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Using instruments to prevent disasters

At fossil-fueled plants across the U.S., air in-leakage troubleshooters are increasingly turning to new technology to reduce the guesswork involved in diagnosing condenser problems and measuring condenser performance.

Many plant performance and maintenance experts are turning to air in-leakage detection and measurement hardware from vendors such as Intek, Inc. (Westerville, Ohio). Intek is the developer of the *RheoVac*® line of instruments (Figure 6), which provide real-time data on vacuum system quality, air in-leakage levels, and exhauster capacity. The instruments determine the water vapor-to-air mass ratio of gases being removed from the condenser through the vent line, utilizing for the first time a technology that allows a precise, noise-free determination of fuel efficiency degradation. They can even lead to air in-leakage control at or below zero excess backpressure, completely eliminating this concern from air ingress.

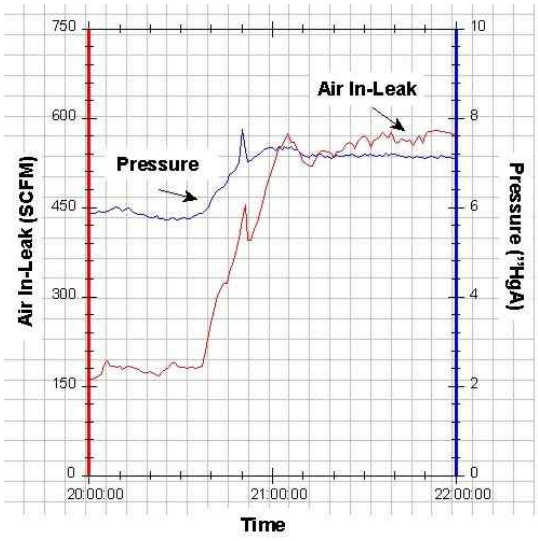
"In my opinion, the air removal system in the typical fossil plant is the most complex thermal mechanical system," says Aaron Miller, an engineer with Entergy Services Inc. (Beaumont, Texas). "The mixture of saturated water and gas is incredibly difficult to perform any kind of measurement on."

6. A typical air in-leakage instrument and probe
Courtesy: Intek, Inc.

Miller, who performs thermal performance testing at three fossil-fueled generating stations in Louisiana and Texas, says the *RheoVac* unit adds previously unknown information to condenser performance assessments, enabling more complete and accurate thermal analyses. "Before, we had to go out and manually look for leaks. This was very time-consuming, since it was not clear if high condenser pressure was due to air in-leakage or other causes. Now, we can directly determine the level of air in-leakage, and that frees technicians to search for leaks or pursue other causes of high backpressure."

Miller says his most interesting experience with air in-leakage measurement was at the Sabine Plant in Bridge City, Texas. The plant called him to perform emergency diagnostics on a 530-MW critical unit running at extremely high condenser backpressure. Initial readings on the *RheoVac* monitor showed a very high (165 scfm) level of air in-leakage into the condenser. Thinking that the main feed pump might be the likely source of the leakage, plant operators switched to a motor-driven pump, but that change actually made the problem worse. By then, air in-leakage had risen to 570 scfm. Continued searching based on output readings resulted in the discovery that a 4-in. gland steam pipe had ruptured inside the condenser (Figure 7).

The *RheoVac* instruments' ability to do continuous monitoring and diagnostics can prevent disasters and even change a plant's efficiency rating from poor to high, says Barry Long, mechanic and air in-leakage specialist at Georgia Power's Plant Yates in Newman. Long even says the main reason Plant Yates went from being one of the least-efficient plants in the Georgia Power fleet to one of the most efficient was that it installed and uses *RheoVac* systems on three of its seven units. The instruments proved so successful at eliminating backpressure that they were installed on the other four units in short order, says Long.



7. Ruptured gland steam pipe

Over a one-hour period, the level of air in-leakage into the condenser of a 530-MW critical unit in Texas rose from a very high 165 scfm to a dangerously high 570 scfm. The cause was revealed to be a ruptured gland steam pipe inside the condenser. Courtesy: Intek, Inc.

"With seven units, we need all the help we can get," he says, noting that the continuous reporting generated by the *RheoVac* system has changed the plant's approach to backpressure testing from first-shift-only maintenance and conditions testing to full-time computer-based testing. "Five of our units are 50 years old, so lots of their components fail frequently. What's more, it's hard to keep air out of equipment that's so worn out."

INTEK, Inc.
751 Intek Way
Westerville, Ohio 43082

sales@intekflow.com
www.intekflow.com
1-800-RheoVac