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How General Manufacturers Create High-Quality Compressed Air

Ingersoll Rand®

What's Inside

Introduction

The choice can be a bit overwhelming: how do you find a high-quality, reliable air solution that is available when you need it? Your manufacturing operation demands it, but you also have other pressing things to worry about: issues with the supply chain, the economy, recovering from the pandemic, the labor shortage, and more. And now, among everything else on your mind, you have to consider how to design, deliver, and install an air system that is customized to your plant.

As if that isn't enough, you hear more and more about smart connected equipment enabled by Internet of Things (IoT), and how it can deliver, but you don't know how or if it can help you, if it makes your operations more effective, or if it can provide cost and time efficiencies.

There are many decisions to be made when it comes to compressed air solutions and the full lifecycle support programs that could potentially make you more productive. Ingersoll Rand is here to help!

In This White Paper, You Will Learn:

- The types of compressed air solutions available
- How to find service and maintenance programs that optimize the total ownership cost
- How to lower operating expenses and boost productivity
- How to create high-quality compressed air for your facility

Available Compressed Air Applications

Compressed air is an integral part of most manufacturing processes, but it can be inefficient and expensive if not managed appropriately. One challenge is that compressed air is often considered a free commodity so many plant operators don't spend a lot of time thinking about how to manage it. But, by the time air is compressed, cooled, dried, transported, regulated, and then finally used, it is anything but free.

By the very nature of physics and thermodynamics, compressing air is inherently inefficient. The motor that drives the air compressor heats the air, which then needs to be cooled. This requires a fan and an air- or water-cooled heat exchanger. Both of these consume even more energy. Then, once the air is compressed, it has to be delivered at a certain pressure, but as the air is transported, losses occur and inefficiencies arise along the way.

That's why it's important to consider a compressed air solution that takes out the guesswork and provides efficiencies, both in terms of time and cost.

There are seven common applications compressed air is used for in general manufacturing:

- **Power pneumatic equipment and tools**
- **Cooling metalwork and steel**
- **Paint and powder coating**
- **Conveyance**
- **Mixing**
- **Sparging**
- **Aeration**

Here is what you need to know about each of them.

Power Pneumatic Equipment and Tools

Powering pneumatic equipment and tools is the most common application for an air compressor solution. There are several different types of tools and equipment that rely on compressed air to operate, such as impact tools, air hammers, grease guns, or speed saws.

No matter which pneumatic tool you use, moisture is the enemy. When you use dry, compressed air to power your equipment and tools, it helps to maintain their performance and long life.

Cooling Metalwork and Tools

In metal fabrication, a reliable air compressor system is the central power source—it's what keeps production moving quickly and efficiently.

Metal and fabrication both consume a lot of compressed air, whether it is from clamping/unclamping spindles, running pneumatic tools and lasers to activate shear and puncher machines, power punch hole drills, cutback saws, and more.

Compressed air is a quick and easy way to cool machined metals or steel. Very dry air may be required based on the material used for the part and whether it is susceptible to rust or corrosion. Alternatively, if the metal will be painted or powder coated after cooling, it's a higher priority for the air to have minimal particulates and low oil content.

Paint and Powder Coating

When you use paint or powder coating, contaminants can travel through your powder coating gun and onto the part. These contaminants, when heated, will cause issues in the final finish, typically referred to as “fisheyes.”

A compressed air solution that meets the ISO rating for the application will prevent this from happening, as well as keep moisture and other contaminants away from your parts.

Conveyance

Conveyance means that bulk goods can be moved by air through the pipelines. This happens when the flowing conveying air transmits a propulsion force on the bulk material, which then moves it through the conveying line. Because conveying requires a pressure difference between the beginning and the end of the pipeline, a compressed air solution is used.

Mixing

It’s important to promote fast and efficient tank mixing, which can be done with quick bursts of compressed air that are released at timed intervals at the tank bottom. The air is released through a series of pipes that are connected to disks that are attached to the tank bottom. The compressed air is also used to maintain over-pressurization in the tanks to ensure product integrity and sterility.

Sparging

Sparging, or gas flushing, is a method of degassing. It creates a gas that is bubbled through a liquid to remove other dissolved gas and/or dissolved volatile liquid. When sparging, it’s essential to have quality air so it effectively removes the contaminants from the liquids. It also must meet ISO specifications to ensure low levels of solid particulates and must meet moisture level requirements to prevent other issues.

Aeration

Aeration is the process of injecting air into water, typically wastewater, to maintain water quality and reduce algae growth. When compressed air is aerated into wastewater, it helps to remove or reduce harmful particles, such as suspended solids, biodegradable organics, pathogenic bacteria, and nutrients.

Terms to Know

SPARGING
Quality air is essential when using it to remove contaminants from the liquids. Generate air that meets ISO 8573.1 specifications to ensure low levels of solid particulates. The air's moisture content may be a factor to consider as well, depending on the mixture's components.

