

SITE SAVINGS GUIDE

Compressed Air

Walking Your System For Energy Savings

Sometimes energy savings opportunities are staring right at us – we just don't recognize them!

Take this guide with you on a tour of your compressed air system to help you see opportunities.

And remember - **Compressed air isn't free!**

Instructions

As you walk through your system, answer the questions and check the radio buttons. Empty boxes and unchecked buttons may be opportunities for energy savings.

System Basics

The following information will help your coach identify and quantify your opportunities.

QUESTION	ANSWER	EXAMPLE
How many air compressors do you have?		3
What is the total nameplate horsepower?		300 hp
Average operating HP of compressors:		200 hp
Cost of electricity in cents per kWh (if known):		6.5 cents
Typical line pressure (after filters and dryer):		85 psi
How many variable speed compressors?		1
How many refrigerated or desiccant dryers?		3 refrigerated 0 desiccant
Estimated annual compressor electrical cost (to be completed by your energy coach):		

1 Pressure Limiting User

*What is your pressure limiting user?
This is the user that requires the highest pressure.*

ANSWER

What machine, tool, or operator notices a drop in pressure first? This is your pressure limiting user.

ANSWER

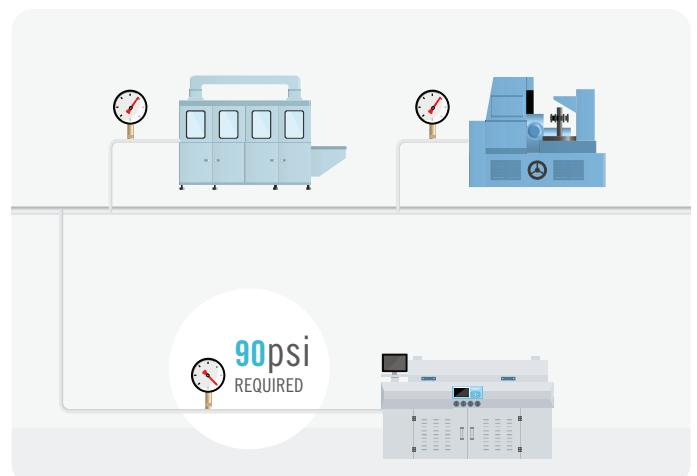
What pressure does it require?

ANSWER

- Check or install a gauge near this user.
- Discuss pressure and performance with operators.
- Learn the details of this user. Helping this user could save you thousands per year.
- Most users require 60 psi or less at the tool, but losses upstream lead to much higher compressor settings.
- Could the pressure limiting user benefit from a larger regulator? A larger, shorter hose? A dedicated tank?

- Does the pressure limiting user have a dedicated tank?

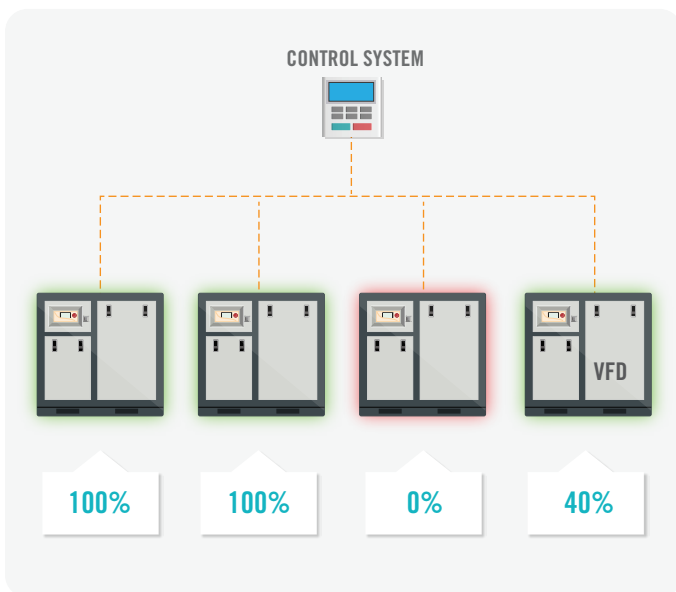
- Dedicated tanks can often "fix" pressure sensitive users and allow for lower compressor settings. (See the graphic in Section 5 to see how this can be done.)



