White Paper

Gardner Denver

Compressor purchases: what do you need to consider?

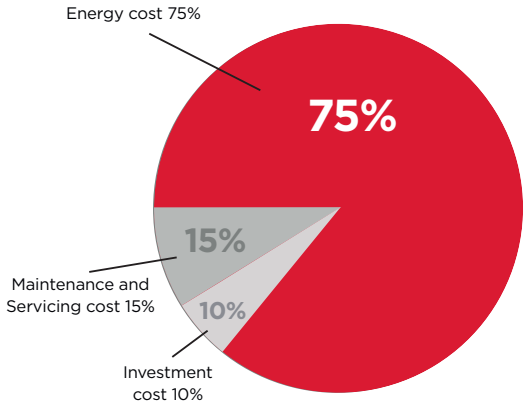
Buying a compressor on more than just principle

Piston or Screw, oil-free or oil-lubricated, variable speed or fixed speed, the latest drive technology or a proven principle?

When it comes to purchasing an air compressor or upgrading your plants existing compressor station, you have a wide array of solutions to select from. This article provides some brief tips to help you make an informed decision. A great place to start is the selection process which should begin with benchmark analysis of, your facilities compressed air demand and your plants requirement profile.

Total cost of ownership

When comparing the prices of different compressor types and brands; energy accounts for more than two thirds of a compressed air station's Total Cost of Ownership (TCO). You need to compare beyond the initial purchase price to the total cost of ownership which includes maintenance and service procurement and energy usage costs. Systems with the lowest sticker price are not necessarily the most cost-effective in the long run.



Do your due diligence

Before purchasing a compressor, a range of figures and facts need to be established for your entire compressed air network. These include the compressed air demand (current and the foreseeable future) , the required compressed air quality and wether the waste heat from the compressor is being added to an existing station, then you also need to consider integration into the control technology.

It is generally advisable to measure the compressed air demand over a representative period of time to determine an accurate profile to be used for compressor solution selection or compressors can be selected.

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Which operating principle?

The decision regarding the compressor design is best left until later in the selection process. Different compressor designs and constructions can result in considerable differences in the TCO. In addition the three "well-known" basic principles of piston, screw and centrifugal there are new operating principles and drive technologies, that were developed with energy efficiency during the selection process.

The design objective of any compressed air system is to provide the needed resources at the lowest possible costs.

Focused on maximizing your return on investment through a new system or by upgrading an existing one, our team of audit experts work with you to determine the most efficient system design.

Energy audit

The Energy Audit from Gardner Denver is proven to be a valuable "tool" for accurately your current needs and compressed air demand. The Energy Audit uses the latest measuring technology and data loggers to record the current state of your compressed air demand along with the load and no-load times of existing compressors over several days.

$14,000

POTENTIAL ANNUAL ENERGY SAVINGS

THROUGH DATA ANALYSIS AND SYSTEM OPTIMIZATION ON A 100 HP SYSTEM

Based on these findings, volume flow and performance measurement can be carried out in accordance with ISO 1217 Annex C to provide information about the efficiency of your compressors. These measurements can then provide a solid basis for configuring an energy-optimized compressed air station and indicate where modernization measures are best implemented.

Leakage measurement and elimination

A comprehensive condition assessment also covers energy consumption and leak measurement. It can often result in considerable savings' even in well maintained compressed air networks, 10 to 20 percent of the generated compressed air is lost due to leaks, and in some cases as much as 40 percent. A check of the system pressure can also save energy. For example, is 116.03 psi really needed, or would 101.53 psi suffice? If it would, then you would save eight to ten percent of the energy costs relating to compressed air - without any investment.

80%

OF AIR LEAKS

ARE NOT AUDIBLE

Heat recovery can also considerably raise the efficiency of the compressor station. There are many thermal processes where the waste heat can be used, such as in the case of oil-injected compressors, 94 percent of the energy used can be recovered as heat.

