WHAT IS A COMPRESSED AIR AUDIT?

A compressed air audit, done by qualified professionals, will indicate the opportunities an organization has to increase efficiency and save money on energy costs by examining the air supply and demand. According to the U.S. Department of Energy, on average up to 50% of the energy it takes to run one 100hp air compressor is wasted!



WHAT TO EXPECT FROM AN EFFECTIVE COMPRESSED AIR AUDIT

Air systems have a supply side and a demand side. For optimum performance, we want the supply-side compressors to produce and store air at the highest necessary pressure. On the demand side, we want to run at the lowest effective pressure at each process. A good compressed air management program looks at the entire system. It recognizes interconnectivity to optimize compressed air energy cost to the corresponding productivity. Any program that does not deal with these areas on a continuing basis will not be effective nor have any permanent positive effects.

One important component of any compressed air program is employee education and awareness. Every employee, from management to machine operators, should be made aware of the costs of air usage and waste. Company newsletters should include a column on air use. Employees should be encouraged to report air leaks. Machine operators must remember to turn off the air supply to idle equipment and to report any air-related problems.

A few items that are common in a compressed air audit:

1. Critical pressure applications inspected
2. Piping system meeting flow requirements
3. Energy storage
4. Testing of system capacity
5. Evaluate performance and operating condition of existing supply side
6. Maintenance approach that meets demand requirements
7. Financial evaluation
8. Future planning
9. Best operating compressed air format/practices
10. Drawings, diagrams, and other documentation

Before an audit can take place, there are some tasks to be considered by the requesting company to ensure a successful audit:

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1. Select an appropriate time for audit site work – normal production hours.

2. Meet with plant personnel to discuss problem items and priorities

3. Installation of instrument taps in multiple locations

4. Plan to stay with the auditor for the entire audit

Every aspect of the compressed air system needs to be checked to ensure all complications are identified – leaks, dust collection, rust, equipment misuse, poor piping, pressure issues, etc. A comprehensive approach analyzes the complete system from inlet filtration to point of use. If you follow the recommendations from the audit then it will likely have a quick return on investment.

"INITIAL CONSIDERATIONS"?

Compressed air system reviews can incur costs in the mid to high four figures or low five figures. However, paybacks are often measured in months — not years. These audits allow development of longer term follow-up opportunities that continue to reduce the operating cost. Some plants recorded cost reductions of up to 80 percent.

Some companies look at energy expense as a variable cost the production energy costs saved with a well-managed and well-controlled compressed air system represents a reduction in fixed costs. The reason is that as the electrical usage goes down, production stays the same or even increases.

A $100,000 energy reduction will have the same net income effect as $2,000,000 in sales at a net 5 percent margin.

Expect an effective plant air system survey or audit to reduce air demand and power costs from 25 to 50 percent almost immediately. Below are some frequently asked questions and issues about what drives energy costs in compressed air systems found during a survey:

- Is it leaks?
- Running excessive pressure?
- Lack of air-saving devices like venture nozzles, air curtains, and the like?
- Producing high-pressure air only to use it at low pressure?
- Poor selection of air supply equipment?
- Poor selection or application of compressor controls?
- Poor selection or application of filters, dryers, connectors, and regulators?
- Poor air receiver placement?
- Incorrect piping?
- Poor selection of compressed air to do the job compared to an alternate energy source?
- How can you compare relative costs if you don't know the cost of compressed air?
- Or, all of the above?

The truth is that it is usually "all of the above," plus others.

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The survey must provide a quality overview of the compressed air system at a cost commensurate with the system size, complexity, and potential recovery. The survey could potentially generate both short- and long-term plans to establish basic control and management of the air system.

Focus on what is needed to pull together the interrelated parts of the system, and allow the user to understand the “basics” of these parts and their relationship. Create a general guide you can follow to continue to increase the efficiency of the system. Identify specific programs and actions to be implemented with estimated costs and payback. Develop a full sustainability program to include basic plans for expansion if required.

THE SUPPLY SIDE

Evaluate the suitability of the existing air compressors as to the application and the general performance and condition (without disassembly or mechanical work). The report should address the efficiency ratings, suitability of unloading controls, and capacity for translating lower air demand into lower power cost. If required get the facts about the potential for modification. These include: the capability for system sequencing; the installation and support systems, like cooling water and ventilation; and general advice on alternate types of equipment and controls that may be preferable or more power efficient.

Also, expect an evaluation of the compressed air treatment equipment. This includes: installation, general apparent conditions and performance, the suitability for application, the general effect on efficiency and energy costs. These factors along with effect on production and quality issues. Specifically, look for data on the following:

- For the aftercooler, you want to know about the effectiveness it has for delivering 100°F in the hottest ambient temperature. If not, then determine the possibility of using auxiliary coolers at the dryer inlet. You’ll also want a critique of the installation setup to the dryer.

- Be sure the dryers and filters are suitable for the application with respect to sizing, efficiency, pressure drop, and the controls. Learn about possible modifications that would improve performance and efficiency. Are the auto drains applied correctly? Is the sizing and installation correcting to meet the most extreme ambient temperature?

When looking at a Receiver:

- The supply-side piping between the compressor and the system storage vessel should be evaluated for suitability, efficiency, and pressure drop. Finally, the placement of the air receiver should be consistent with good practices for control, storing dry air, and its ability to function with appropriate storage to offset capacity control response lag.

- It is vital that the operating control band for the compressor capacity controls includes the primary dry air storage for the production area to ensure the control is operating in relation to actual production. This is not in relation to false signals from internal piping and other pressure spikes.



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An effective review or audit will evaluate all the compressed air generation, treatment and air distribution to the production area. It does not have to recommend new equipment but should identify any operating energy cost benefits currently available, and/or generic alternates for future considerations.

EFFECTIVE AUDITING REVEALS SIGNIFICANT SAVINGS

During an air audit when the supply side is reviewed and modified as required to achieve controlled and monitored operation for continued sustainability, performance should remain optimum unless improper changes are made.

As an example, a Midwestern plant had twenty-two 300-hp, lubricant-cooled, rotary screw compressors all running simultaneously . A previous audit had them all at full load and recommended three additional units. Plant personnel also felt all the units were at or near full load, and additional units would be required.

A second professional system analysis revealed that several units were actually at no load, and all the other units at part load. Reconfiguration of the piping allowed the plant to deliver the same airflow at the same pressure with only 11 units. This resulted in annualized energy savings of $800,000/year with 6 months simple payback.

Compressed air is not free, but it can be less expensive and more reliable with a proper systems analysis review and management program. Learning to manage and maintain your compressed air system now will save you time and money in the future.