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Your total compressor cost may be too high

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When users talk about updating their compressed air systems, they often say: "The price is too high!" Why is that? And why is the price always questioned? Maybe cost is not explained well enough.

It is the real cost of a new compressor that counts, not just the initial price tag. To better visualize cost, use this formula to relate price and value:

Cost = Price ÷ Value

The formula shows that the value of a product - not only the initial price - determines real cost. The higher the true value, the lower the cost.

Value has to be defined before looking at the impact it has on compressed air cost. Overall compressed air cost depends on electrical efficiency and maintenance plus equipment price (Fig. 1). A quality piece of equipment has high efficiency and low maintenance.

Key concepts

Real compressor cost includes energy consumption, maintenance, and initial price.

Over a compressor's life, electricity is about 70% of its total cost.

The value of compressor features influence its real cost.

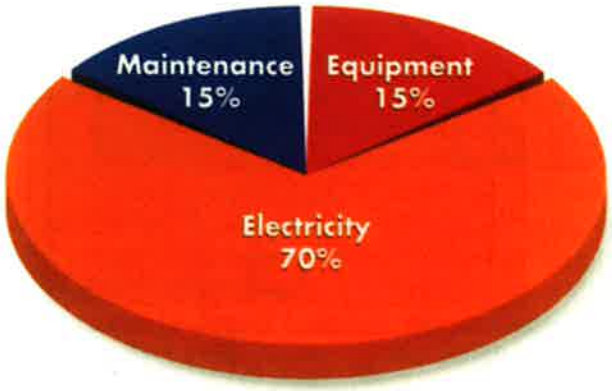

Fig. 1. Operating expenses for electricity and maintenance of a compressor are far greater than the equipment's initial cost.

Basic cost structure

All costs associated with generating, storing, and distributing compressed air determine the total cost. This cost ranges between $0.30-$0.40/1000 cu ft. It is easy to see that compared to water, gas, and electricity, compressed air is by far the most expensive utility.

Energy cost

As the pie chart shows, the major cost portion of compressed air is electricity. At $0.08/k Wh, it represents more than 70% of compressed air cost. It is crucial to evaluate how value-added features impact energy consumption.

Maintenance cost

Maintenance costs vary from 10%-20% depending on the type of compressor, operating conditions, and elapsed service life.

Initial purchase cost

While the initial purchase price is often the most discussed, it only accounts for 10%-20% of compressed air cost. It is important to determine how each compressor feature affects this compressed air cost.

It is a mistake to purchase a compressor, which is 20% less expensive, accounting for only 4% (0.20 x 0.20) of total compressed air cost, but requires 20% more energy, or 14% (0.20 x 0.70) of total compressed air cost.

Value and how it is measured

Value is the customer's total benefit. While the value of some features is influenced by an individual's perception, most features result in accountable benefits, such as reduced energy bills. Service and support before and after the equipment purchase often generate value. A properly sized and installed compressed air system definitely offers value to the customer (Fig. 2).

Anything above industry-accepted standards (motor efficiency, specific compressor performance, noise levels, etc.) also adds accountable value. For comparison, standard features can be scaled at 100, below average features can be scaled below 100, and above average features can be scaled above 100.

For example, if the industry uses open drip-proof (ODP) motors with standard efficiency, then a compressor equipped with a high-efficiency, totally enclosed, fan-cooled (TEFC) motor should receive a 110 rating. An ODP motor operating at the high end of its service factor should only get a 95 rating.

Airends

Airend efficiency is one of the most important features on a rotary screw compressor. Since energy accounts for over 70% of total cost, any reduction in specific power consumption (cfm/bhp) greatly affects total cost. The rotor profile should be an asymmetrical design and should not depend on sealing strips.

A reliable way to judge compressor package performance is to compare the compressed air delivered from the aftercooler discharge at a specific pressure/bhp used (cfm/bhp @ rated psig). The assigned value rating should reflect the importance of airend-compressor package efficiency on total cost.

Compressor controls

The basic function of a compressor control is to match the compressed air demand of the system to the compressor output. Dual-control or start-idle-stop control is overall the most efficient system (Fig. 3).

Comparing the power consumption at reduced loads reveals a maximum savings potential of up to 70%, compared to straight modulation control. The right compressor control is one of the most important efficiency features. The assigned value rating reflects this influence on compressed air cost.

Noise levels

EPA has established regulations to protect the environment and plant personnel from exposure to excessive noise. In general, equipment generating noise above 85 dbA must be installed in a separate building or room or ear protection must be worn at all times.

