

Older Refinery Gets New Lease on Life with Transient-Capable Online Condition Monitoring



RESULTS

- Increased throughput by 120,000 barrels per day
- Eliminated more than \$2,340,000 per year in electricity purchases
- System ROI in less than 8 months



APPLICATION

Online monitoring of expander train on fluid catalytic cracking unit (FCCU) of gasoline and petroleum products refinery

CUSTOMER

90-year old petroleum refinery, more than 500 employees

CHALLENGE

Increasing demand for gasoline and other refined products have kept many refineries producing at or beyond capacity for decades longer than their original design life. As equipment ages, efficiency is lost. Yet industry demand drives constant production without allowing costly shutdowns for system upgrades. These older machines can be dangerous to both workers and the refinery itself. "I've seen this situation in six refineries, and I think it's typical of many older ones," says this refinery's Control Systems Manager. "I am shocked by the conditions at some refineries." In his facility, the age and condition of the equipment meant unplanned shutdowns every month. "When I started working here, my department's work orders were 100% reactive. Reactive maintenance is a lot more expensive than predictive maintenance."

One very critical system at the refinery is an expander train on the plant's FCCU catalyst cracking unit. "It's the heart and soul of the refinery. Basically a large volume of catalyst is used to control additional cracking of the cat feed. Under controlled conditions you can produce more gasoline."

"I don't like emergencies. I like to plan for things."

Refinery Control Systems Manager

When operating properly, the catalyst burns off coke which forms on the catalyst. The heat generated is run through an expander which uses a blower to turn that heat into mechanical energy. This motion turns a 6,000 horsepower motor/generator which produces electricity for the plant's power grid.

In this industry, catastrophic failure could mean some equipment would be shut down for years. At this facility the FCCU train experienced failure and "the motor/generator was badly damaged. We were able to disconnect it and keep production up, though at much higher cost." The plant was losing \$195,000 per month by having to purchase the electricity they should have been generating, but it was still more profitable than a long interruption.

"There was no online monitoring equipment on the train," says the Control Systems Manager. "It was all done through older, handheld vibration equipment which really didn't fit the bill. This train is critical equipment, and we wanted to go to online predictive maintenance."

SOLUTION

"We chose Emerson's CSI 4500 Machinery Health™ Monitor as our online system because of its seamless integration with the DeltaV digital automation system. There were also a lot more diagnostic options available on the CSI 4500 than on the competition's system.

"With the CSI 4500 transient monitoring capabilities we can see eight hours worth of high-speed transient data, including what happened before the event, before you had the problem. We can see the orbits or misalignment or rotational errors and if any issues were in effect prior to the shutdown. I can take those 8 hours of data and store it for future use. It's handy to have very fast speed information. With the CSI technology, we can also watch issues developing over time. You see increasing vibration and plan your work. Now we can plan an outage instead of having a catastrophic failure."

With the integration of the DeltaV and CSI 4500, efficiency and throughput at the plant has increased. "The CSI 4500 gave us the confidence to operate the units at a higher throughput," resulting in 120,000 barrels more per day or an additional \$36 million dollars per year.

"The advantage with CSI 4500 transient online monitoring is when you have an event, you can see eight hours worth of high-speed transient data, and what happened before the event."

Refinery Control Systems Manager

"DeltaV integrated with AMS™ Suite: Machinery Health Manager software is virtually idiot-proof. With features like Explorer functionality you don't have to be a software guru. It's easy to let folks who should be looking for the business opportunity do their jobs instead of trying to work the software."

Refinery Control Systems Manager

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Online Machinery Health Management powers PlantWeb through condition monitoring of mechanical equipment to improve availability and performance.

