In the Field: How Keeping an Eye on Energy Consumption Can Prevent Catastrophic Failures

By **Bill Holmes, P.E.** April 11, 2013 04:17:52 pm

There are many ways that good energy management mitigates risk, from reducing vulnerability to volatile costs and uncertain supplies to improving your company's public image and promoting employee morale and loyalty. You can migrate to less expensive, environment-friendly sources; produce your own energy with cogeneration or on-site renewables; use it to provide employees with free vehicle charging; brighten work environments with more efficient lighting; partner with the community in district energy projects; and perhaps above all, simply reduce energy's role in risk by using less.

One of my favorite ways is using energy monitoring to find savings opportunities, and the same monitoring system often also can reduce risk by identifying overstressed equipment and incipient failures. Here are a few examples from the field.

Electrical Systems

I got an urgent call from John, the plant engineer at the 80-acre RCA facility on Sherman Avenue in Indianapolis. A transformer had just exploded, there had been a minor fire and production was shut down in that part of the plant. Luckily no one had been hurt but it was a wake-up call. As in many big plants, they were continually adding, removing or moving production equipment in response to market demands. The plant was old and much of the electrical system had been there for many years. Like a lot of older facilities as well as many newer ones, there were no accurate "as-built" records for the electrical system. John had no idea that one of the transformers was overloaded until it exploded. As a result there had been a near disaster and with production shut down for a few days, the incident had cost them a lot of money.

"Can your energy monitoring system be expanded to monitor the loading on all of my big transformers?" he asked. He wanted to be able to watch the loading in real time and have a permanent record to help him make decisions about locating and supplying power to the constantly changing equipment. Think of the costs and trouble he could have avoided had he been monitoring the loads before that incident. "Sure," I replied. We added the necessary points.

Electric Motors

The plant engineer for a huge Kosmos cement plant in northern Kentucky called me one day with better news. He said, "Your monitoring system just saved me $100,000 in one day! I detected a rising amperage on a 3,000 hp motor, shut it down and an inspection showed that we had avoided a catastrophic failure that would have cost us more than $100,000." I think the monitoring system had been in the plant for six months or so. When they had purchased the system, we had signed a guarantee that they would recover the cost of the system from documented energy savings alone within 12 months.

The actual costs were recovered within the first six months by reducing the peak demand 2,250 kW and the consumption 200,000 kWh per month through a combination of no-cost changes in operation and control. Combined with the $100,000 avoided cost of a motor failure, the owner had realized more than 200% return of their investment within the first year.

Air Conditioning/Dehumidification Systems

Sustainability Infographics

We here at Sustainable Plant love infographics. Aside from being easy to read and geniously designed, they are also incredible resources to have on hand, ready to share with others. With this in mind we've put together a collection some of our favorites from around the web. Check them out, pass them along and let us know if you have any other infographics you'd like us to share with the community. **View the gallery**

Author Bio

Bill Holmes, P.E.

Bill Holmes, P.E. founded Holmes Energy LLC www.holmesenergy.com and developed the AutoPilot Monitoring-Based Commissioning (MBCx) System in 1979. He has a B.S. and M.S. in mechanical engineering and has done additional coursework and research for his PhD. He is a former Purdue professor and taught for several years in the Continuing Education in Energy Management Program at the University of Wisconsin.

Bill has produced savings from 20% to, in a few projects, more than 50% from low-cost, no-cost changes in management, operation, maintenance and control alone in all types of facilities including Industrial Plants owned by Fortune 500 Companies.

He is the recipient of a DOE Award for Energy Innovation and was the Indiana Energy

In two different facilities, monitored data showed direct expansion (Dx) refrigeration systems in large rooftop air conditioning and dehumidification systems running out of control with coils freezing, compressors shutting off as a result of anti-freeze thermostats, and then cycling back on as the coils warmed and began to thaw. Compressors that were designed to cycle off and on five or six times an hour were cycling three or four times a minute and destroying themselves.

In one case, the problem resulted in part from the minimum capacity of the equipment being so much larger than the actual cooling required by the conditioned space. In an effort to keep the unit running, a contractor had set a 100 kW electric heating coil to run 100% of the time, more than doubling the utility costs of the HVAC systems and destroying at least one compressor. The system was modified to reduce its minimum cooling capacity.

In the other facility, the large built-up dehumidification system had been poorly designed more than 10 years before with the components mismatched. In an effort to keep the system functioning, a different contractor had set the cold deck to the minimum temperature causing the direct-fired natural gas re-heater, the largest energy user in the facility, to consume five times the amount gas that it should have. The resulting short cycling of the oversized compressors had destroyed at least one compressor during that period.

Compressed Air Systems

In a GE plant in Louisville with 15,000 hp of air compressors, monitored data showed a large variation in compressor efficiencies and further investigation showed a number of control or maintenance problems that were not only increasing the operating costs but shortening the lives of the huge machines. Control sequences were modified and the system efficiency was increased 20%, saving more than $250,000 annually. Compressors were repaired and monitored continuously to keep them running at peak efficiency.

Refrigeration Systems

See Whole Article 1 2 »

Relevant Tags

closed-loop, facilities, alternative energy, automation, career, design, electricity, engineering, information technology, lifecycle analysis, measurement, monitoring, power generation, product lifecycle, productivity, software,

Add a comment

You cannot post comments until you have logged in, and have an appropriate permission level.
Login here or register for a new account.

Manager of the Year in 1990. He has published numerous papers and been making presentations on his projects and methods for more than 25 years. Bill is a sculptor, a writer and a regular contributor to Sustainable Plant.

RSS Author Articles

The Most

Most Recent Most Read Most Commented

- Nation's Largest Brewery Goes Landfill-Free 10/18/2013 12:10pm
- Infographic: The Dangers of Industrial Dust 10/18/2013 11:44am
- Compressed Air Systems: Friends or Foes of Sustainability? 10/18/2013 10:29am

Green or Green Wash?

Manufacturer Designates Eco-Certification for Electrical Devices

The company's Acme electrical devices meet criteria established by the company for its Eco-Certified designation. Demonstrating its commitment for a better, cleaner environment, a company has developed an eco-certification designation for a variety of its industrial products, including the company's entire line of Acme electrical devices. The company's Acme electrical devices meet criteria established by the company for its Eco-Certified designation: The devices have a positive impact on…

Read More >>
Add Your Comment >>

Swisscleanwater Group
Just selecting and buying a water filter isn't enough, you also need to know the ways to maintain it so that you can enjoy great service from the Clean water...


Author
2/9/2013 @ 10:44pm Read More >>

Supporters Corner

1 of 7

BALDOR
A MEMBER OF THE ABB GROUP

Baldor Electric
Our Job is Making Yours

2 of 7

ABB

ABB
Together We Can Make the

Easier. Worldwide. World a Better Place