faced by both parties at key points in the project (e.g., segmenting FAT into various parts, adjustments to site installation timing). The Honeywell team devoted extensive hours after each day of testing to address issues, thus ensuring the quality of tests was not significantly impacted and helping maintain the project schedule.

For More Information
To learn more about how Honeywell UniSim® solutions help maintain reliable and optimal plant operation, visit our website www.honeywellprocess.com/software or contact your Honeywell account manager.

Honeywell Process Solutions
Honeywell
1250 West Sam Houston Parkway South
Houston, TX 77042

Honeywell House, Arlington Business Park
Bracknell, Berkshire, England RG12 1EB

Shanghai City Centre, 100 Junyi Road
Shanghai, China 20051

www.honeywellprocess.com