



MICHIGAN PNEUMATIC TOOL

Exhausted Air Recycling Systems



The Time Is Right For An Efficient Compressed Air System

Most companies in the world today, from manufacturing to service, use compressed air to drive tools and equipment. Millions of pneumatic tools do the work in workshops, factories, production lines and service facilities. The current state of compressed air technology presents some rather significant challenges that we must overcome. The compressor has to work harder to provide the required air as the exhausted air from the tools can't be reused which wastes valuable energy. The exhausted air is also a problem because it is noisy and creates air pollution. The ingenious solution to these issues led to the invention of the EARS® system.

The Facts On Compressed Air

Compressed air is a versatile fuel that is commonly used in most manufacturing and service locations.

The advantages of using compressed air tools are obvious:

- **Compressed air can be a safe energy source**
- **Compressed air drives are fast, powerful and precise**
- **Compressed air tools are lightweight**

The disadvantage of conventional compressed air systems is the rising energy costs to compress the air.

Worldwide production processes are becoming more automated and the use of compressed air is increasing. Pneumatics, the most common field of application for compressed air, has seen growth in the double digits for the past few years.

However, environmental concerns like CO₂ emissions and global warming, increasing energy costs and resource management has put the spotlight on the big energy consumers in every facility—and that spotlight is shining directly at conventional compressed air systems. For those who prefer the benefits of compressed air, it is time for the revolution that is EARS®!

The EARS® Story:

The EARS® System was created out of frustration by Chris Bosua in Australia. As he tried to make a pneumatic manufacturing machine work with an air compressor that was simply too small for the job, Chris realized that the problem was waste. With a background in mechanical engineering and a bit of Aussie common sense, he saw that the energy used to create the compressed air was wasted in the exhaust air from the pneumatic tool.

“Why not create a closed loop system and just send that air right back to the compressor just like a hydraulic tool works?” he asked himself. After a few tries assembling a few bits in his workshop and creating a special manifold, Chris hit it just right, making a system that converted an ordinary compressor into a compressor capable of almost double the capacity, and EARS® was born.

Imagine an invention that literally doubles the capacity of an ordinary air compressor? This alone is spectacular, but the benefits did not stop there. With the whole system up and working, the unforeseen benefits started to reveal themselves. The first and most obvious was a dramatic reduction in noise. The pneumatic drills used in the machine reached decibel levels of 89dB prior to EARS®. Upon conversion to EARS®, the drills were virtually silent, maintaining a decibel level of only 67dB—or the difference* between a common lawn mower and a sewing machine! As testing and use continued, other benefits began to surface as well:

The return of pressurized air into the inlet of the compressor had a dramatic effect on energy use. Under continuous use, energy consumption dropped over 40%, not only was this invention functional, it would pay for itself over time in the shop energy bills.

The closed loop air was much drier (up to 70% as the compressor no longer needed to pull in ambient air) and cooler; this extended the life of the tools, hoses and the air compressor.



No longer did the air tools emit oil vapor and other harmful exhaust into the atmosphere of the shop. Since the tool exhaust was returning via a hose to the compressor, there was no longer the dust and debris blown about the shop from the exhaust of the tools.

* Decibel ratings are logarithmic. A 10dB increase is 10 times louder. The change from 67dB to 89dB means the original tool was 120 times louder than the EARS®-equipped tool.

What is EARS®?

In a conventional compressed air system, ambient air is compressed, stored and used to perform work in various production and transportation processes. After the work has been performed, the exhaust air escapes into the atmosphere from the exhaust outlet of the compressed air tool or the drive cylinder. This exhaust air is usually still compressed and contains an amount of energy, which should not be underestimated.

EARS® ("Exhausted Air Recycling System") enables the utilization of the (normally) wasted exhaust air energy by returning this to the intake side of an air compressor via a return pipe system and a patented manifold system. Because of this, in a typical work cycle the compressor compresses almost twice the volume of air and therefore increases the volumetric flow by up to 80%. By means of this EARS® modification, the rate of delivery of a particular compressor can be increased, allowing more work to be done, or dramatically shortening the recovery time for the storage tank. An EARS® compressor with a motor power of 15 hp produces the same rate of delivery as a conventional 25 hp compressor and therefore achieves electricity savings of up to 40%.

Our compressors make more efficient use of the energy consumption, resulting in faster work through higher performance. The equipment has a longer service life and the costs of wearing parts and electricity are reduced.

Why EARS®?

Improved Industrial Safety

Every year about 10,000 employees suffer from noise induced hearing loss*. Industrial noise reduction therefore has a high priority and must start at the source of the noise.