A focus on compressed air quality

It is essential to take new developments and findings into account when deciding which technology will best generate the required compressed air quality. High-tech, cutting edge compressors for generating oil-free compressed air and refined traditional piston compressors both play important roles here. This is particularly true for sensitive production processes, where at least part of the compressed air flow must meet the highest quality requirements. It may be used, for example, as sterile air for ventilating fermenters in the pharmaceutical industry or food production, for filling and packing lines or electronics manufacturing and paint shops. In these cases, processing medium compressed air must be 100% oil-free, which poses the question of whether to generate oil-free air directly or by filtering. This has been a highly controversial debate in the past. While removal of the oil aerosols from the compressed air is a complex process, compression in an oil-lubricated compressor is considered to be more efficient.

Modernization pays off

With energy costs accounting for more than two thirds of a compressed air system's total cost of ownership, modernization - with advanced energy-saving compressor technology that carry a higher upfront investment - typically results in lower TCO than continuing operation with a suboptimal system.

This means that the energy consumption of a compressor station should be the decisive cost factor. A higher initial investment can result in a quicker return on investment. Take the following example:

Comparative Analysis			
Item	**Case A**	**Case B**	**Case C**
Total First Cost:	$291,770.00	$293,748.00	$316,200.0
Annual kWH (model)	747,709	731,020	652,978
Electricity cost (model)	$74,770.87	$73,101.987	$65,297.831
Total Maintenance	$14,000.00	$14,000.00	$14,800.00
Annual Operating Cost:	$88,770.873	$87,101.987	$80,097.831
Monthly Expense	**$13,641.45**	**$13,544.71**	**$13,441.50**

Ten Year Cumulative Cost Model			
	Case A	**Case B**	**Case C**
Year 1	$380,540.87	$380,849.99	$396,297.83
Year 2	$469,311.75	$467,951.97	$476,395.66
Year 3	$558,082.62	$555,053.96	$556,493.49
Year 4	$646,853.49	$642,155.95	$636,591.32
Year 5	$735,624.37	$729,257.93	$716,689.15
Year 6	$824,395.24	$816,359.92	$796,786.98
Year 7	$913,166.11	$903,461.91	$876,884.81
Year 8	$1,001,936.98	$990,563.89	$956,982.65
Year 9	$1,090,707.86	$1,077,665.88	$1,037,080.48
Year 10	$1,179,478.73	$1,164,767.87	$1,117,178.31

Impartial planning is the key to success

It is best to approach planning without preconceived opinions such as “it has to be a screw compressor/piston compressor/oil-lubricated compressor” or “we need a 75 kW machine.”

It is better to carefully consider all your options. If you consult with specialists, they should also not be tied to one specific compressor type. A precise analysis of the current situation and calculation of the current compressed air demand and pressure level, along with what’s needed in the future, should always be used as the basis for your decisions.

If the system components, including those for treatment, are integrated and maintenance expenses have been determined, then operating costs - of which energy costs accounts for 75% (graph page 2) - can be estimated with a great deal of accuracy.

Variables to consider when calculating your TCO

Available Technologies

Reciprocating | Rotary | Centrifugal
Oil-Lubricated | Oil-Free | Oil-Less
Fixed Speed | Variable Speed
Single-Stage | Two-Stage | Multi-Stage

Pressure Selection

Low | Medium | High

Downstream Equipment & Accessories

Drains | Oil/Water Separators
Lubricant | Piping
Genuine OEM Parts & Lubricants

Air Treatment

Air Dryers | Filters

About Gardner Denver Industrials Group

Gardner Denver Industrials Group delivers the broadest range of compressors and vacuum products, in a wide array of technologies, to end-user and OEM customers worldwide in the industries we serve.

We provide reliable and energy-efficient equipment that is put to work in a multitude of manufacturing and process applications.

Products ranging from versatile low- to high-pressure compressors to customized blowers and vacuum pumps serve industries including general manufacturing, automotive, and waste water treatment, as well as food & beverage, plastics, and power generation.

Our global offering also includes a comprehensive suite of aftermarket services to complement our products. Gardner Denver Industrials Group, part of Gardner Denver Inc., is headquartered in Milwaukee, Wisconsin, USA. Gardner Denver was founded in 1859 and today has approximately 7,000 employees in more than 30 countries.

For further information please visit www.gardnerdenver.com/gdproducts

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