

Compressed air



Compressed air is widely used throughout industry, accounting for about 10 percent of industrial electricity consumption and making it one of the most expensive industrial utilities. Regularly checking air compressors can reduce electricity consumption and avoid costly decreases in compression capacity.

Leaking air compressors waste energy and money, and result in lower system pressures that may cause equipment to operate inefficiently.

In a typical plant, air compressors which have not been well maintained will generally have a leakage rate of at

least 20 percent out of its total production capacity. Air loss can be improved by more than 10 percent by detecting and repairing leaks.

Fixing leaks can be as simple as tightening a connection or replacing faulty sections and fittings.

Detecting air leaks

1. Check for escaping air
 - Shut off all equipment and start the compressor.
 - Listen for air escaping around the plant to identify leaks.
 - If there are no leaks, the compressor should not run at all

once it has reached the required pressure.

- The test should be done on weekends or when it won't interfere with the plant's operation.
2. Compare energy consumption
 - Monitor the energy use of your air compressor(s) when your plant is idle and no air-driven equipment is being used.
 - Compare energy consumption during idle periods against operating periods to see how much energy is saved.

3. Tag leaks

- Establish a maintenance program using compressed air leak tags.
- Tag leaks as they are identified so it is easy to find and repair them.

4. Use an ultrasonic leak detector

- Ultrasonic leak detectors cost less than \$1000. These hand held detectors scan for leaks, heard through a headset.

Measuring air leaks

Measure air leaks when the plant is shut down and background machine noise is minimal. Measure the proportion of the time in which the compressor is loading over a cycle:

Air leakage = compressor capacity x time loaded / (time loaded + time unloaded)

For example, for a compressed air system with a capacity of 100L/sec, loaded for 10 minutes and unloaded for 30 minutes within a cycle, the air loss is calculated by:

$$\begin{aligned} \text{Air leakage} &= 100\text{L/sec} \times 600\text{sec} / \\ & (600\text{sec} + 1800\text{sec}) \\ &= 25\text{L/sec} \end{aligned}$$

Air pressure

Leaks and drops in air pressure cause an increased pressure supply requirement to compensate for air loss, keeping compressors running longer than is necessary. Minimising leaks and drops enables the compressor to match pressure to system demand, thereby reducing energy costs.

If more air pressure is needed, first try to reduce pressure drops and leaks. Remove unused compressed air lines and separate equipment with a valve to help reduce pressure drops.

Air temperature

Save energy by reducing the temperature of the intake air. Energy is reduced by one percent for every three degrees reduction in the intake temperature. Ducting fresh air from outside, particularly from the south side of the building, will help reduce the temperature and will pay for itself in two to five years.

Control the flow

Air compressor systems are typically sized to suit maximum demand. Therefore, a control system is generally needed to reduce output during times of lower demand.

Shutting down unnecessary compressors creates substantial energy savings. Timers can be used to turn off compressors after production is finished, or a Variable Speed Drive (VSD) to match the motor speed to the actual compressor load can be installed.

To determine the type of control to best suit your situation, contact an air compressor control supplier.

Compressed air is sometimes used when other energy sources could be more economical. For example, consider using a blower or fan for cooling, drying and cleaning rather than compressed air.

Consider using the waste heat from your air compressor to pre-heat boiler feed-water or to process hot water. You could also use a nozzle that draws in surrounding air when using your compressor to move particles or liquid. This can reduce compressed air use by 70 percent.

For more information

- > visit www.epa.qld.gov.au
- > email ecobiz@epa.qld.gov.au
- > call (07) 3225 1999