

# MAXIMIZING Compressed Air Energy

By Kathy Scott

## Choosing the right compressor is a crucial decision for plant managers.

Compressors and compressor systems can be the most important purchasing decision a plant manager can make. A 100 horsepower compressor costs anywhere from 30,000 to 50,000 dollars. A plant or manufacturing facility's need for compressed air is undeniable. Choosing the right compressor for your plant's operational needs is vital, influencing productivity, customer service and quality assurance levels.

### ASSESSING YOUR NEEDS

Not all compressors are created equal, nor are all plants' compressed air needs the same. Before looking at the various compressors and compressor systems, there are three key questions that need to be answered:

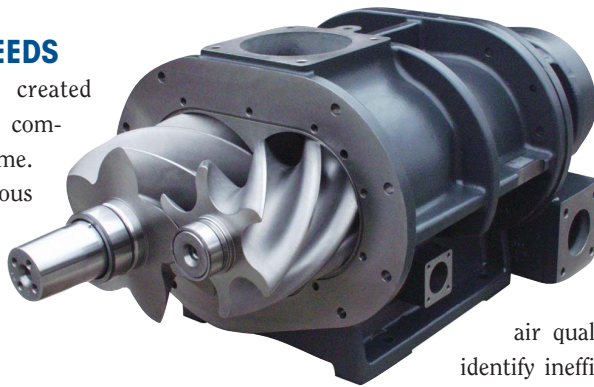
- What kind of Air Quality is required by the tools and functions within your plant?
- What kind of flow or Air Quantity is needed at various peak and off-peak times?
- What level of Air Pressure is needed to service all plant operations?

Air quality is determined by both the dryness and contaminant level necessary to effectively run and maintain systems, tools

and equipment. In general, air quality ranges from Plant Air which is used for products such as air tools; Instrument Air, used in laboratories, for paint spraying, powder coating and climate control; Process Air, needed to process food, pharmaceuticals and electronics; and Breathing Air, necessary for hospital air systems, diving tank refill stations, respirators and grit blasting. You also have to determine quantity and flow necessary for your plant. Most compressor vendors have equipment to help in determining a valid number.

For example, Kaeser, one of the nation's leading compressor manufacturers, uses its Air Demand Analysis (ADA) to monitor flow, power consumption, pressure and air quality. "ADA profiles existing systems to identify inefficiencies and control system issues, or to help manufacturers plan for upgrades and expansions," says Kaeser's Angela Kelly. "Based on these findings, our experts can make recommendations for improvements."

Once flow is determined, be aware that oversized air compressors can be extremely inefficient if not used at full capacity. Multiple, smaller compressors with sequencing controls for off-peak operation times can be more cost-effective. Plants that have wide air demand fluctuations should look



for compressors or compressor systems that can work efficiently under part-load demand as well as peak time.

Process engineers trained in plant operations can establish operation pressure requirements, making sure to take into account system losses from dryers, separators, filters, piping and artificial demand. A plant's load profile should also be taken into account when determining the best compressor based on pressure levels.

## TYPES OF COMPRESSORS

Single- and double-acting reciprocating compressors (piston compressors), once the most common compressor in industrial plants, have been replaced by lubricant-injected rotary screw compressors.

The single-acting reciprocating compressor is smaller and requires little foundation. It is less efficient because it utilizes smaller horsepower. The larger, industrial grade double-acting reciprocating air compressor is water-cooled and requires a substantial foundation.

Rotary positive-displacement compressors (rotary screw compressors), and particularly, lubricant-injected rotary screw compressors are the type most often used in plants that require large air applications. One of the most appealing benefits of this type of compressor is its excellent return on investment, low initial installation and maintenance costs. It requires smaller floor space and is typically less noisy than reciprocating compressors.

Another type, centrifugal compressors, operate at high speeds and are best matched in plants where demand is relatively constant with high-volume application needs. Centrifugal compressors are highly efficient, generally smaller and more compact than other compressors with increasing efficiency as the size increases.

Lubricant-free compressors are typically less efficient than lubricant-injected compressors and are generally considered to have the highest quality air because it is oil-free. This idea is not accepted by everyone in the compressor industry. "We can achieve the same air quality with lubricated compressors as in oil-free compressors," says CompAir's Ross Cicero.

## COMPRESSOR STANDARDS

Since compressor systems can be less efficient at part-load than reciprocating compressors, plant managers should look at different models to determine the best compressor for a given plant and load profile. Fortunately, manufacturers' claims on performance and efficiency can be easily compared by obtaining a Compressed Air and Gas Institute (CAGI) Data Sheet. "CAGI provides an apples to apples comparison and educates the user by rating performance according to CAGI standards," adds Kelly.



## SIX SIGMA OR KAIZEN TO ASSURE HIGH SAFETY PERFORMANCE

Many plant managers are starting to look at better ways to improve their safety performance as well as eliminate unnecessary waste. Some are looking to philosophies and methodologies like Kaizen and Six Sigma to assist not only in focusing in on problematic areas, but also to instill a new culture of improvement and cost savings throughout its workforce.

### KAIZEN PHILOSOPHY

Kaizen is a Japanese word meaning gradual, orderly and continuous improvement. The Kaizen philosophy is built around a corporate culture that encourages ongoing communications and input from all company employees from operators to management. Employees are given tools like training and education to help determine possible areas of improvement with continuous workshops and personal coaching to make sure goals are met.

### SIX SIGMA METHODOLOGY

Six Sigma relies heavily on data and is a highly structured program that also works to eliminate defects, waste and other quality control issues from manufacturing, delivery, and customer service. Six Sigma is driven by statistical numbers that assist in providing better quality control and optimum results – measuring quality standards at 3.4 defects per million.

For more information visit [www.iSixSigma.com](http://www.iSixSigma.com).

Before settling on any compressor, get its CAGI Data Sheet as well as sheets from other similar compressors and match them against one another. Even a small difference between the amounts of compressed air used per kilowatt hour can mean thousands of dollars in savings over the life of the compressor.

Electric companies are also looking for ways to partner with big companies that use large compressor and compressor systems offering compressed air auditing services and rebates for more energy-efficient machines. It is these kinds of resources and opportunities that can make buying a compressor an uncomplicated undertaking.