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CEJN Industrial Corp.

Capturing air no longer an exhausting task

Figure 1. EARS was tested on this test rig with air cylinders and a rotary compressor, with results showing the compressor delivering more than double the rated output of free air delivery.

Closed-loop system recycles compressed air right back to the compressor, nearly doubling the capacity of pneumatic tool systems.

Frustration with mismatched air compressors gave birth to the Exhausted Air Recycling System, or EARS, distributed by CEJN Industrial Corp., Gurnee, Ill.

When Chris Bosua of Australia was trying to make a manufacturing machine work with an air compressor that was too small for the job, he realized that the real problem was waste — the energy used to create the com-

pressed air was wasted in the exhaust air from the pneumatic tool. To reduce this waste, Bosua thought it would be helpful to design a closed-loop system that would send air right back to the compressor, just as a hydraulic tool works. Out of this idea came EARS, with a system that converts a conventional compressor into one capable of nearly twice its original capacity.

Multiple benefits realized

Besides increasing capacity, however, Bosua soon discovered several other benefits with the new system,

including a dramatic reduction in noise. The pneumatic drills used in a machine generated noise of 89 dBA prior to the implementation of EARS. After the conversion, the noise from the drills dropped to just 67 dBA — roughly the difference between a gas-powered lawn mower and a sewing machine.

As testing continued, other benefits were realized, too. Not only did the system generate 80% more air volume, as seen in Figure 2, but the return of pressurized air to the inlet of the compressor had a dramatic effect on energy use. Under continuous use, energy consumption dropped more than 40%, helping to pay for itself in reduced energy costs, Figures 3 and 4.

In addition, the closed-loop air was cooler and up to 70% drier because the compressor no longer needed to pull in ambient air and cool it. This extended the life of tools, hoses, and the air compressor.

Finally, the air tools no longer emitted oil vapor and other harmful exhaust into the atmosphere. Because the tool exhaust was returning through a hose to the compressor, dust and debris was no longer blown about from the exhaust of the tools.

Retrofit kits for all

Bosua realized he needed to develop retrofit kits for common air tools and air compressors.

According to Cliff Kniesly, CEJN's Div. Manager, EARS Products, "The system is designed to allow the retrofit of existing equipment, whether that be existing air compressors, actuators, multiple tools, or entire machines."

Kniesly adds that the practicality of the system depends on the condition of existing equipment and if the facility has excessive compressor capacity. "Often, as plants lean down — they may still be using a 200-hp compressor, even though EARS may be fully supported by a machine half that size or less. Because more than 80% of the cost of compressed air over five years is for energy, often a new smaller, more efficient compressor has a faster ROI." Figure 5 highlights the total real costs of compressed air for industrial use.

Full constant power at low energy consumption

A manifold is a key piece of the EARS system because it allows the exhausted air from the air tool to flow into the compressor, forming

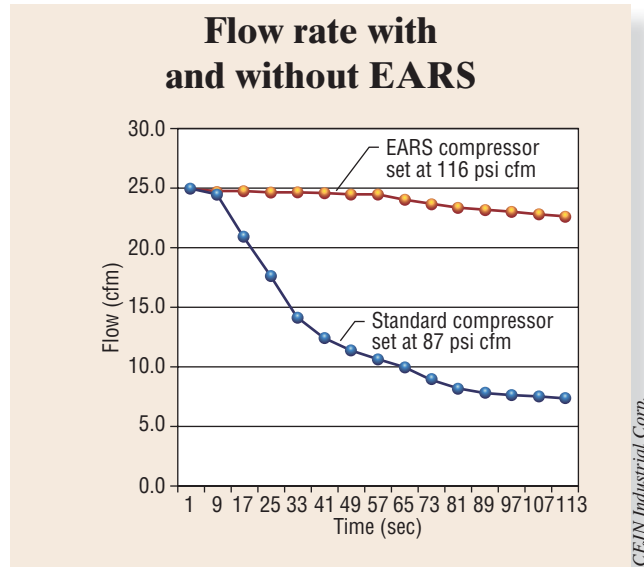


Figure 2. This chart reveals the EARS advantage: The closed-loop system delivers more air on a consistent basis over time. The compressed air is constant and requires less energy to compress the air needed to operate the tools.

a closed-loop system. The coupling on the end of the air tool ensures the exhausted air is captured and sent to the manifold. The closed loop allows the compressor to re-compress the exhausted air and send it back to the air tool.

Because it has already been compressed, the air recirculated to the compressor is at a higher pressure than atmospheric pressure. The compressor, therefore, does not need to work as hard to maintain the pressure required. Within this closed loop system, the pressure and

Return on investment.

20kW screw compressor: supplying 33 pneumatic tools at about 82.6 cfm or 2,340 l/m. air consumption and without spray and air guns.