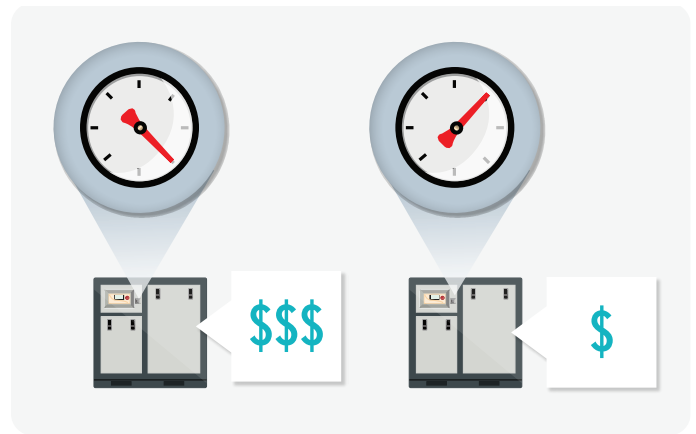
2 Compressor Checks

The goal is to operate only one compressor at part load (preferably a variable speed or Load/Unload compressor). All other compressors should be fully loaded or off, automatically starting and stopping as needed.

- Are all compressors in Auto mode? Compressors left in Hand or Run mode can never shut off or restart on their own.
- Are all compressors in Remote or Sequence mode, being managed by a control system if present?
- Are the shutdown timers set reasonably short, typically 10 minutes or as recommended by the manufacturer?
- Are fixed speed compressors using load/unload control, if possible?
- Are variable displacement controls checked regularly for proper function? These controls can get stuck and are often not shown on the control panel.
- If a variable speed compressor is present, is it usually operating below max speed? Are other compressors at full load or off?
- Is the entire compressor system powered off when the plant is down on nights, weekends, and holidays?



Some screw compressors should work at full capacity while others are off and one is at part load.

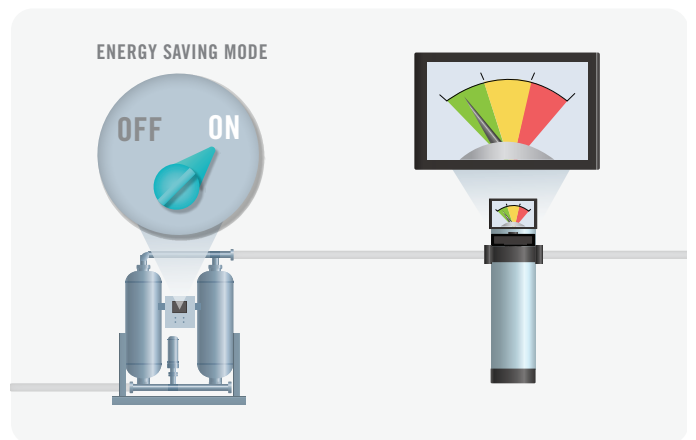


3 Compressor Pressure Setpoints

The goal is to operate at the lowest possible compressor discharge pressure that gets the work done in the plant.

Reducing discharge pressure by 2 psi saves 1% power for screw compressors.

- Reduce compressor setpoints by a few psi per week to find the pressure limiting user. Raise the setpoints slightly to keep this user happy.
- For load/unload compressors, does the sump pressure fall to about 25 psi when unloaded? Sump pressure determines compressor power.

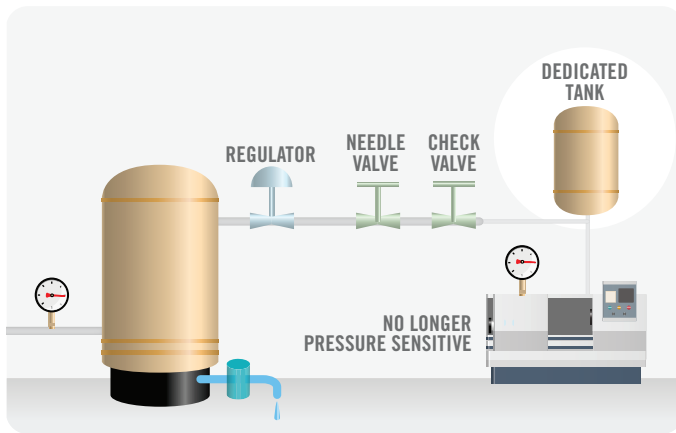


4 Filters & Dryer Checks

- Are desiccant dryers using their energy saving features (if present)?
- Has the desiccant been changed within the last 3 years? Typical life is 3-4 years.
- Is the dryer delivering an acceptable dewpoint?
- Is the total pressure drop across the filters and dryer reasonable (2-6 psi)?
- Are filter elements changed on a schedule?
- Do any filters show high differential pressures (over 3 psi)?

