TESTIMONIAL

Genie gets a lift from seeing air leaks in action

When a production line relies heavily on compressed air to run tools and processes, even tiny air leaks can multiply product and energy waste and lost production time. Staying on top of those air leaks is a priority. Genie, a Terex brand, is a leading global manufacturer of aerial lift equipment recently found a new weapon to help it combat those pesky and costly leaks.

Operator: Josh Stockert, Maintenance Supervisor

Company: Genie, a Terex brand

Application: Compressed air leak detection

Application: Energy savings (documented with the Fluke 3540 FC Three-Phase Power Monitor)

Results: 25.7 % recovered compressor capacity–annual savings estimate $48,754 (USD)

Genie designs and builds innovative vertical work platforms and material lifts to make working at heights safer and more productive in a whole range of industries. You can find Genie® equipment at work everywhere from construction sites, and aviation plants, to entertainment venues, and retail warehouses.

With more than 50 years in business, Genie continues to design new products that leverage the latest technology to meet changing needs. Throughout their evolution as a company, Genie is adhering to stringent manufacturing standards to increase quality and lower costs.

The high cost of low pressure

The business's plant in Redmond, Washington builds material lifts and uses between 1,800 and 2,600 CFM of compressed air each day. That volume of compressed air runs up to 200 torque tools per line and process equipment responsible for moving large sheets of half inch steel and positioning of parts. If the tools don't have enough compressed air pressure to function properly, the results could be costly.

"If we were to lose pressure on the system we use to vacuum sheets up and transfer them to the laser to be cut, we wouldn't be able to pick up or move the sheets," explains Josh Stockert, Genie Maintenance Supervisor, Terex AWP. "If one sheet misses a transfer, we've lost nearly 20 sheets of cut parts, which could add up to 200,000 parts. If the pressure is too low on our torque tools, we could wind up with mis-torqued units."

The more leaks there are, the higher the demand for compressed air. Increased demand for air pressure raises the risk of not being able to supply an adequate amount to all the tools and process equipment that need it.

Compressed air leaks also increase energy costs. According to the U.S. Department of Energy Office of Industrial Technologies*, a single 1/8" (3mm) leak in a compressed air line can cost upwards of $2,500 a year.

*energy.gov/eere/amo/industries-technologies

Some typical locations for air leaks		
3-way fittings and elbow fittings	Drill press air coupler	Quick release fittings and disconnects
Air chuck and hoist	Filters	Seals and gaskets
Air cylinder fittings	Foot pedals	Shut-off valves
Air dryer	Grinder connectors	Solenoid fittings
Air tools, pneumatic guns, riveters and rachets	Hose reel fittings	Storage tanks
Bag houses	Industrial or process gas storage tanks	Terminated air lines
Ceiling valve	Lubricators	Threaded connections
Compressor valve	Manifold air lines and fittings	Tubing
Condensation traps	Pipe joints and O-rings	Vacuum lines
Control handle and valves	Pneumatic actuators	Vacuum suction cups
Couplings	Pneumatic cylinders	Valve block
Cylinder rod packing	Pressure regulators	

Expediting air leak detection

To reduce the risks of low air pressure, Genie is vigilant about finding and fixing air leaks. Some leaks occur in hoses and fittings high up in the rafters; others show up on the torque tools on the shop floor. In the past, during monthly weekend preventive maintenance (PM) operations, Genie dedicated one or two maintenance technicians to hunt for air leaks. The technicians first sprayed joints and hoses with a soap and water mixture to reveal bubbles that indicate leaks. Then they fixed the leaks and retested with soapy water.

"It's very labor intensive," says Stockert. "It might take 30 to 45 minutes to find one leak in the rafters, and then come back down to get material to fix it, go back up and fix the leak, and verify with soap and water that the leak was fixed."

The soap and water method works but slowly; and it requires a lot of cleanup afterward to prevent slipping hazards. Genie also tried using ultrasonic parabolic discs connected to headphones to try to find leaks but without much success. They couldn't get close enough to the equipment to locate the exact location of the leaks. Plus, traditional ultrasonic leak detectors detect only very high frequency leaks and air leaks occur at many frequency ranges.

So, when Fluke offered the company a chance to test its new Fluke ii900 Sonic Industrial Imager, Genie immediately accepted. The ii900 includes an array of tiny super sensitive microphones that detect sounds in both the human hearing range (2 to 20,000 Hz), and the ultrasonic range (20,000 Hz and higher). Even more unique, it allows the user to actually see sound.

