REFINERIES GET BACK ON TRACK TO SAVE ENERGY

Visual MESA Systems Empower Improved Operational Efficiencies in Real Time

by Paul Studebaker

Chevron Downstream is reviving and improving energy management software systems at the three largest of its six refineries in North America. The Visual MESA systems were installed in the early 1990s and the upgrades promise to help automate and improve real-time operational decisions to minimize energy waste and costs.

"The focus is on the three largest, wholly-owned refineries because larger sites offer complexity and higher benefits for energy management," said Gavin Turk, process control BIN leader, Chevron, during his technical presentation today at the Yokogawa Users Group Conference and Exhibition in Houston. Chevron business improvement network (BIN) leaders are facilitators and coordinators for new technology and best practices in their given area of specialization. Turk's presentation was co-authored by Dennis Cima, manager, process control network and control systems, Chevron.

The systems at two of the three refineries had languished because they were not maintained during modifications and overhauls, so inaccuracies had led to low use by engineering and operations. "Over a 10- or 15-year period, only one of the sites continued to use MESA. The others kind of fell out," Turk said, "Now we've made an effort to get the other two large plants' MESA systems updated and back in operation." Chevron is also improving the usefulness at the third refinery where Visual MESA has continued to be used.

VISUALIZE, OPTIMIZE, PRIORITIZE

Visual MESA provides web-based graphics that give views of entire systems such as pump/compressor drivers, de-aerator operation, furnace/boiler efficiency and steam production. Equipment information is loaded into the models so users can track performance and efficiencies. Data is available through OPC for storage and tracking.

A real-time optimizer uses model data and makes recommendations to minimize energy costs, such as swapping turbines for electric motors. Optimizations

"You can look for hidden events, hidden blowdowns. You may find a huge imbalance due to a valve that's not even shown in the PID." Chevron's Gavin Turk on the company's use of Visual MESA software to identify sources of energy inefficiency at its largest, most complex oil refineries.

are typically run every 30 minutes. "Recommendations are downloaded to the operators, and they decide whether to make changes," said Turk. Some plants use the system in closed-loop, but not Chevron. "Recommendations are sent out by email to operators, maintenance and utility operators. Not everybody is responsible to implement them, so they may not be."

Powerful "what-if?" modeling allows users to see the effects of operation or equipment changes. New plants, modifications, turnarounds and shutdowns can be modeled, and the consequences made clear for planning ahead. "This also works for anticipating unexpected changes," said Turk. "What if a steam plant or turbine is shut down? You can see what will happen and plan ahead for those events."

Auditing and accounting features help users uncover waste. For example, a "balloon feature" shows locations of energy imbalances as symbols that expand according to the size of the imbalance, and can be color-coded. "You can look for hidden events, hidden blowdowns," said Turk. "You may find a huge imbalance due to a valve that's not even shown in the PID."

Key performance indicators (KPIs) can be configured. "We have KPIs for each site, and we can compare them to industry standards," said Turk. "The software improves the accuracy of these KPIs, and we can push them into the historian for use by other groups."

The refinery that has continued to use Visual MESA since the beginning has done so because of the people involved. "They managed their model to fit their purposes. They did not try to add new systems they didn't need," said Turk. They focus on fired boilers, turbine/motor swaps, make-up fuel to the fuel gas system (natural gas), letdown vents and flow rates, Turk explained.

Now each of the three large refineries has a team that includes an optimization operating assistant, furnace specialist, utilities specialist and energy technician. The two languishing plants completed updates to their models in 2013 to cover fuel system, detailed cogeneration and electrical, and they improved the system correlations.

RESULTS RELY ON OPERATIONS

But successful energy savings still largely depend on operations. "Out in the operations world, they have their structure," Turk said. "The operating assistant is a 24/7 role focused specifically on optimization using multivariable control." You have to have his attention.

Keeping resources focused on saving energy is a challenge. Like any project, "Implementing tools without the associated work processes and associated organizational capability compromises results," said Turk. "You don't get all the benefits that you target.

"We aim to get the right people on projects, but we don't always afford them the time to get it done," Turk said. Also, frequent personnel changes result in turnover that affects getting projects done, and key decision makers have to provide resources and guidance to avoid roadblocks.

"These are typical Project Management 101 problems," Turk added. "We don't always apply good practices to small projects."

You need a detailed plan scope definition, and to define console operator expectations. "The expectation setting of console operators is critical to success. If operators are not in agreement of what's expected of them, you can put in the best system, but not gain the expected improvements," Turk said. "On the flip side, if console operators can see that they're doing good and reducing costs, they're more likely to use the system." ■