COMPRESSED AIR END USES

In our Previous editorials we have been discussing in detail about the ways to analyse the Compressed Air System for Performance Improvements and also on Designing and Maintaining the Compressed Air Distribution System for Peak Performance. With this editorial we will explore the Improvement opportunities that lies within the End Uses.

Compressed Air is used in Textile Industries throughout many processes and applications, such as Pneumatic Controls, Air Cylinders for Machine Actuation, Product Cleansing and Blow Offs. Without a consistent supply of compressed air of the right pressure and quality, the manufacturing process can stop functioning.

Requirements of Pneumatic Cylinders and Valves:

Pneumatic Cylinders:

In the application of pneumatic cylinders, there are two major considerations:

A. Force to be exerted.
B. The Speed at which the piston is required to move.

In applications where force is a major consideration (a.), speed may not be a significant factor, like in job applications such as holding for long periods (Variator Piston in Ring Frame).

This Situation changes dramatically where the speed of piston is a major consideration (b).

> **The amount of air consumed during the actuation is not the same as the flow rate during actuation.** The flow rate must be the value used to size the proper valves,hoses, filters, and regulator for the particular cylinder.
>
> In addition, other cylinders might be actuating at the same time on a piece of equipment and their flows must be considered when sizing the branch piping to feed this machine.

Pneumatic Valves:

> When Selecting valves for air cylinders, an important consideration is their ability to pass the required volume of air at an acceptable pressure drop. This is referred to as the flow rating. A Common method of rating flow is by Cv factor.

Appropriate Uses of Compressed Air:

Make sure that compressed air is the best alternative for the application. Although compressed air can be a very versatile utility, not all applications are best served by it. The Cost of compressed air often is overlooked because of the convenience and ergonomic advantages it provides.

Potentially Inappropriate uses of Compressed Air:

In majority Industries, potential inappropriate uses refer to blow off or cleaning which can be served better by a low pressure blower, an electric motor driver, or a vacuum pump.

Also determine the minimum practical pressure required for the application and use a blower, rather than a compressor, if appropriate.

How to Reduce Wasteful Consumption of Compressed Air:

- **Review and understand the cost of leaks. Repair all leaks, beginning with the most significant.**

- **Implement an aggressive and continuous program of leak detection and elimination to reduce consumption substantially.**

- **Large quantities of compressed air can be lost through improper methods of condensate drainage.**

- **Turn Off Compressed Air Supply at a process when it is not running.**

Stopping the supply of Compressed Air to applications not in operation can reduce the consumption of compressed air. This can be accomplished very easily by means of a solenoid valve in the air supply to each application.

Make Sure the application uses only the required amount of compressed air. Higher than needed pressures and extended cycle times will result in excessive air usage. Open-blowing applications waste compressed air. For existing open-blowing applications, inexpensive energy saving nozzles should be applied unless another practical method can be found.

All parts of a process may not need air simultaneously.

> Where feasible, time significant demands to be consecutive rather than concurrent. A Programmable timer, operating multiple solenoid valves sequentially, may allow this. Analyze the peak and average rates of flow to determine actual needs and whether local secondary storage may be advantageous.

Determine if pressure to points of use is further reduced by FRLs, hoses, valves, or fittings, and if these components are properly sized.

Determine the Cost of Compressed air for each machine or process.

Accurate measurements of air consumption and electrical power allow proper assessment and appreciation of the true cost of operation. This, in turn, can help in management and conservation of available resources.

Are the compressed air supply side personnel involved in process related decisions?

Changes in processes and end uses of compressed air can impact the entire system. Required flow rates and pressures can impact the number of compressors required, their control pressure ranges, compressed air treatment equipment, and the distribution system. Coordination among departments is essential for an efficient operation.

Important to Note:

The above remedies must be followed by a review of the total compressor horsepower in operation and the control settings so that a corresponding reduction in energy is realized.

General Comments on Selecting and Using Valves, Filters, Regulators and Lubricators (FRLs).

1. Pipeline strainers should be installed prior to solenoid valves to protect the valve from pipeline particles, which can become imbedded in the valve seat, prevent positive shut off, and therefore result in leakage.

2. In any intermittent operation, such as an air cylinder, all the components prior to the cylinder must be able to satisfy the air rate-of-flow requirement of the cylinder during the part of cycle when the piston is in motion.

3. Filter bowls should be drained frequently, either manually or automatically. If the plant has air drying equipment, the presence of moisture in the filter bowl should be reported as it may indicate a problem with the dryer.

4. Replacement of Point-Of-Use filter elements should be scheduled as part of routine maintenance.

5. FRLs should be sized according to peak flow demands and not by pipe size. Selection by port sizing could lead to improper operation and poor results.

6. Oversized regulators may provide greater stability of the required pressure at the End Use. Consult with the regulator manufacturers.

7. Install FRLs as close as possible to the point of use, but in locations that are very accessible for inspections and servicing. Reduce the number of elbows and bends in the system.

8. The Combined Total Pressure Drop in the filter and lubricator should not exceed 3 psi.

9. Do Not Use the complete “Standard” available lengths of Pneumatic Hoses when only a short length is required.

10. Pneumatic Hoses that are too long or too small in diameter, often are the primary causes of excessive pressure drops.

Quick Disconnect Fittings or One Touch Fittings:

Quick Disconnect fittings often are bought from a catalog on the basis of first cost, without any determination of the pressure loss that will result from their intended use. This proves to be very costly in the long term. Outward appearance is not a good criterion. Tests of disconnects having a similar appearance have indicated a pressure loss as low as 1 psi and as high as 20 psi and where coupling halves were not matched, as high as 40 psi.

Select Quick Disconnect Fittings on the basis of:

A. **Energy Savings:** Low Pressure drop for the required peak rate of flow. With Otherwise similar quality and performance, select the quick disconnect with the highest Cv for the required peak rate of flow.

B. **Quality:** Sturdy, durable construction preferably metal to provide years of trouble free operation.

C. **Performance:** Ease of connections of the coupling, leak free operation over the life of the coupling.

The Above article is part of the Best Practices Training Manual of Compressed Air Challenge. The author can be contacted in the below address

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