The same applies to hazardous substances in the exhaust air: Inhalation of dirt and dust, or even oil particles from the lubrication of compressed air tools is annoying in the short term and is a long-term danger to health. Here, the closed circuit of the EARS® System makes a decisive difference: Because the exhaust air is fed back to the compressor, it does not contain any hazardous substances which are emitted into the atmosphere. At the same time, the noise level is considerably reduced, which makes the workplace cleaner and quieter.

Optimized Compressed Air Processing

The closed system facilitates the processing of the compressed air. Production of condensation and separation of liquids are drastically reduced. The air which circulates is always clean and dry and is cleaned after every cycle. Only optimally processed compressed air can guarantee product quality, protect tools and equipment, and contribute to industrial and environmental safety.

* Source: "Technik 1": Noise figures for machines. Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (German Institute for Industrial Health and Medicine), 1998.

EARS® Compressed Air Tools:

EARS® compressed air tools are supplied from the factory complete with an integrated exhaust air adapter. In combination with an appropriate air return hose, this eliminates all exhaust noise. The result is amazing: EARS® compressed air tools are completely quiet and therefore prevent hearing damage, which is often caused by operating conventional tools for long periods without adequate hearing protection. The oil mist, which was originally used to lubricate the tools, but was often released into the atmosphere and inhaled, is now completely returned via the air return hose and separated upstream of the compressor.

CUSTOMER ARE TALKING ABOUT THE EARS® SYSTEM:

"EARS® makes us more competitive because we spend less to do business in our conservative way of saving energy here. It's been one of the best things that we've done in business. I'd probably use two words: buy it. It'll be the best thing you ever did." – Bob Goff

Goff Collision Repair Centers of Wisconsin



EXHAUSTED AIR

The Keys To The EARS® System: The Manifold & Coupling

The “manifold” is a key piece of the EARS® system as it was developed to allow the exhausted air from the air tool to flow into the compressor, forming a closed loop system. The coupling on the end of the air tool makes sure 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.

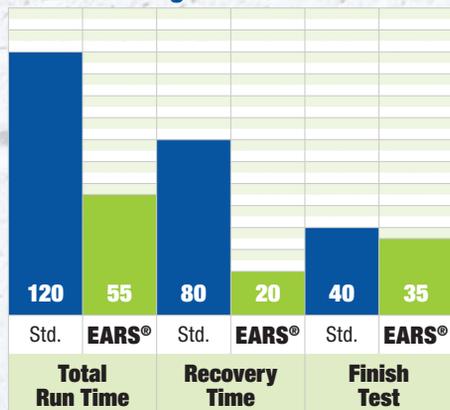
High Performance At Lower Cost

Because an EARS®-fitted air compressor delivers more air volume, a conventional technology compressor with a large motor would be needed to match it. Larger units are more costly and demand more energy. However, by retro-fitting a current compressor with EARS®, you can save up to 40% in energy costs alone. These two features alone allow you to save money on equipment purchases and save money on energy. An added benefit is that your tools and equipment will last longer with the efficiency of the EARS® system. EARS® high performance comes with less energy requirements and increased air flow. Your system will work faster and more efficient with EARS®.

The EARS® System Helps To Keep Humidity & Heat To A Minimum

“EARS®” is a closed loop system, only drawing in ambient air when there is insufficient return air available. By recycling cooler and dryer air from the pneumatic tools (under pressure), the compressor runs cooler, and run times are shorter, decreasing wear and tear. This closed loop operation drastically reduces the moisture content in the compressed air supply. The more you use your pneumatic tools, the cleaner and dryer the air becomes.

Total run time (in sec) of compressor drilling 25 mm brass*



Results of an Independent Noise Test*

	with EARS®	without EARS®	with EARS®	without EARS®	with EARS®	without EARS®
	LAeq dB(A)		SPLF max. dB(A)		C Peak dB(A)	
Impact Wrench						
Free Running						
At operator's ear	69.1	93.1	74.4	97.0	84.2	105.8
3 feet (about 1 meter away from operator's hand)	68.1	96.8	70.2	99.7	82.6	111.9
Working						
At operator's ear	88.2	92.7	97.5	99.9	119.2	120.5
3 feet (about 1 meter away from operator's hand)	80.4	86.9	91.6	95.5	108.0	112.4

Note: Decibel ratings are logarithmic. A 10dB increase is 10 times louder. A 20dB increase is one hundred times louder.

Example: A pneumatic tool that changes from 67 dB to 89dB is 120 times louder.

