



Increase the Energy Efficiency of your Compressed Air System

Compressed air is useful for many reasons; however, it is expensive to produce. The total cost of ownership should be a factor when dealing with a compressed air system.

June 28, 2018

Compressed air is useful for many reasons; however, it is expensive to produce. The total cost of ownership should be a factor when dealing with a compressed air system. Most users of compressed air are surprised to learn over the course of a typical life span of an air compressor, $\frac{3}{4}$ of the total cost of ownership is spent on energy. For example, compressor costing \$5,000 will cost \$5,000 to maintain and \$30,000 in energy to run over 10 years. Because the energy usage of a compressed air system is so significant, here are some ways to help operate the system as efficiently as possible:

Limit use of compressed air

When compressed air is not needed, turn off the compressor. A 20hp air compressor can cost \$175 per week to run 24/7. If a different tool can do the job, use it. It takes a 10hp air compressor to run a 1hp air motor. Battery powered tools have become more durable and less expensive. Worn media blaster nozzles can use much more air than specified. Some inappropriate and potentially dangerous uses of compressed air are sweeping the floor and personal cooling.

Turn down the pressure

Many times, when a problem with an air tool occurs, the first solution tends to be 'turn up the air'. Plants often run at a higher pressure than needed. For every 2 psi the pressure is lowered, 1% of energy can be saved. To turn down the pressure from 120 psi to 100 psi saves 10% power! Adding receiver tanks and shortening rubber air hoses can solve low pressure problems allowing the system air pressure to be lowered.

Use the heat

The laws of thermodynamics dictate 85% of the energy used for compressing air is rejected as heat. The heat can be recovered in many useful ways. The cooling fan outlet can be ducted to provide space heating. Liquid cooled heat exchangers can be plumbed into warm water for boiler pre-heat or any number of other applications.

Perform regular maintenance

All rotating equipment requires periodic maintenance. Regular fluid and filter changes maximize longevity and uptime. At the time of service, a skilled technician can make adjustments to fine tune energy efficiency and keep set-points in the designated range. In addition to performing maintenance on the air compressor, the dryer, filters and drains should be checked for proper operation and efficiency.

Fix leaks

Most compressed air systems can become more efficient by repairing leaks. Leaks can account for 20% or more of system demands. A leak repair program is helpful to identify, repair and verify repairs. A 3-part leak repair tag is generally used to document the process. Replacing rubber hoses and quick connects are the easiest repairs. Large air cylinders or banks of solenoids can be more difficult. A formal leak audit performed with an ultrasonic leak detector can identify, quantify and prioritize leaks to be repaired. An ultrasonic leak detector can be used in loud environments where leaks cannot be heard.

Optimize air piping

Many compressed air systems are run at higher than ideal pressure due to problems with the piping system. Ideal systems have a 'ladder' or 'ring' style piping system

resulting in low pressure drop. Other items to consider are restrictions from flex hoses, extra or clogged filters and excessive use of splitters on manifolds.

Buy a Variable Frequency Drive (VFD) compressor

Every new car buyer considers efficiency or miles per gallon (MPG) when purchasing an automobile. The Compressed Air and Gas Institute (CAGI) set an independent testing standard to compare air compressors of from different manufacturers. The efficiency measure is kW/100CFM. New VFD compressors have the highest efficiency over a wide range of flows. A VFD allows an air compressor to slow down when demands decrease. Older types of compressors use less efficient 'inlet modulation' or 'load-unload' controls to maintain plant pressure. The VFD is the most efficient control system over a broad range of flows. Compressor manufacturers publish CAGI data sheets to allow the comparison of specific machine efficiency.

Call your local utility company

When the time comes to purchase a new compressor, many power companies or other organizations offer significant financial incentives to help purchase new, energy efficient compressed air equipment. With the help of calculation tools and monitoring equipment, an estimate can be provided to calculate energy savings and payback to upgrade the system. Simple paybacks of 1-2 years are not uncommon for upgraded compressed air systems. Depending on system size and variability, the effort and detail required to secure incentives may vary. Many incentive programs require enrollment before purchasing equipment.

For more information or any questions, call us at **(503) 639-0808**.