

Moving Towards Predictive Maintenance - Xcel Energy



CUSTOMER: Xcel Energy
INDUSTRY: Natural Gas



LT-LMS Bulk Storage

COMPANY PROFILE:

Xcel Energy provides the energy that powers millions of homes and businesses across eight Western and Midwestern states. Headquartered in Minneapolis, the company is an industry leader in responsibly reducing carbon emissions and producing and delivering clean energy solutions from a variety of renewable sources at competitive prices.

One of the company's oldest power plants, Black Dog Generating Station in Burnsville, Minnesota, has burned coal for most of its 65-plus years of producing electricity for Upper Midwest customers. In 2015, Black Dog transitioned to a clean-burning natural gas facility with a combined-cycle unit and a simple-cycle natural gas turbine. Another simple-cycle unit is scheduled to go online later this year.

THE CHALLENGE:

Reducing emissions is not the only way Xcel Energy produces cleaner energy. Improving operating processes is another key factor in its corporate priority of leading the clean energy transition.

Although plants have been utilizing in-house oil sampling for more than 30 years to keep equipment well maintained, Seth Carlson, Xcel Energy chemist, saw the potential for further improvements. Black Dog's main turbine oil had a low ISO 4406 cleanliness code level of 21/19/18. Carlson realized the chances for

equipment failures would increase if the plant did not improve its oil cleanliness.

With corporate approval and support, he began in 2017 to develop a more modern reliability program based upon a predictive maintenance strategy to extend equipment life and decrease downtime. Overhauling the lube rooms served as a good starting point to visibly shift plant culture from reactive maintenance to proactive, precision lubrication and reliability. "We wanted to get ahead of the game and manage our equipment before something went wrong," said Carlson.

THE SOLUTION:

To test his theory, Carlson focused on the lube room, the command center of a premier lubrication program. By improving oil storage and handling, contaminants can be eliminated in new lubricants, and therefore, transfer of contaminants into lubricated critical assets is also eliminated. Knowing the impact an updated and improved lube room could provide to the entire plant, Carlson and his team concentrated on the oil storage at Black Dog as a way to update all facilities across Xcel Energy's fleet.

While construction was underway to create a controlled lubricant storage room, Carlson began looking for a partner to assess how the company was handling oil and identify improvements that could lead to cost savings. Finding a total-solutions provider was important to the success of the project. Des-Case was selected because of its holistic product offerings that work together seamlessly.

In collaboration with a Des-Case distribution partner, Des-Case toured the Black Dog facility and, with Carlson, developed a plan to move forward. Measurements of the lube room, an audit of its in-use lubricants and best-practice products and tools recommended by Des-Case were used to create a schematic design for a new lube room.

Simple changes were immediately identified within the space, and an assortment of barrels, pumps, coffee cans and various bottles were replaced by state-of-the-art LT-LMS storage systems, wall-mounted Panel Units, and Oil Transfer Containers. The LT-LMS systems and Panel Units allow Xcel Energy to filter each oil when it arrives on site and keep it clean and dry until it is ready to be transferred and put into service. When oil top-offs or transfers of small quantities are needed, containers isolate oil from the environment, ensuring contamination control throughout the transfer process.

All three of these new products in the Black Dog lube room are outfitted with quick connects for seamless integration, preventing contamination from entering the lubricant from the moment it arrives at the plant until it is put into service. A strict color-coding and labeling process is used in the lube room to prevent human-error or cross-contamination. With these tools and processes in place, Xcel Energy has made the easy way also the right way. "The main goal was to have all oil filtered," said Carlson. "The only way to get oil out for use in the plant was to have it run through a filter, which this system accomplishes."



Panel Unit





THE RESULTS:

Prior to the redesign of the Black Dog lube room, new oil entering Black Dog was typically near an ISO 4406 cleanliness code level of 21/19/18, which is 32 times too dirty for a standard turbine oil. An ISO 4406 cleanliness code level is a measure of the number of particles greater than 4, 6 and 14 microns in every milliliter of fluid. In most cases, the amount of particle contamination in a lubricant is the single biggest factor that determines how long a lubricated component will last. For optimal operation and to maximize component life, a turbine oil should have an ISO 4406 cleanliness code level of 16/14/10.