* Acoustics PTY Ltd., Victoria 3165 Australia, July 2006

Safety & Quality Of The Work Environment

Your facility will have the highest quality of air available, ensuring product quality in operations like paint, longer pneumatic tool life, and more importantly—eliminating the “toxic soup” of conventional compressed air and other airborne contaminants being blown around by the exhaust of conventional air tools. The impact of this closed loop operation on the health and safety of the workers contributed to EARS® winning the Work Safe Trophy for “Best Solution to a Health and Safety Risk.”

* This direct test comparison clearly illustrates that EARS® gives you dramatic energy savings and a much reduced temperature at the air compressor pump.

Clean Air & Less Noise

With conventional compressed air systems, contaminants infiltrate exhausted air and considerable noise is emitted from the air tools. Even when filters and silencers are installed, noise levels can still top 120dB, levels that are hazardous to the operator as well as others in the vicinity. Studies have shown hearing loss at these noise levels can occur after only a few hours.

More than 4 million employed persons worldwide are subjected to dangerous sound levels in the workplace. It has been shown that nearly 10,000 employed persons suffer annually from “noise induced hearing loss”*. Noise reduction in the workplace should be a top priority, and to begin, you need to go to the source of the emission - the exhaust of conventional pneumatic tools.

The contaminants emitted from the air tool are a health and safety risk. Inhaling the exhaust from the air tools can mean breathing in rust, oil, mold, chemicals and fine particles from the compressed air tank and the wear of pneumatic tools.

THE GOOD NEWS:

The closed-loop design of EARS® changes this equation decisively. Because the exhaust air is fed back to the air compressor, emissions of dirty air and noise are eliminated. This dramatically changes the working environment for the better. The workplace becomes a cleaner and quieter place, something we know you will really like!



Increased Efficiency All Around

There has not been such a change to compressed air technology in decades. Today, users of compressed air technology no longer have to settle for the status quo:

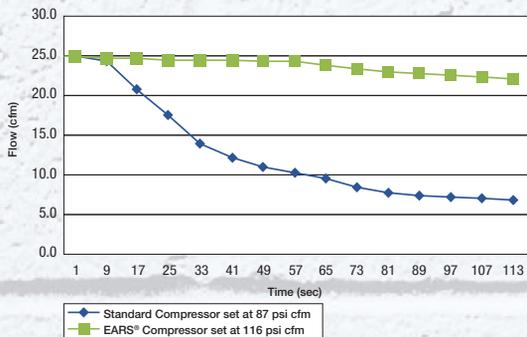
- **The EARS® system provides the answer to the most urgent questions of energy efficiency, climate protection and environmentally friendly working conditions**
- **The EARS® system is an investment in the future that pays for itself today and has clear competitive advantages of conventional compressed air systems**
- **The EARS® system provides solutions for both piston and rotary screw compressors**

The advantages gained by EARS® are easily recognized:

- **Physically, by the operator in the workplace due to productivity gains**
- **Financially, due to reduced energy costs for the company, and environmentally by all**

Whether you invest in an EARS®-ready compressor, or have an EARS® retrofit kit installed on your existing compressor, there is an EARS® system to fit your needs. In addition, leading manufacturers of pneumatic tools, air compressors, fittings and hoses have the right EARS® ready tools for the job.

Flow Rate with and without EARS®



* 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.

EARS® Has The Tools Needed To Do Any Task

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 by the EARS® specialist. The range of compressed air adaptors is continuously updated in order to cover the varied range of compressed air tool manufacturers. This minimizes the requirement to invest in new tools when retrofitting with EARS®.

Test arrangement: 1/2" Impact Wrench (1080 l/min) variable speed drive compressor.

without EARS®	10.0 BAR	85°C
	2.0 HRS	AUTOMATIC
	ENERGY SAVINGS	0 %
	MTR1 POWER	12.9 KW

with EARS®	10.0 BAR	78°C
	2.0 HRS	AUTOMATIC
	ENERGY SAVINGS	35%
	MTR1 POWER	6.9 KW

The EARS® Exhausted Air Recycling System

- Reduces power consumption
- Reduces tool noise
- Reduces airborne contaminants
- Recycles exhausted air into the system
- Reduces the heat at the air compressed pump
- Reduces moisture content in the compressed air system
- Reduces compressor runtimes
- Increases the air volume of current air compressors
- Reduces the overall cost of compressed air systems

With EARS® you get all the benefits of compressed air without the disadvantages. Whether you choose a purpose-built system or a retrofit for an existing system, EARS® can work for everyone who uses pneumatic tools.

The greater the air volumes required, the more "exhaust air" can be recycled and the more energy is saved.

Depending on the local conditions, the effort required for installation and the exploitable air volumes, the system can typically pay for itself within one to three years.

The bottom line:

The EARS® System is an investment into the future that pays for itself quickly. ■



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