Seeing sound

The ii900 applies proprietary algorithms to determine the location of the leak. The results produce a color SoundMap™ image superimposed over a visible light image of the equipment to show the exact leak location. The user views the results on a 7" LCD screen as a still image or a real time video.

"Being able to visualize where the problem is and how big it is adds another dimension," says Stockert. "You can identify which threads, fitting, or hose is affected. Being able to pinpoint where the leak is coming from on that image is extremely exciting. You can see different angles and determine 'Yep it's these threads versus that hose that feeds this fitting.'"

The ability to visually scan large areas from up to 50 meters (164 feet) away with the ii900 has expedited leak detection at Genie and significantly reduced the hours of labor spent on that task. "Rather than taking at least an hour to move everything out of the way, put the lift in position, spray the joint, and then move everything back, it takes me all of 30 seconds to a minute to find an air leak with the ii900 camera. Some days we can find and repair 30 or 40 leaks in just a couple hours," says Stockert. "Plus, we can use the ii900 during production hours, when it's extremely loud in here and still been able to capture leaks at the rafter level up to 6 to 9 meters (20 to 30 feet) away."

Testing during production without disrupting operations

The ability to scan for leaks without affecting production is a huge advantage. "Before, we never thought of testing for air leaks during production because we couldn't shut down the aisles and move people out of an area to go up and look at a potential leak," says Stockert. "Now, we can stand on the sideline and scan the air line overhead, while carts and people are moving underneath. We're not affecting their work, but we can tag the leak and then move a lift to that spot during lunch and fix it rather than having to wait for a weekend PM shift."

Initially, the primary objective for Genie when testing the Fluke ii900 Sonic Industrial Imager was to save energy.

After the initial air leak inspections and corrections, Stockert saw a 25.7 % recovery in their compressed air capacity. “We were near the top end of what our compressor system can put out,” he said. “By correcting the leaks found using the ii900, one of our four compressors is nearly idle much of the time.” The reduction in compressor usage translates to an estimated $48,754 in annual electrical energy savings. However, Stockert believes that there is an additional benefit derived from not having to add more compressor capacity.

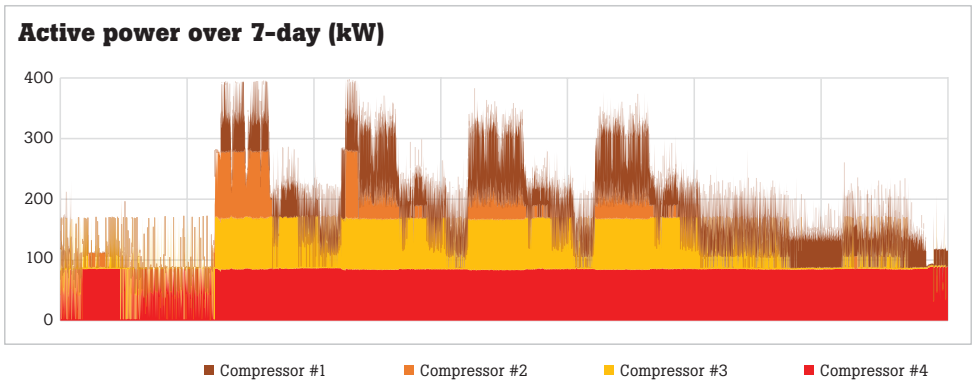
Heavy equipment manufacturer before and after leak inspection

4 air compressors: 2x75 HP + 2x90 HP

	Compressor #1	Compressor #2	Compressor #3	Compressor #4	Total
Power/energy log					
Week before	7,954 kWh	2,849 kWh	8,502 kWh	13,818 kWh	33,124 kWh
Week after	10,913 kWh	5,513 kWh	6,779 kWh	1,418 kWh	24,623 kWh
Difference	2,959 kWh	2,664 kWh	(1,772) kWh	(12,400) kWh	(8,501) kWh