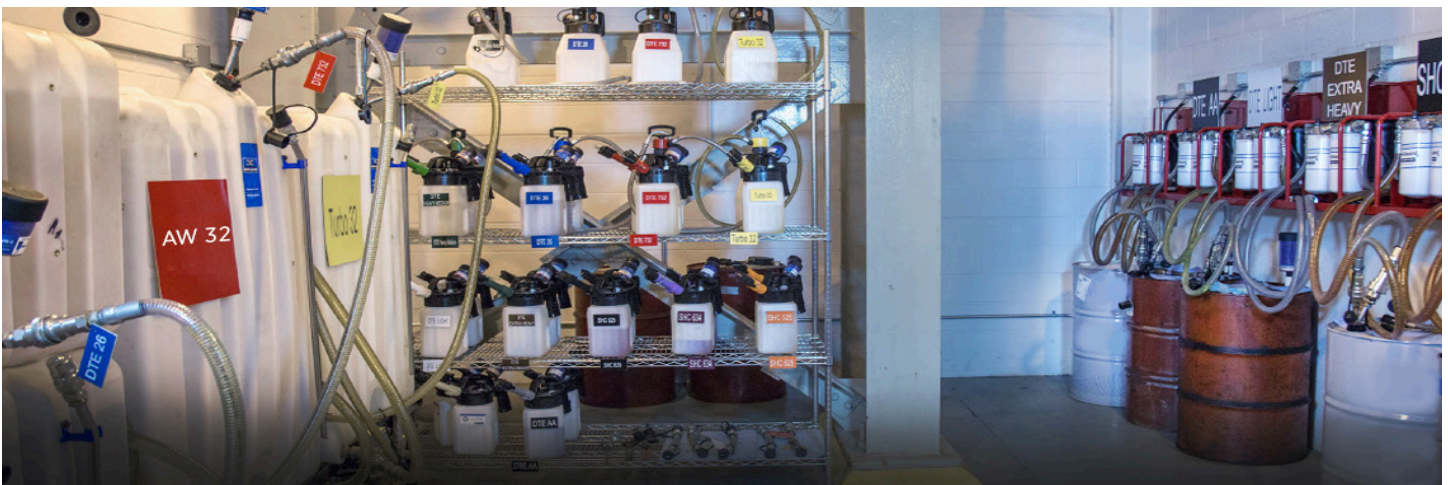
When working to improve an ISO 4406 cleanliness code level of 16/14/10, it is recommended to cycle the lubricant six to ten times through a dedicated filtration system, whether an LT-LMS or Panel Unit. How long would this process take? By multiplying the volume of oil (likely 55 gallons) by 10 (the optimum number of cycles) and dividing that number by the pump size (five minutes per gallon, for example), the filter would run approximately 110 minutes or almost two hours.

“ This new level of oil cleanliness transfers to 80 percent gains in component opportunity, extended equipment life and, ultimately, lowers maintenance and repair costs. ”

Today, using the LT-LMS systems and Panel Units, Black Dog is filtering new oil to optimal ISO 4406 cleanliness code level of 16/14/10 throughout the plant. Said Carlson, “this new level of oil cleanliness transfers to 80 percent gains in component opportunity, extended equipment life and, ultimately, lowers maintenance and repair costs.”

“If we can keep oil clean, and not change it, that’s also a selling point,” says Carlson. “All of the little costs add up. Since data points can take some time to acquire, we are currently monitoring how well the changes made to oil handling, sampling and the general implementations of new best practices are accepted.”

To date, Xcel Energy has implemented similar programs and Des-Case products in more than five facilities. Training classes for plant staff on topics such as oil cleanliness and operating Des-Case equipment are regularly offered by Carlson. By making the right way the easy way, the culture has shifted. The oil cleanliness improvements help Xcel Energy continue to reduce customers’ energy costs by lowering operating costs and leading the clean energy transition.





UNITED STATES
675 N Main Street
Goodlettsville, TN 37072
+1.615.672.8800

EUROPE
Coenecoop 99, 2741 PH
Waddinxveen, The Netherlands
+31(0)182 244 888