Ultrasonic Scanner Helps Facility Manager Find Leaks

BY ALAN S. BANDES

The facilities manager of a glass manufacturing site explains how he located compressed air leaks --- and thousands of dollars in savings.

When a manufacturer's utilities bills run close to $2.5 million annually, management is wise to watch for wasted energy. "That's why in 1998,1 initiated a compressed air program using ultrasonics as our key weapon to fight air leaks," said Ben Black, facilities manager with Corning Inc. in Harrodsburg, Kentucky. "So far we've found almost 30 leaks which," Black said," has saved us about $20,000 a year."

Corning Inc.'s Harrodsburg facility manufactures flat glass for the assembly of ultrathin liquid crystal displays for both consumer and industrial markets. One of its biggest customers makes flat panel displays for laptop computers. The plant has six processes, each one producing approximately 700 pounds of flat glass an hour. Silicon, the primary constituent of the glass, is melted in tanks with a combination of gas burners and electric power using resistance heating. The plant's electric bill runs close to $2 million; its gas bill usually runs to $500,000 annually.

Black became aware that the facility was having a problem with compressed air capacity in the late 1990s. "We needed to use our reserve compressor just to keep up with the workload," he said. "The demand for compressed air was steadily increasing but I had a hunch that it was less a result of production demand than some false demands in the system."

Built in 1952, the Harrodsburg facility has been modified many times since then. Over the years, Corning Inc. has fitted new pipes into the original ones, which are older than most people who work there. Black walked through the entire compressed air system following the pipes and listening for leaks with only his ears. He found several leaks. Fixing these first leaks slowed air loss down a bit, though the demand was still climbing slowly.

Black decided to investigate technological ways to help locate compressed air leaks. Reading a trade magazine, he came across an advertisement for an acoustic ultrasonic scanner. Black called the company and got a demonstration model of the product for a test-run. "I read the instruction manual and set out across the plant. In an hour or so I had pinpointed seven major leaks."

WALK-AROUND INSPECTIONS

Testing for air leaks is a straightforward process. Black wears headphones and, using the ultrasonic scanner, walks the facility searching for external compressor leakage. He walks along pointing the handheld instrument towards pipes. Initially he started with the trouble spots where he knew he had some compressed air leaks to get a read on how the fault was supposed to sound. According to Black, he could pick it up a leak even 50 feet away. He then compared these sounds to properly functioning equipment. Black checked by listening and also relied on the instrument's meter.

As with any mechanical movement, all compressed air systems and components have a normal ultrasonic signature. Deviations from this normal signature are caused by leaks in the system or through components such as the manually operated valves at the Corning facility. Due to the short wave, high-frequency nature of ultrasound, the sounds produced by a compressed air component can be isolated, which provides a clear test result.

During the trial period. Black quickly pinpointed seven leaks which by his estimation were costing Corning Inc. $5,000 a year. As a result, he had no trouble convincing management to purchase an ultrasonic detector.

COST ANALYSIS FOLLOWS REPAIRS

Once Black finds a leak, he marks it with a numbered tag so can track it. He submits a work order for each leak, a tradesman makes repairs, Black records the repair, disposes of the tag and then conducts a cost analysis. "The procedure was actually written by a sharp summer intern who learned quickly how to use the scanner," Black said.It costs Corning Inc. roughly $60 per cubic foot per minute per year. "That takes into account the power we use and the labor and parts that go into maintaining the compressed air system," Black said. Using a reference chart, a hole 1/32 of an inch in diameter at 100 psi costs us 6.5 cfm per minute. Multiply that number by 60 and the cost is $390. This means that if we continue to blow 6.5 cubic feet per minute from that pinhole for one year, it would cost us $390."

As an example, Black said they had a piece of equipment that was malfunctioning and found a hole 1/32 of an inch in diameter. They compared this leak with others that might be coming through pin holes, cracks or loose connections. To arrive at a cost-savings estimate, they estimated the equivalent of what the leak would be if it was a round hole, i.e. what would be the equivalent diameter. Once a year, Black reports the savings to plant.

"A cost analysis, of course, is only an estimate of how much money is being wasted through air leaks," Black said. "But the more you take the time to do the calculations, the better you become at making more accurate estimations. One thing is for sure, ultrasonics continues to save Corning Inc. thousands of dollars each year in compressed air costs."

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