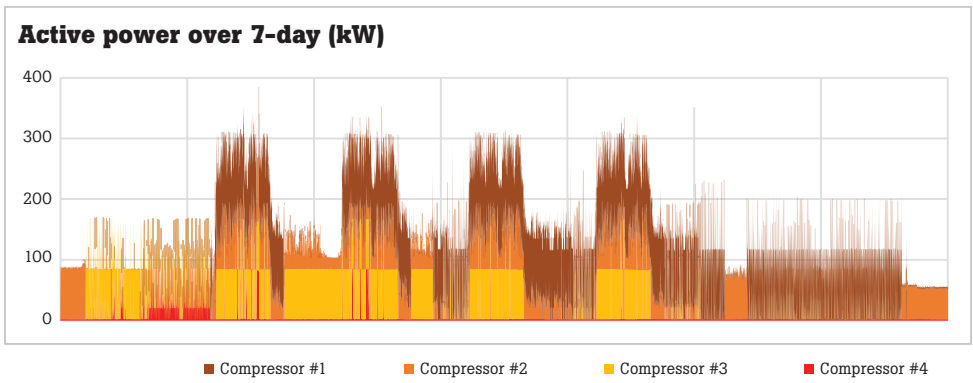
Before

- 90HP compressor #4 working full time (red)
- Air working at max capacity at peak times



After

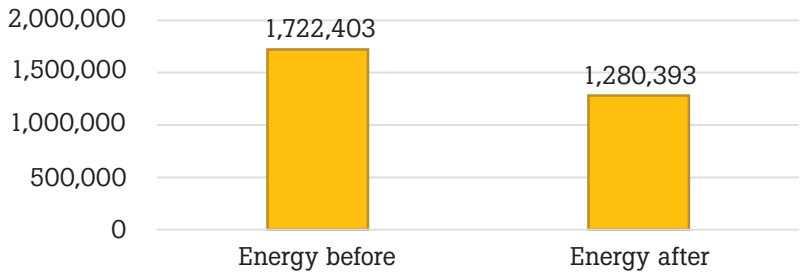
- #4 compressor idle
- 25.7 % recovered capacity
- $48,754 savings



Heavy equipment manufacturer before and after leak inspection (continued)

Annualized Consumption (kWh)

Energy before	1,722,403 kWh
Power bill before	$189,464
Energy after	1,280,393 kWh
Power bill after	$140,843
% saved	**25.7 %**



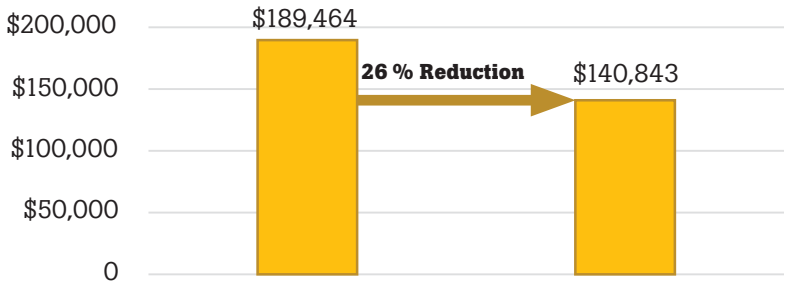
Energy savings

Per day	1,214 kWh
Per month	36,429 kWh
Per year	**443,225 kWh**

$ savings

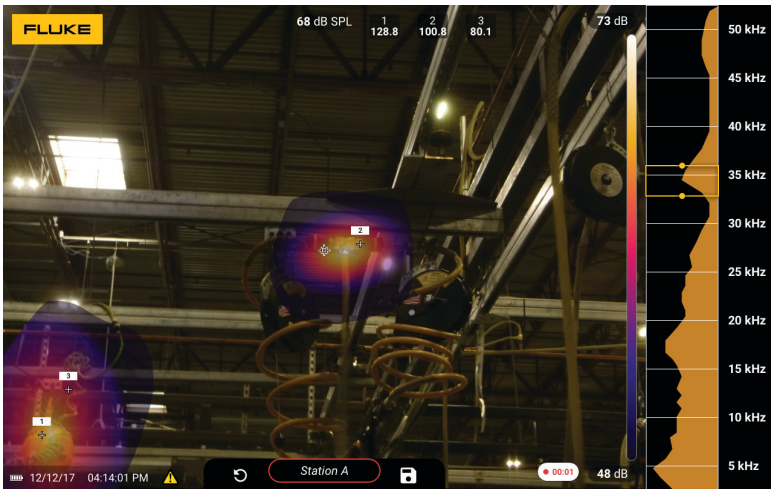
Per day	$133
Per month	$4,007
Per year	**$48,754**

Annualized electricity cost



$48,754 = savings in electricity bills

25.7 % = compressed air capacity recovered



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