How to Improve the Compressed Air System at Your Glass Manufacturing Plant

Ingersoll Rand

How to Improve the Compressed Air System at Your Glass Manufacturing Plant, or Design a New, More Efficient One

On the surface, a glass manufacturer's goals for its compressed air system seem straightforward: provide 100% oil-free, contaminant-free air while providing maximum efficiency, uptime at a minimal cost.

Achieving those goals, though, requires careful planning and a skillfully executed plan for the compressed-air solution. Glass manufacturers have specific requirements for compressed air as a critical process utility, that are not easily met. They require a continuous supply of air for fluctuating demands. They need low-pressure and high air flow for bottle-blowing and medium-pressure airflow for instrument air.

With compressed air technology advancing significantly during the last 10 years, installing new systems can often save you more operating costs than continuing to extend the service life of older, high-maintenance ones.

But how do you decide whether to keep giving your glass plant's air compressor the tender loving maintenance care it needs to keep running or pave the way for new technology designed to optimize energy consumption?

Step 1: Assess the Existing Equipment

"If you can't measure it, you can't improve it," or so the saying goes. So, the first step is to assess the current performance of the glass plant's existing equipment and air distribution.

- **Is the equipment reliable?**
- **What is the cost of current or anticipated maintenance or repairs?** Newer equipment is often able to offer ease of maintenance at a reduced cost and more uptime.
- **Is the current equipment efficient?** Advances in air compressors, air treatment, and controls can yield sizable reductions in energy consumption. If the current equipment is nearing the end of its service life and will require an overhaul or airend replacement, and that cost has to be weighed against the cost to upgrade to newer, more efficient equipment.

Step 2: Conduct a Compressed Air Assessment

Partner with a compressed air solution expert to conduct a complete system assessment. That's essentially an energy efficiency audit program that identifies areas of improvement to get the most out of your plant's existing equipment.

Such assessments can yield up to a 20% improvement in operating efficiency and a 24% reduction in energy consumption. A recent audit of a large glass bottle manufacturer led the organization to install a new system to meet the plant's increasing production demand. The energy profile of the new system saved them nearly £271,000 per year in operating expenses.

An expert assessment can provide insights into several parameters, including:

- Actual performance, both on standalone compressors and on compressor combinations
- Energy consumption
- True airflow production, verification of air demand versus air supply
- Variable events throughout the production day
- Air leaks, prioritized in order of their severity
- Performance compared to its original design specifications
- Air and energy wasted during blow off cycles

Step 3: Check to See if Your Current Compressors are Equipped with Automated System Controls

Do the air compressors you are using at the glass plant have automated system controls? Using controls will help you maximize the performance of your compressed air assets and thus drive energy and cost savings.

Because glass manufacturers require a wide operating range, having automated system controls on your air compressors can help:
• optimize the response of the compressors operating setpoint to process changes
• load and unload, start and stop, and modulate multiple compressors as needed to share the load and fulfill the air demand in the most optimal way
• provide total control of your air compressor system
• avoid the blow off of compressed air
• maximize the efficiency of the entire compressed air system
• lower the cost of air for glass manufacturing plants

There aren't many excuses left not to use automated system controls. It should definitely be on your specification list if you are planning to design and install a new, more modern air compressor system.

In addition to optimizing your compressed air system's performance, automated system controls will just simply make the responsibility of managing compressors at the plant easier and smoother so your operation can keep the meeting its output numbers.

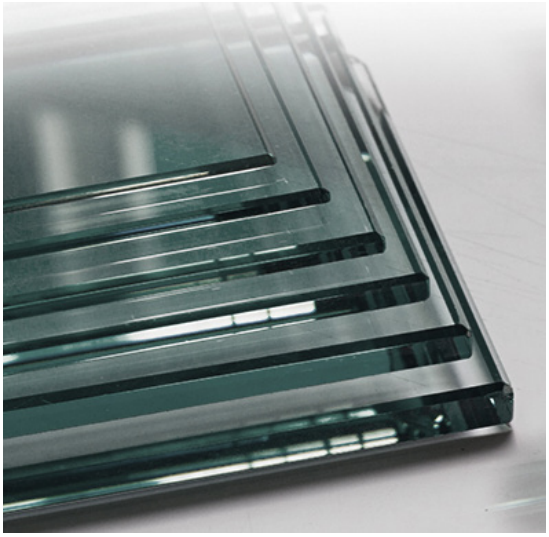
Step 4: New Equipment May Be the Answer

If your assessment points to the need for new equipment to either replace legacy equipment or integrate with it, or if your system doesn't have energy enhancing features such as automated and controls and load sharing, it may be time for new equipment.

To manage the overhead costs in glass manufacturing it's imperative to understand the cost of power over the life of the compressor. The cost of energy over the compressor's lifecycle will dwarf the initial acquisition (capital) cost.

Consider a centrifugal compressor with a life of 30 years (it is not uncommon to find centrifugal compressors still installed that have been running since the early 1980s). Just two to five years ago, a typical 7,500 cfm compressor discharging at 125 psig would likely require 1500hp of power at full flow.

A new centrifugal compressor on the market today will generate the same flow and pressure but only consumes 1400hp. Applying typical costs for energy and extending it over the 30-year lifespan and that 100hp in continuous power consumption savings translates to more than $1,000,000 in savings.



Step 5 : Air Treatment May be Wasting Energy

Some older technology air dryers can waste energy, and there are new ones that re-use the heat from the air compressor to dry and heat the air more. Heat of Compression (HOC) dryers use the heat of air compression to regenerate the desiccant.

Via its compressed air audit, the glass plant previously mentioned found that the system's vacuum-regenerative dryers were wasting electricity. Replacing them with heat of compression dryers eliminated about 88.5 kW/hr, saving an additional £62,020 per year, driving the total potential cost savings for that plant's high-pressure system to £174,848 per year.

