COMPRESSED AIR SYSTEM EFFICIENCY

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The energy used by a compressed air system is proportional to the* QUANTITY *of air that is compressed times the* PRESSURE. *Energy is inversely proportional to the* EFFICIENCY *of the system. So, to save energy, reduce air consumption and pressure, and increase efficiency.

BEGIN WITH THE APPLICATIONS

☐ **Compressed air is an inefficient power source. It takes about 8 KW of compressor input power to provide 1 KW of power at an air tool. Use compressed air only where it is needed, not just because it is available. For example, use pressure atomizing instead of air atomizing in boilers, explosion-proof electric motors instead of air motors, etc. But, don't forget the safety and other advantages of compressed air.** *Modest to large saving, modest cost, requires engineering of applications*.

☐ **Improve the efficiency of all your processes that presently require compressed air. For example, newer methods of paint application require much less energy than old-style compressed air sprayers. Improving the process may save more energy than all the improvements you can make in the compressed air system itself.** *Modest to large saving, modest to large cost, requires engineering of applications.*

OPTIMIZE SYSTEM DESIGN & LAYOUT

☐ **Use separate compressed air systems for applications that require different pressures. Eliminate the need for pressure reducing valves, which waste large amounts of energy. This requires multiple compressors, but reduces piping.** *Moderate to large saving, moderately expensive, requires careful engineering.*

☐ **Select the most efficient compressors, considering all application issues. For example, screw compressors are substantially more efficient than reciprocating compressors, but filtration of the entering air is more critical. Variable-speed compressors can operate at a lower average pressure than cycling compressors.** *Large saving, moderate to large cost, requires engineering knowledge of compressors.*

☐ **Select compressors that allow efficient recovery of heat, if applications exist, e.g., water heating.** *Modest to large saving, modest cost, requires engineering of applications.*

☐ **Select the most economical prime movers for compressors. Choices include electric motors, diesel engines, gas reciprocating engines, gas turbines, steam turbines, and possibly others.** *Large energy cost saving, may increase or lower equipment cost, requires specialized knowledge of compressors, prime movers, and energy costs.*

☐ **Minimize pressure loss in pipe. Select ample pipe diameter in relation to flow. Don't let heavy air usage in one part of the system starve air from adjacent users. Select fittings for low resistance.** *Modest saving, modest cost, requires engineering calculations.*

☐ **Use storage tanks (receivers) that are large enough to minimize cycling, which avoids excessive peak pressure.** *Modest saving, modest cost*.

☐ **Tailor the amount of filtering and drying to the applications. Both functions consume energy.** *Modest energy saving, eliminates unnecessary cost.*

INSTALL CONTROLS AT AIR USERS TO MINIMIZE WASTE OF COMPRESSED AIR

- ☐ **Install timeclocks or other controls to shut down compressed air systems when they are not needed, e.g., during idle shifts.** *Large saving, modest cost, requires persistence to maintain the controls and adapt them to production requirements.*

- ☐ **Install normally-closed valves for all compressed air equipment. Actuate the valves in the manner that is most efficient for each application. For example, solenoid air valves are an easy way to coordinate compressed air with equipment operation.** *Moderate to large saving, moderate cost, requires controls design.*

IMPROVE COMPRESSOR EFFICIENCY

- ☐ **Substitute a more efficient compressor instead of duplicating or overhauling an inefficient compressor when it fails. If a compressor uses a lot of energy, it may be economical to replace it immediately. When you change a compressor, optimize the system layout at the same time.** *Large saving, moderate to large cost, requires engineering knowledge of compressors.*

- ☐ **Keep intercoolers and aftercoolers as cool as possible. The amount of compressor energy is proportional to the discharge temperature. Install a small fan to cool finned intercoolers.** *Moderate saving, small cost*.

OPERATE & MAINTAIN THE SYSTEM FOR EFFICIENCY

- ☐ **Lower the pressure output of each compressor to the minimum needed to satisfy the applications. Don't set the pressure too low for efficient equipment operation. But, don't raise pressure in response to complaints without investigating the cause of the problem.** *Large saving, minimal cost, requires effective management.*

- ☐ **Eliminate air leaks everywhere. A leak is an energy consumer that never stops. Check for system pressure drop when equipment is idle. Check for leaks at all joints.** *Large saving, minimal costs, requires persistence.*

- ☐ **Replace removable air tool couplings as soon as they start to leak. Install couplings that remain tight.** *Large saving, low cost, requires persistence.*

- ☐ **Where flexible hoses are needed, keep them short and use the largest practical diameter. But, don't interfere with equipment usage.** *Small saving, no cost.*

- ☐ **Keep filters and dryers clean. Dirty filters are obstructions in the system that eat large amounts of power.** *Moderate to large saving, low cost, requires persistence.*

- ☐ **Install efficient drain traps on receivers and other parts of the system where condensate accumulates.** *Small saving, increases equipment life, low cost, requires careful selection.*