

Choosing the Right Air Compressor



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CFCM asked three air compressor specialists to explain how to best choose the air compressor that is right for your business.

Bogdan Markiel, DV SYSTEMS, Barrie, ON: Compressed air has over the years become a utility, very similar to electricity or natural gas and is indispensable in safe operation of today's manufacturer. A typical system will consist of: air compressor, compressed air dryer, compressed air filters, condensate filter and air lines (pipes).

When choosing an air compressor we often make the mistake of defining the need by specifying the compressor's brake horsepower, which is only related to how much energy your compressor will use, not how much air it will deliver. What we should do instead is calculate the air consumption rate of our facility and choose the compressor that will deliver the sufficient amount of air. In North America, air consumption is usually expressed in cubic feet per minute (CFM) at a specific pressure, which for the majority of operations is 100 psi. It is very important that we specify the pressure correctly in order not to over pressurize the system. Compressing air generates heat as there is an additional cost associated with each additional psi, for example: using a 145 psi compressor in a system, which would require only 100 psi, would significantly increase the facility's energy consumption.

Most equipment manufacturers provide us with an average free air consumption rate for each tool or machine. Those rates are normally added for each machine being used and the sum will give

us a general idea how much air is needed. Consider using a compressor that is slightly larger than your actual air needs to compensate for possible additions of air

consuming equipment.

Reciprocating compressors use pistons driven by a crankshaft. They can be either stationary or portable, can be single or multi-staged, and

can be driven by electric motors or internal combustion engines. Reciprocating Piston air compressors are typically used in installations requiring up to 100 CFM at 100 psi, their

pressure can be normally set up to 175 psi or higher in special “high pressure” models. A good quality piston air compressor will have low RPM (600 – 850), it will be pressure lubricated – oil is delivered to journal bearings under pressure. It will have good quality valves which are easily accessible and it will be covered with a five year warranty – a good quality piston compressor will last many more years if maintained properly. Piston compressors need to be matched with an adequate air receiver (tank), their duty cycle (how long they operate each hour) is usually 70 – 80 per cent for a heavy duty compressor and much less for splash lubricated units. Piston compressors are an excellent choice for installations with intermittent duty use.

Rotary Screw air compressors are considered the new technology. The smaller, under 50 hp models have gained popularity in the last decades, the larger machines have been used for over a century. Screw compressors range in size from small 3 to over 1200 horsepower. A rotary screw compressor is a type of gas compressor, which uses a rotary type positive displacement mechanism. The mechanism for gas compression utilizes either a single screw element or two-counter rotating intermeshed helical screw elements housed within a specially shaped chamber. As the mechanism rotates, the meshing and rotation of the two helical rotors produces a series of volume-reducing cavities. Gas is drawn in through an inlet port in the casing, captured in a cavity, compressed as the cavity reduces in volume, and then discharged through another port in the casing.

The effectiveness of this mechanism is dependent on close fitting clearances between the helical rotors and the chamber for sealing of the compression cavities. In an oil-flooded rotary screw compressor, oil is injected into the compression cavities to aid sealing and provide cooling sink for the gas charge. The oil is separated from the discharge stream, then cooled, filtered and recycled. It is usual for some entrained compressor oil to carry over into the compressed gas stream. These are usually used for continuous operation in commercial and industrial applications and may be either stationary or portable.

Brad Sparkman, Innovative Finishing Solutions, Brampton, ON: Air compressors have been around for well over 100 years and have as many applications as their tools that use the air itself. The main



reason for their popularity is because air as a resource is safe, flexible, clean and convenient. These machines have evolved into highly reliable pieces of equipment that are almost indispensable in most of the applications they serve. Compressors can come in a wide variety of different types and sizes. Ultimately, as with any tool, air tools and the compressors that power them, have to save the user time and money on any given project. Most compressed air tools are more powerful and typically lighter than standard electric tools or battery powered cordless tools. They are used by virtually every industrial sector from woodworking to automobiles and Aerospace Manufacturing. While there are many types and styles of compressors, they all perform the same basic function, which is to increase the pressure and reduce the volume of a given gas, which in this case is air. Pay particular attention to piping systems that provide energy savings and

laminar airflow when considering a piping solution to deliver the air to multiple locations within your facility. You want to choose a system that does not leak air when you are not calling for air. Compressed air is an expensive investment, so ensure that you select an energy efficient solution for your application. You do not want your compressor to be running when your plant is not.

Jonathan Snook, CompreVac Inc., Mississauga, ON: Selecting the correct air compressor for your facility can be a daunting task; the selection process requires a certain amount of guidance. Make sure that you have trustworthy advice. Select potential suppliers based upon local experience and with knowledge of your particular industry. Questions to be considered include: What pressure do you need to have in your main compressed air header system? What compressed air storage equipment do you have and what may be required? What volume of com-



pressed air is required at this time? What productivity growth expectations do you have for your business? What is your compressed air used for and how clean and dry should it be? Do you require oil free compressed air? Is noise reduction an important consideration? Where would you like to locate your air compressor? What environmental factors should be considered? What is the real cost of ownership after parts and maintenance are factored in? You need at least 115 to 125 psi in your airline, closed loop pipe header system. You also must get rid of as much flexible pipe as possible and ensure that you have equal pressure to your entire facility, supplied via a horizontal fixed pipe system. Storage of compressed air is an important consideration if you want all of your spray guns receiving stable pressure. This is calculated by knowing the volume of air required, (CFM per gun plus blow-off and other uses). It will also determine the ideal capacity of the air compressor.

Fish eyes and blemishes can ruin hours of preparation and lose productivity as well as profit. In most cases, an oil free compressor is not essential and the capital cost can be one-third to twice as expensive as an oil lubricated air compressor. Reciprocating air compressors normally produce more oil carry-over than rotary screw or rotary vane air compressors. However, in most cases, a quality air filtration system, including a coalescing and particulate filter can eliminate fish eyes and blemishes ruining the finished work. At 100 psi, approximately 8 cubic feet of air at ambient pressure and temperature is crushed into one cubic foot. Included in that air is the moisture content of the original 8 cubic feet, which on humid days can be considerable. If that water reaches your spray gun, you are in big trouble. Thankfully, most screw compressors are manufactured with on-board dryers eliminating salesperson miscalculations and ensuring that your dryer is perfectly matched to your air compressor. Dryers can ensure that the air reaching your guns is equivalent to a dry day of +3C to -70C, dependant on the finished quality you desire.

Always select an air compressor that is capable of meeting the needs of your business, in terms of volume of air required, as well as the growth potential. Always ensure that the equipment is serviced properly and on time. Do not permit oily condensate to run into the drains and pollute our planet, always install an oil/water separator. ■