1 kW at 15 cents US X 3600 annual operating hours X 20kW = \$10,800

15% energy costs for dryer and filter system = \$1,620

Total energy costs per year = \$12,420

25% estimated energy savings = \$3,105

Total costs of EARS installation = \$5,527

Payback period is 1.78 years: Divide installation cost of \$5,527 by \$3,105 savings in energy costs per year.

Note: The above mentioned numbers are based on facilities where the generated air volume can be returned to the compressor.

Figure 3. Retrofitting and energy savings allows the system to pay for itself in less than two years.

the volumetric flow remain almost constant. This helps shorten the re-loading time that the compressor needs to return to working pressure.

The EARS compressor works faster to maintain the compressed air volume required than a conventional compressor. That reduces the power consumption of the compressor, thereby reducing costs.

Adaptive tools simplify the job

EARS air tools are equipped with an integrated exhaust air adaptor that feeds the compressed air back to the compressor.

Many existing conventional air tools can be retrofitted with special adaptors. The range of compressed air adaptors is continually updated in order to cover a varied range of compressed air tool manufacturers. This minimizes the requirement to invest in new tools when retrofitting with EARS.

Making the connection

EARS uses compressed air piping made of durable polyethylene (PE). It is easy to install and is flexible for future changes or modifications. The PE piping also provides maximum flow to the tools, and is available in diameters from 25 to 110 mm.

Polyurethane dual hose sets are preassembled in both straight and coiled versions, in both metric and conventional lengths. Coiled versions come in lengths from 13 to 33 ft, and straight models are available in lengths from 10 to 39 ft.

In addition, plastic couplings and a complete range of PE-100-SDR9 tubing are completely air-tight

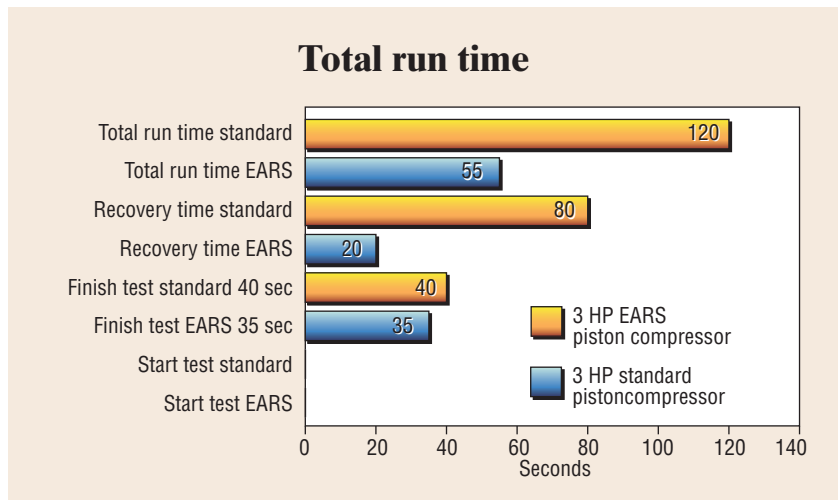


Figure 4. Tests show that total runtime in seconds of the compressor when drilling 1-in. or 25-mm brass means higher performance with the same energy requirements.

and UV stable. An installation wrench allows coupling nuts to be easily tightened or quickly released. The twin coupling developed specifically for the EARS application flows up to 64 cfm.

High performance, low cost

Because an EARS-fitted compressor delivers more air volume, a conventional compressor with a larger motor would be needed to match it. Larger motors and compressors cost more and require more energy to operate. By retrofitting an existing compressor with EARS, reportedly users can save up to 40% in energy costs alone. An additional benefit is that tools and equipment may last longer with EARS.

For more information, contact Cliff Kniesly at (262) 498-8459 or cliff.kniesly@cejnusa.com, or visit www.earsnorthamerica.com.

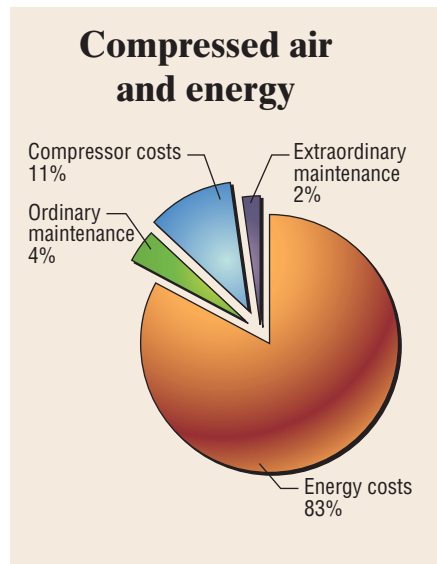


Figure 5. Compressed air continues to be a flexible and extremely important element of industry's production process. Compressed air represents more than 10% of total industrial costs. The growing emphasis on environmental protection and awareness on saving energy are pushing research towards the improvement of air compressors' efficiency.



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