5 Tank & Condensate Drain Checks

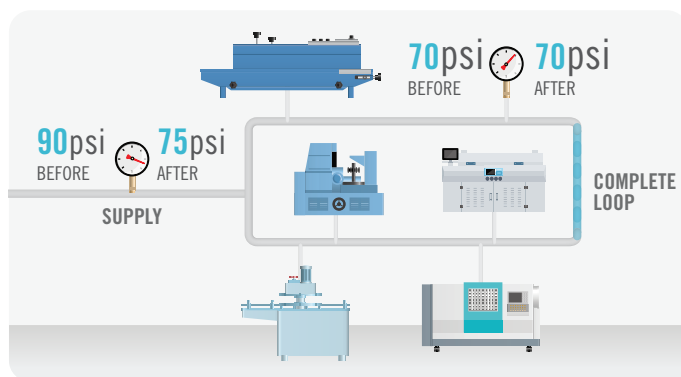
- Do you have large primary tanks near the compressors? These will stabilize air pressure, allow for lower pressure settings, and allow for more efficient compressor control methods like load/unload.
- Are the timer drains adjusted reasonably? Are they blowing minimal excess air?
 - Timer drains can cause a compressor to start or keep a compressor from shutting off.
- Can you upgrade timer drains to zero loss drains? These take no air from the system.



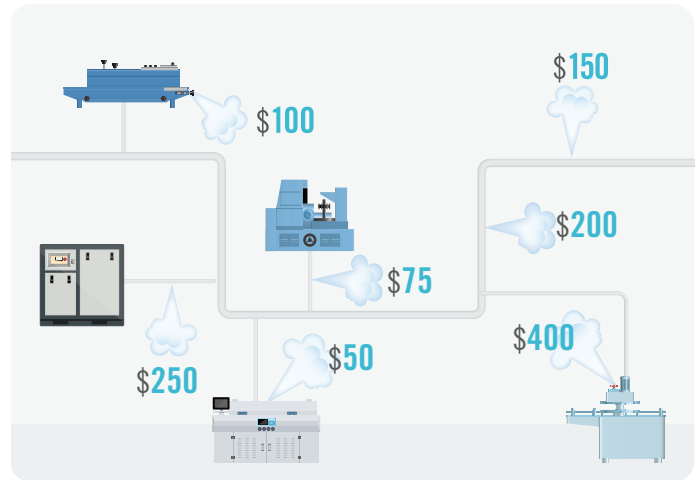
6 Piping

Check trusted gauges near the compressor room, and at the far end of the plant.

- Trusted gauges show less than 5 psi loss throughout the plant.
 - Some plants have grown but rely on old piping that is now too small. Piping loops can sometimes be created by connecting the ends of headers, allowing air to flow both ways to a high demand user, reducing pressure drop.



The “before” system had 95 psig air at the compressors, and 70 psig at the far end of the plant. By completing the loop, the “after” system pressure at the compressors can be reduced to 75 psig, while still maintaining the same 70 psig at the far end of the plant.



7 Leak Repair

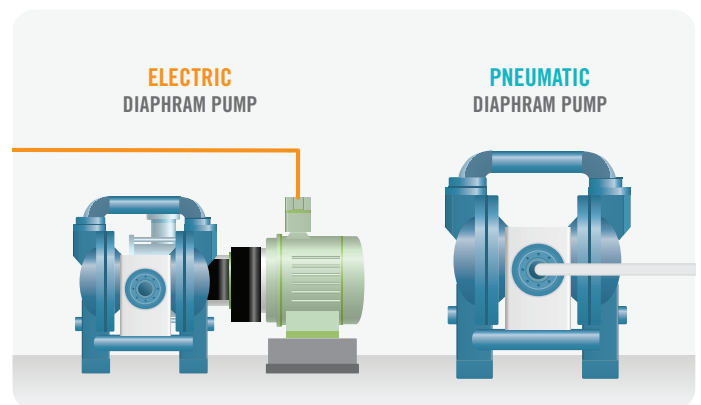
What is the plant's approach toward leaks? Do you fix leaks as they are found, perform periodic leak sweeps, or ignore leaks as long as possible? Leaks you can't even hear can cost \$50 a year.

ANSWER

- Use an ultrasonic leak detector or hire a compressed air vendor to tag leaks. 30% leak flow is common and avoidable.

