

Coke Processing Plant Prevents Ghost Trips and Saves \$160,000 with Advanced Online Monitoring



RESULTS

- More than \$160,000 saved in compressor replacements in first year
- Steam turbine shutdowns avoided
- 120 hours of electric power grid purchases avoided by continuous generation at plant



APPLICATION

Waste-heat power turbine and fuel gas compressors at coke processing plant producing electrode material

CUSTOMER

Standalone "needle coking" plant with 100+ employees, producing most of its own power

CHALLENGE

The facility converts the heavy bottom product of oil refining into hard "needle coke" used in electric arc furnaces to melt steel. High temperatures thermally crack the petroleum into light products (such as methane, naphtha and gasoil) and needle coke. The needle coke is calcined to drive off all volatile materials, leaving a hard, pure carbon used in the steel melting process.

This plant makes the majority of its own energy using waste heat from the kiln, but purchases power from the local power grid when necessary.

The online protection system on the power generation turbine would sometimes trip for no apparent reason, forcing purchase of electricity from the grid at high cost. Also, large fuel gas compressors used in the manufacturing process would fail without notice, causing damage to machinery and requiring expensive overtime for repairs and expedited costs for replacement.

The plant engineering staff knew that a solution to these issues could save them big money.

"We took a look at many systems and decided what we needed in equipment. The CSI 4500 showed functionality and value."

Plant Engineer

SOLUTION

After evaluating options, Emerson Process Management was chosen as offering the most viable solution to meet predetermined requirements. The CSI 4500 Machinery Health™ Monitor provided trendable information, waveform analysis, ability to expand this type of monitoring to other plant equipment, and moved the facility towards predictive maintenance. With AMS™ Suite: Machinery Health Manager software, additional technologies and solutions can be seamlessly integrated.

"After the CSI 4500 was installed we operated from April to October without a single trip; in the five months prior we had nine 'ghost' trips," with each event requiring purchase of about 24 hours' worth of expensive power from the public grid.

Another CSI 4500 was installed on the coker fuel gas compressors. Before the system was installed, mean time between failures for the two compressors was 3 months. Failures resulting from cracked bearings caused the rotors to rub the case which required replacement of the entire compressor, costing more than \$30,000 versus \$8,000-10,000 for bearing replacement. "We were running the compressors to failure. We didn't know what was causing the failures, or when the compressors were going to fail. We'd just get a call on the weekend, and we would end up paying to expedite things."

Since installing the second system, "We've been able to trend data from the CSI 4500 and compare that to process trends. We've been able to correlate spikes in vibrations to process changes and to alter the process changes and reduce spikes. This improves equipment life and eliminates equipment trips on high vibrations."

One of the criteria for the protection system is that it could be expanded to other pieces of equipment in the plant. As the plant's reliability program grows and creates more savings in plant efficiency and increased production, additional technologies can be added for even more benefits. Lubrication samples from other process machinery are now sent to the Emerson Oil Analysis Lab monthly for thorough study. Reports sent back to the plant are integrated with the reports from vibration monitoring.

Planned repairs and swap-outs reduce impact on the process and productivity of the plant, as well as the people working there. According to the Plant Engineer, "The boss sleeps easier now," not bothered by ghosts.

"We've been able to trend data from the 4500 from pi and compare that to process trends. We've been able to correlate spikes in vibrations in operations and to reduce spikes...Anything you can do to reduce vibrations is good."

Plant Engineer

"The boss sleeps easier now."

Plant Engineer

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