

REMOTE ANALYSIS UNCLOGS DATA

Off-site monitoring of filters helps power plant increase efficiency

Centro Energia Teverola started operations at its 150-MW cogeneration combined cycle power plant in 1998. The plant in Teverola, Italy, has two gas turbines, two heat recovery steam generators, and a steam turbine.

Filters that clean the inlet air to the turbine's compressor section were clogging. The inlet air must be as clean as possible to prevent compressor blade fouling, which has a large effect on performance. Otherwise dust builds up quickly.

"Filter clogging often resulted in emergency downtime to install replacement filters, which was especially costly during peak production periods," says Vincenzo Piscitelli, general manager at Centro Energia. "When the filters clogged, the plant almost always was forced to shut down a turbine because of the serious performance degradation caused by high-pressure drop across the filters."

To solve the filter problem, Centro Energia installed Emerson Process Management's AMS Performance Monitor software to provide performance data on two gas turbines, two heat recovery steam generators (HRSGs), and one steam turbine. "After analyzing the data remotely, Emerson could inform operators when problems existed," explains Piscitelli. "Remote analysis would allow us to schedule filter replacements at a more convenient time, such as during low-demand periods."

AMS Performance Monitor takes data from the Centro Energia historian, so it's independent of the plant's control system and its instrumentation. The software uses as inputs the hourly averaged values from the historian.

"The Emerson data collection tool formats the historian data into Excel files, which are then transmitted by e-mail to

Emerson's Performance Centre in Teesside, England," explains Piscitelli. "For security reasons, the data is stripped of its units of measurement. The team in the UK knows the proper data format, so it can perform the analysis unhampered."

In Teesside, the data is inspected manually for problems. It's then put through an automated SPC-type analysis to identify missing and suspect data points. If necessary, agreed values, such as last good or mean values, can fill in for missing values, or data can be re-collected.

The data then goes through a thermodynamic model tuned to represent the asset's characteristics and behaviors. Emerson's engineers develop these ASME models for each machine. "Running data through the appropriate model identifies further data problems, such as instrumentation inaccuracies," says Piscitelli. "This provides a check on field instrumentation effectiveness and identifies malfunctions or calibration that otherwise would be impossible to detect."

Detailed results, charts, and analysis are published to the Centro Energia dedicated secure website for viewing.

The UK center contacts Centro Energia either via telephone or email if the analysis reveals urgent problems. In addition, the website provides a red/amber/green alert system that indicates overall asset condition on its summary page. Alerts also can be forwarded automatically to Emerson's AMS Asset Portal for additional annunciation. Emerson provides periodic performance reports and results based on key performance indicators displayed graphically. Graphs and reports are placed on the website, accessible with a login and password.

AMS monitors the gradual filter performance deterioration and calculates the cost of the resulting reduction in turbine performance. By comparing this with the cost of the required maintenance, Centro Energia can determine the most appropriate point to replace the blocked filter. Maintenance is now scheduled for periods when energy production is less profitable and when penalties for being off-line can be avoided. This improved planning enables Centro Energia to reduce average repair times from seven hours to two hours.

While the main purpose of the AMS Performance Monitor was to detect filter problems, another benefit was that overall plant efficiency increased by 1%. In a 150-MW power plant, a 1% improvement is significant. Centro Energia generates 120 million euros' worth of power every year, so 1% represents a savings of about 1.2 million euros. ☺



Monitoring gas turbine variables by extracting data from the plant's data historian allowed remote comparison of live data to a computer model to determine when filters needed service.