While individual company and insurance guidelines vary, it is desirable to install equipment with the lowest noise level possible.

Fig. 2. Major compressor componets include the drive, airend, controls and enclosure. Accessibility improves maintenance.

Noise level ratings

A rating of 100 is assigned to the following horsepower ranges and noise limits.

Motor, hp	Sound level, dbA
5-20	Less than 70
25-50	Less than 76
60-150	Less than 82
200 and larger	Less than 85

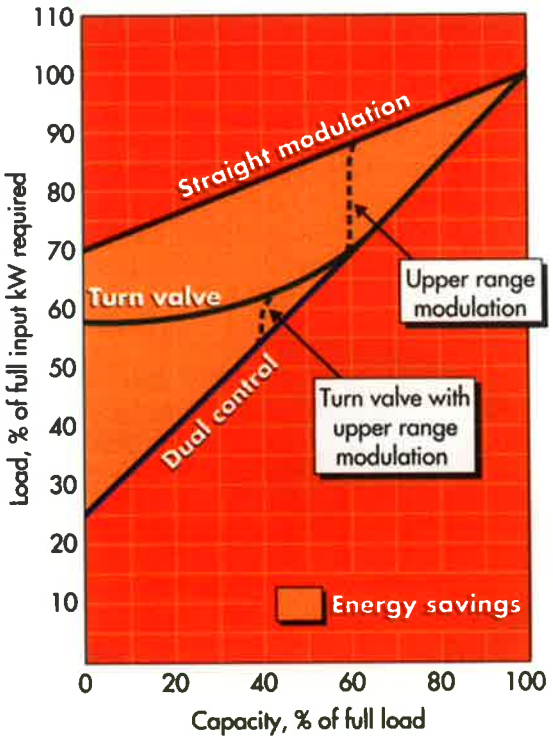

Fig. 3. The type of control used on the equipment determines overall compressor effciency. Dual-control provides the best efficiency.

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Features providing maintenance value

- Easy access to all maintenance points.
- Maintenance indicators for all filters.
- Convenient and reliable communication about service requirements and event history (motor starts, operating temperatures/trends, load vs idle hours, etc.).
- Long maintenance intervals.
- Fast and convenient cleaning of coolers in extreme environments.

Maintenance

Many factors determine compressor maintenance requirements, including type, size, application, and age. A major consideration is whether the compressor is a lubricated or oil-free design. Since compressed air needs to be dried and filtered with either design, the need for an oil-free compressor and its increased maintenance requirement should be carefully evaluated.

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More info

The author is available to answer questions about evaluating true compressor costs. He may be reached at 540-898-5500.

See the Compressors channel on *PE Online* (www.plantengineering.com (http://www.plantengineering.com) for more articles related to this topic.

Comparing compressor cost and value

A potential customer received two bids for a 50-hp rotary screw compressor and wants to make an educated buying decision. The specifications for the units are:

Unit A 55 bhp	Industry standard	Value, %
230 cfm at 110 psig (4.2 cfm/bhp)	4.5	90
ODP motor with 89% efficiency	92%	96
87 dbA (no enclosure)	76 dbA	96
Modulation control	Dual	85
$11,500 purchase price	$14,500	106

