

# Refinery slashes repair costs and reduces chance-of-failure incidents

United Refining Co. is a 110-year-old, wholly independent refiner and marketer of gasoline, diesel fuel and other petroleum products. Their service station brands, including Kwik Fill, Red Apple Food Marts and Country Fair, are well known throughout the state of Pennsylvania, as well as portions of New York and Ohio, and serve thousands of loyal customers every day.

United's entire network of stations is supplied by the company's modern, recently expanded refinery in Warren, Pennsylvania (FIG. 1), which operates 24 hours a day, seven days a week to meet the demand. According to Maintenance Supervisor Craig Fankhouser, the plant has long had a preventive maintenance program in place, as well as redundant spares of critical equipment always standing by to help ensure ongoing operation, which has helped them maintain high levels of reliability.

"If the refinery goes down it's a big deal," he said. "Once that production time is gone, there's no way to make it back up."

Despite their best efforts, a bearing failure in the plant's light vacuum gas oil (LVGO) pump caused damage to the facility and partially shut down operations for more than a week in 2008.

**Continuous monitoring.** Following this incident, the United Refining team investigated the concept of hooking up their critical pumps to a continuous condition monitoring system, which would give them early notice of any potential operating problem. They called in ITT to install a ProSmart system on the LVGO pump (FIG. 2) as well as on two vital electric vacuum bottoms pumps.

"With the ProSmart system we are able to monitor vibration, temperature and other variables continuously and know immediately if a bearing is starting to go bad or the pump is operating outside of its parameters for any reason, and investigate and take action while the situation is still small, manageable and inexpensive to fix," Mr. Fankhouser said.

In fact, he notes, there has not been a single failure on any of the three pumps since the ProSmart system was installed.

"We've had several alarms, and were able to step in and take appropriate action to fix the problem each time," he said. "How many of those situations would have led to a bearing failure, pump failure or even a more catastrophic event, we'll never know. But we do know that a single failure on the bottoms pumps can cost upwards of \$20,000 to repair, and a catastrophic incident like a significant fire can cost millions. I don't think there's any doubt that the ProSmart system has more than paid for itself."

**Protecting the equipment.** Now that he and his team have several years of experience with the ProSmart system in real-world operation, Mr. Fankhouser sees an enormous difference between the detailed and continuous monitoring capabilities of the ProSmart system and even the best personnel monitoring efforts.

"If you have a cavitation or if your impeller sucks up a piece of refractory out of the tower you're not going to know that unless you get lucky and someone happens to be standing there at that moment," he said. "But with the ProSmart system, you don't have to rely on luck, you get an alarm and can move in right away."

**View and share data anytime.** Unlike other conditioning monitoring systems, the ProSmart system requires no special software or dial-in procedures, and provides an unlimited numbers of "seats," allowing users to access information from anywhere they have an internet connection, and easily share data with colleagues or consultants to discuss and troubleshoot in real time, no matter who they are or where they are located.

"Now we can look at real data and actually put a value to it," Mr. Fankhouser said. "ProSmart gives us the information we need to make vital decisions with speed and accuracy."

Unlike any other comparably priced condition monitoring system, the ProSmart system can automatically take readings at very short intervals, as frequently as every five seconds. And it allows users to request instant updates at those short intervals, and perform extensive analyses on the data.

"When there is a situation, I log in and request instant updates on temperature, vibrations and whatever other variables I want to look at," he said. "I can even request a real-time FFT frequency analysis; looking at where the peaks are provides us with important information on what component might be failing or where the problem might be."

**ITT service.** The ProSmart system has become an invaluable tool at the refinery, and the staff is always learning more about its capabilities, especially the powerful vibration analysis it enables.

"ITT helped us connect to outside experts in vibration analysis so we could keep our equipment at its most reliable," said Mr. Fankhouser. "That's only one instance where they go beyond the call of duty for us. Any time I call anyone there they are very helpful."

"Whether it's a technical question about ProSmart operations, an idea, an upgrade, or even something more related to our own equipment, I get the answers I need right away. For example, we wanted to hook up pressure transmitters directly into ProSmart to trend suction and discharge pressure on the three pumps, and they were very responsive in helping us do that."

I can't say enough good things about the service we have received from ITT. They are always very willing and eager to help us out."

**Looking to the future.** Mr. Fankhouser notes that the information and insights delivered by the ProSmart system have helped the company learn more and more about the intricacies of their pumping systems over time.

"This gives us valuable information and history to compare to the next time we see such events, giving us much better insight into what is really going on and allowing us to act more appropriately and effectively."

According to Mr. Fankhouser, thanks to the ProSmart system, refinery operations are consistently reliable and on a path to continuous improvement. ●



FIG 2. ITT installed its ProSmart system on the refinery's LVGO pump.



FIG 1. United Refining recently expanded its refinery in Warren, Pennsylvania.

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