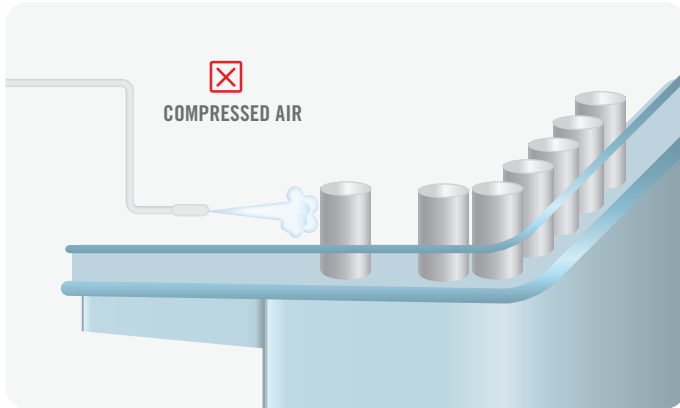
What capacity does your compressor run during plant outages to feed leaks?

ANSWER



8 Pneumatic Pumps & Vibrators

- If the run time approaches 30%, consider replacing pneumatic diaphragm pumps and vibrators with electric diaphragm pumps and vibrators.
- Add controllers to diaphragm pumps to reduce air consumption.

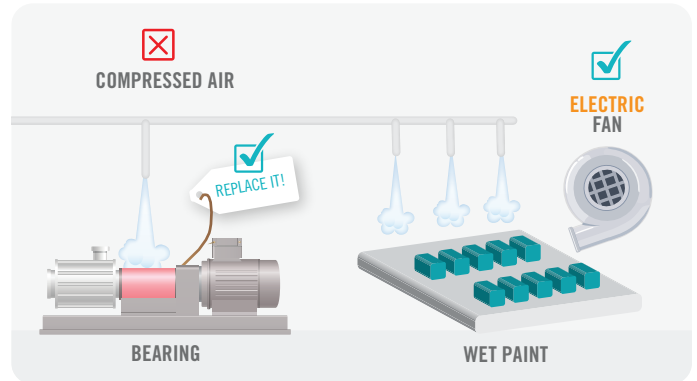


9 Packaging Lines

- Are you using compressed air to help empty containers through a packaging line?
 - Open air tubing is sometimes zip tied to blow packages over troubled spots.
 - A ¼" tube at 60 psi can cost \$1,000 per year in power.
 - Fix or replace the guides and shut the air off.
 - If nothing else works, add a regulator or needle valve and reduce flow as much as practical.
 - Add a sensor and only blow air only when a container is present.
- Are packaging lines (and similar equipment with many compressed air users inside) isolated from compressed air when they are down? This stops all of the small internal leaks.
- Are idle packaging lines still consuming air to create vacuum, keeping a container in position?

10 Cooling and Drying

- Are you using compressed air to cool parts or a motor bearing? Replace that motor bearing or install a fan.
 - Cooling and drying are low pressure users that can often be replaced with a fan system using much less power. If nothing else, add an engineered nozzle to entrain surrounding air and reduce compressed air consumption. Engineered nozzles are good for reducing air consumption in a cooling or drying applications.

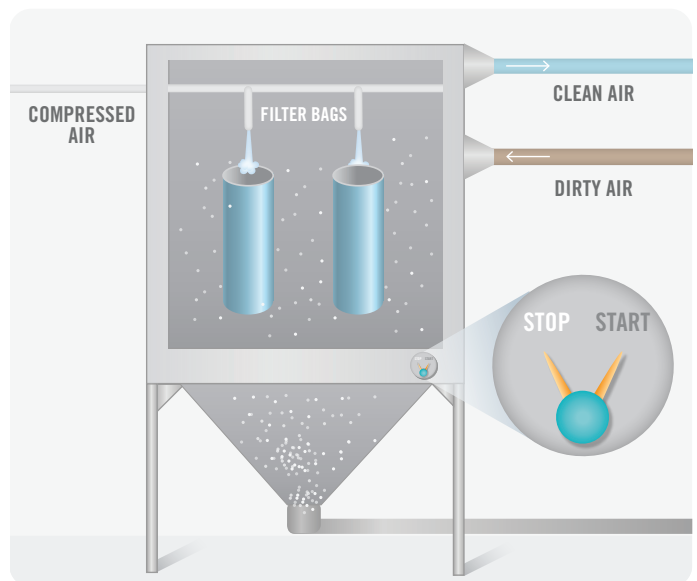


11 Demand Filter & Baghouse Cleaning

- Does the baghouse have demand-based controls?
 - Many baghouses pulse the bags with compressed air continuously. Pressure based controls can start and stop bag cleaning based on need.

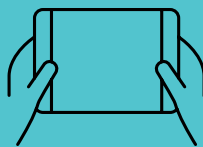
If you have demand-based controls already, are they active or bypassed?

ANSWER



What did you find?

- 1 write down what you found
- 2 take a photo of each page with your phone
- 3 send to your coach



YOUR NAME _____

FACILITY _____
