7 Keys To Using Air Cylinders

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1. Proper mounting of air cylinders. In order to ensure proper operation and life expectancy of an air cylinder, be sure to design your application with the correct cylinder mounting style. While foot mounted or flange mounted cylinders may be easy to design and install, if there is any chance for an off centered load on the piston rod, a rear clevis mount or trunion mount may provide the cylinder with the alignment flexibility needed to reduce the side load stress on the rod of the cylinder, reducing wear and increasing cylinder life. Be sure to design for off-centered loads applied during cylinder operation.

2. Higher pressures do not always equate to higher speeds. In an effort to increase the throughput of a machine with pneumatic cylinders, the operator may increase the air pressure to the machine, thus increasing pressure and stress to the cylinders while not always increasing cycle speeds. There are two better solutions to this problem. The first solution is to install quick exhaust valves on the ports of the cylinder. This allows the air exhausting from the cylinder to go straight to atmosphere at the cylinder site instead of through the exhaust port of the valve, which could be located far from the actuator itself. The quicker the air can escape from the cylinder, the quicker the cylinder will react, thus increasing cylinder cycle times. If quick exhaust valves are not practical in your application, another way to increase cylinder response time is to locate the control valve as close to the cylinder as possible. By reducing the tubing length between the cylinder and the valve, the cycle time of the cylinder will normally improve.

3. Reduce pressures and reduce costs. Many people operate air cylinders at the same pressure for extension and retraction. Typically, the cylinder is only performing work on one direction. This is the direction where maximum force is required. When returning the cylinder in the opposite direction, maximum force is supplied but not required. If the operator of the machine operates the cylinder with a two-pressure setup, maximum pressure for the working stroke and a reduced pressure for the return stroke, the amount of compressed air being used during the return stroke will be reduced. This will reduce demand on the air compressor and in return reduce the costs of operating the compressor; lowering your operating expenses and extending the life of the compressor.

4. Bigger is not always better. Using cylinders that are sized larger than what is required is not always a good thing. If your application only requires 250 pounds of force and you have access to 100 psi of air, a 2” bore cylinder will

provide the force required (with a 25% safety factor) and use less air than a 2 ½" bore cylinder operating at the same pressure. Determine the true forced required in the application, add a safety factor, and properly size the cylinders to reduce wasted energy and the expense of a larger cylinder.

5. Properly size your piston rod diameter. Properly designed and well-built cylinders offer various piston rod diameters as standard options. In order to prevent cylinder rod buckling or premature breaking of the cylinder rod, it is often best to determine the proper diameter size for the piston rod, given your application. This is easily done by providing application information to your cylinder manufacturer who can then determine which diameter rod is required. Or perform the calculations yourself using reference materials provided from your cylinder manufacturer.

6. Higher forces can come from pneumatic cylinders. The need for higher forces does not automatically mean the use of hydraulic cylinders with expensive, cumbersome, dirty hydraulic valves and power units. Before assuming you will need a completely hydraulic system to perform the work required, look into the use of pneumatic force multiplier cylinders or air-oil intensifiers (booster cylinders). Pneumatic force multiplier cylinders can, as the name implies, use standard air pressures and cleanly multiply the cylinder force to achieve higher output pressures. Even higher forces can be achieved through the use of air/hydraulic booster cylinders which use standard air pressures to develop hydraulic pressures up to 64 times greater than the pneumatic input pressure. Pressure multipliers and air/oil booster cylinders may not be suitable for every application, but before you invest in a completely hydraulic system, it may be a good idea to talk with the application assistance personnel at your favorite cylinder manufacturer.

7. Fail-Safe Operations for Air Cylinders. Some applications require that your air cylinder will move to a "safe" position upon loss of air pressure. Rather than stopping in mid-stroke upon loss of air pressure (through the use of a rod lock), some situations require that the cylinder move to a fully extended or fully retracted position upon the loss of air pressure in the system. This can easily be accomplished through the use of a "Spring Cylinder"; employing either a spring extend or spring retract air cylinder. Designed to normally operate as a double acting air cylinder, a "Spring Cylinder" will move to a fully extended or fully retracted position if the event of air pressure failure were to occur. Special consideration must be given to overcoming opposing forces upon pressure loss and spring compression during normal operation. A qualified cylinder manufacturer should be able to work with you to determine the best design of a "Spring Cylinder" for your application.