POWER PNEUMATIC EQUIPMENT AND TOOLS
Moisture is the enemy of pneumatic tools and equipment. Dry, compressed air with a very low particulate count is the best to power point-of-use equipment and tools because it maintains their performance and long life.

COOLING METALWORK AND STEEL
Compressed air is a quick and easy way to cool machined metals or steel. Very dry air may be required based on the material used for the part and whether it is susceptible to rust or corrosion. Alternatively, if the metal will be painted or powder coated after cooling, it's a higher priority for the air to have minimal particulates and low oil content.

AERATION
Injecting air into a process, or aerating wastewater, that matches a wide range of pressures and flow outputs to match your process needs, while mixing chemicals of varying viscosities.

CONVEYANCE
When moving products and conveying bulk material, consistent air power keeps production moving. If the air touches the product in the process, the air should be relatively clean and contain minimal oil.

Lower Operating Expenses and Boost Productivity

Now that you understand the most common applications for high-quality compressed air and how you might use this solution in your manufacturing plant, you can shift your focus to how to lower operating expenses and boost productivity—by understanding how to use a compressed air solution to yield operational gains.

External factors affect the way you use a compressed air solution in your plant. Aspects such as energy, carbon footprint, and downtime risks all play a key part. So does the way you go to market. Of course, all of these things must be considered when investing in a compressed air solution, but so must the ability to use that investment to yield operational improvements.

The new Smart Connected Compressors enabled by Industrial Internet of Things (IoT) allows you to do this in many aspects of your business. The data collected from the equipment provides deep insights into behaviors and performance within your industry. It allows you to look at the data required to drive the highest operational improvements. It provides insights that yield operational improvements and, as you dig further into those insights, additional improvements will become apparent.

To get the most out of your compressed air solution to lower operating expenses and boost productivity, consider the following:

- **Maintenance routines can be planned based on real-time data**
- **Engineers and technicians can be optimized according to the machine schedules**
- **Downtime can still occur, but you begin transitioning from reactive to preventative**
- **Data has high value and can change the way you operate**

With predictive maintenance, you can accelerate your understanding of machine usage and sensor data. Consider the following:

- **You may not have enough data—or good quality sensors. Adequate data is one of the key drivers and sensors have become more intelligent and less expensive**
- **Engineering schedules move forward based on probability of failure**

With augmented reality, connected services and products are overlaid with virtual services. Consider the following:

- **Typical use cases involve products being disassembled virtually for the service engineer**
- **Augmented reality allows technicians to break down compressor without referencing paper-based systems**

Service and Maintenance Programs

There are many options when it comes to the applications you will use for high-quality compressed air in your plant. You also now understand how to lower operating expenses and boost productivity by utilizing and employing the additional data and insights gathers by the smart connected compressors in your compressed air solution. Now it's time to look at how to service and maintain your equipment so you can avoid unplanned, unbudgeted downtime and production interruptions.

Lower cost of ownership, quality results, increased uptime, and efficient energy use all add up to peace of mind.

PackageCARE™: 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

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

Performance Services

Our performance services include electronic, air leak, and system assessments. Whether you need to manage costs, increase reliability, or plan for future growth, our portfolio of assessment tools provides you with detailed diagnostics that give you the proper insights to help lower the total cost of ownership.

System Automation

System assessments often identify waste caused by a lack of adequate controls. Our suite of system automation solutions lowers energy costs and stability pressure.

Create High-Quality Compressed Air in Your Facility

Taking everything you have learned in this white paper and implementing it into your operations may feel a bit overwhelming. As your compressed air solutions partner, we can take the burden off of you, collaborating to design, deliver, and install an air system that is a perfect match for your operations.

We first work with you to identify the air qualities for your applications, including the air's ISO specification: moisture levels and particulate and oil content. Then we design an air system that delivers the air quality, quantity, and power for your manufacturing process. We can also oversee the installation and recommend service and maintenance programs that optimize the total ownership cost.

With various configuration options available such as fixed or variable speed drives, single or two-stage airends, or Total Air System packages, our team collaborates with you to design an integrated, total system that maximizes efficiency and airflow.

We can also help you understand service options and preventative maintenance programs that optimize your total cost of ownership and extend your compressor equipment's lifecycle.

Reliability for Life

- **Generate air in any environment. We offer solutions that operate indoors and outdoors, in compact spaces and extreme temperatures**
- **Enjoy increased oversight with controls you can access remotely. Regulate your air use with compressor controls that monitor critical operating parameters and adapt the system to prevent downtime**
- **Designed for easy serviceability and maintenance, our compressors minimize the total cost of ownership**
- **An extensive catalog of OEM Genuine consumable and replacement parts are available to you to make service and maintenance easy and cost-effective. Genuine OEM parts guarantee a perfect fit and function to the highest quality standards**

There's a lot riding on the quality of your air. Let Ingersoll Rand help you get it right.

Learn More

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