Total value factor, Unit A
0.90 X 0.96 X 0.96 X 0.85 X 1.06 = 0.75

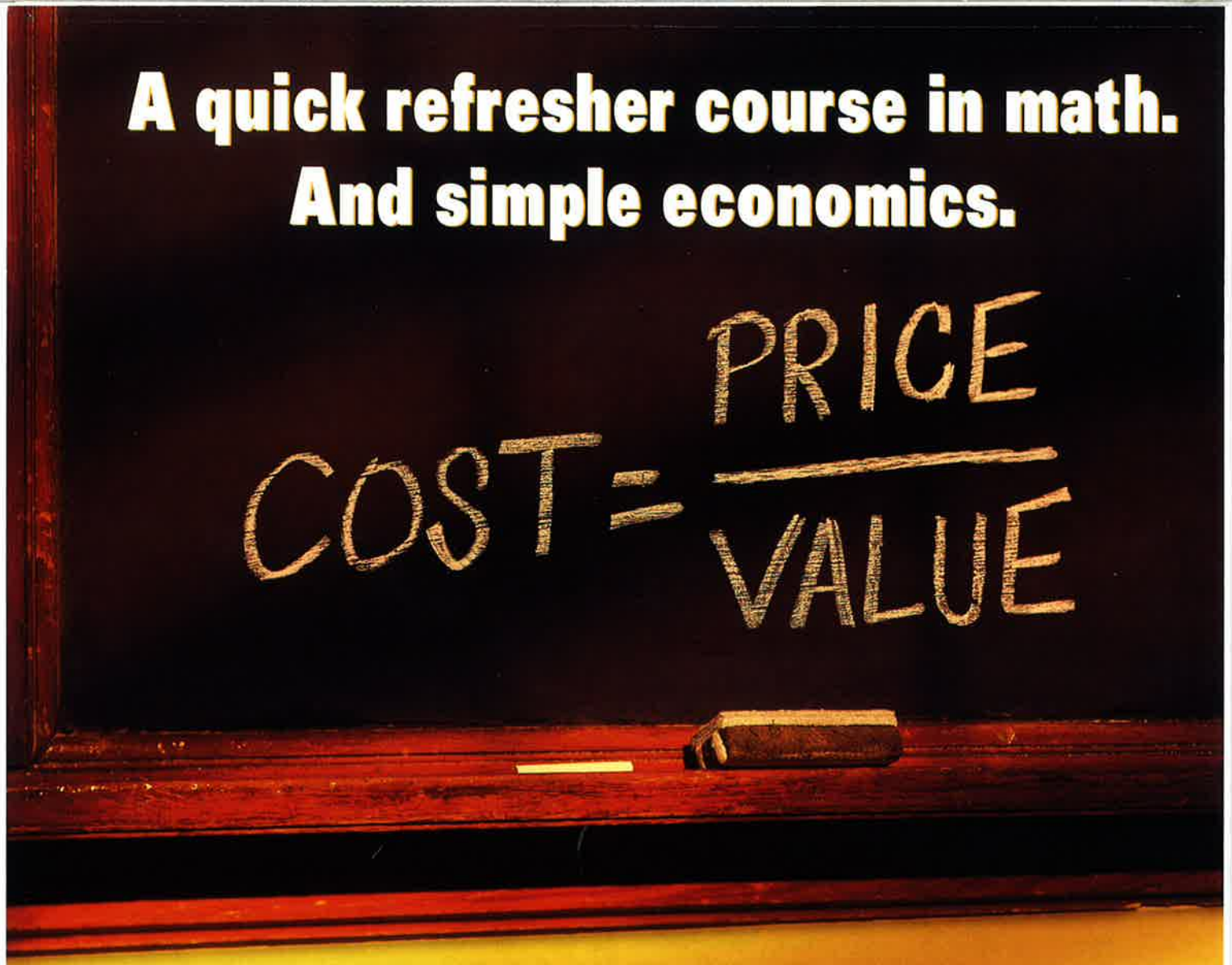
Unit B 55 bhp	Industry standard	Value, %
240 cfm at 110 psig (4.8 cfm/bhp)	4.5	110
TEFC Epact motor with 93.5% efficiency	92%	104
74 dbA (with enclosure)	76	101
Dual control	Dual	100
$16,000 purchasing price	$14,500	96

Total value factor, Unit B
1.10 X 1.04 X 1.01 X 1.00 X 0.96 = 1.11

Use the Cost = Price ÷ Value formula to determine which unit costs less.

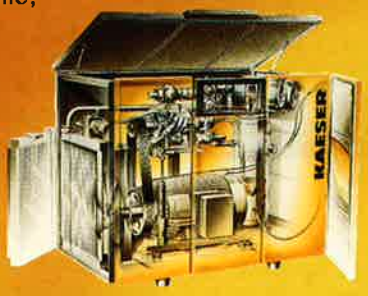
Cost of Unit A = $11,500 ÷ 0.75 = $15,333
Cost of Unit B = $ 16,000 ÷ 1.11 = $14,414

A quick refresher course in math. And simple economics.



It's elementary. The *real* cost of a new compressor goes well beyond the initial price tag. Increase the value, and your costs are much lower than the initial price makes it appear.

Kaeser compressors, with the proprietary Sigma™ rotary screw profile, deliver up to 20% more cfm per horsepower than units with other screw designs. And since 70% of your overall compressor cost is energy, it's easy to figure out that Kaeser compressors are your best choice over the long term.



When you also factor in the value of other design and engineering features, years of superior performance and reliability, plus simplified maintenance, the solution is even more obvious. Kaeser compressors give you the lowest real cost, every time.

So, knowing that the formula for lowest cost means a lot more than simply the initial price, make sure Kaeser compressors become part of your compressed air equation. Visit our web site or call us today at **1-800-777-7873** for more information, or the name of a Kaeser distributor near you.

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