Step 6 : Start with a Total System Solution if It's Time for New Equipment

It's important to factor in the plant's base and peak compressed air demands before installing a new compressor system to know what the real demand is you are designing for.

From there, you can partner with a compressed air system expert to create a comprehensive system solution at the outset that includes dryers, condensate management systems, buffer vessels, system controls, and filtration.

When the system is installed, the parameters are fine-tuned. The settings should be checked and adjusted periodically throughout the compressed air system's lifecycle to verify the equipment is still operating optimally.

Thereafter, the best practice is to conduct compressed air audits annually to inspect for significant air leaks and measure systems performance. On the other hand, controls should be fine-tuned quarterly, if possible, as well as the time of a 4,000- or 8,000-hour scheduled maintenance event.

State-of-the-Art Compressors Purpose-Built for Glass Manufacturing Operations

Ingersoll Rand's multi-stage MSG® TURBO-AIR® NX 5000 is ideal for glass manufacturing, offering best-in-class energy efficiency and the lowest total-cost-of-ownership. Its compressed air quality meets the ISO 8573-1 Class Zero specification to guarantee 100% oil-free air without contamination, and it's designed with ease of maintenance and reliability in mind to offer maximum uptime.

Patented long-life consumables ensure peak performance with longer maintenance intervals and contribute to reduced maintenance costs. Compared to a rotary screw compressor, its centrifugal compressor design has a broad operating range, is more robust, and is easier to maintain.

MAESTRO Universal, Automated Controls

MAESTRO Universal automated controller is a state-of-the-art air control system for managing centrifugal compressor performance. It serves as the standard control solution on the new MSG® TURBO-AIR® and MSG® centrifugal compressors manufactured by Ingersoll Rand. Our engineering team can design a customized MAESTRO Universal controller upgrade for existing compressed air systems. Unique instrumentation packages and monitoring functions are configured to optimize compressor performance for each installation, and, in many cases, existing equipment can be reused to achieve further savings.

Service and Maintenance Programs

There are many options when it comes to the applications you'll use for high-quality air in your plant. You also now understand how to lower operating expenses and boost productivity by employing the Internet of Things in your compressed air solution. Now it's time to look at how to service and maintain your equipment so it can do all the things we've discussed, including increasing worker safety, identifying, and resolving bottlenecks, and gaining insight into even more efficiencies.

With an Ingersoll Rand CARE service program, you can avoid unplanned, unbudgeted downtime and production interruptions.

PackageCARE™
We Protect You

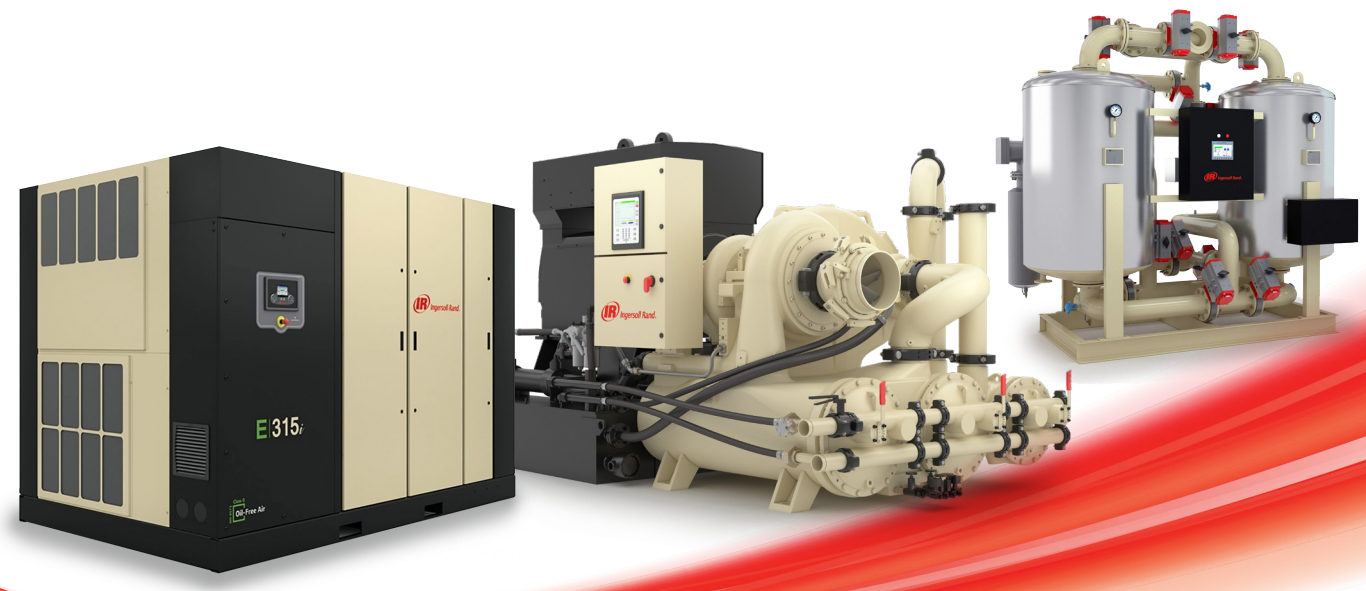
Package Care: We Protect You

- The greatest value for asset management
- Transfer operational risk for up to 10 years
- Includes all scheduled maintenance
- Predictive and analytical tools prevent production interruptions

PlannedCARE™
We Help You

Planned Care: We Help You

- Predictable, on-time planned maintenance
- Preventative diagnostics to catch potential problems
- Up to five-year coverage on major airend components in new rotary compressors



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