Return On Investment —— How Vortron *AIR*POWER™ Helps Your Bottom Line

Justifying New Equipment Purchases

In today's highly competitive marketplace, justifying new equipment investments is ever more crucial. Equipment must not only fullfill all functional needs, but also shown to benefit the bottom line. Thus, "life-cycle" factors such as replacement cost, and operating and maintenance costs must be considered in the purchase decision. Of these three, annual operating cost generally has the greatest impact when considering robust, long-lasting equipment.

Blower Efficiency Plays A MAJOR Role In Reducing Annual Operating Costs

Compressed air is considered the "fourth" utility (in addition to electricity, water, and natural gas) and is a major contributor to plant operational costs. Improved compressor or Blower Efficiency, then, can play a key role in reducing costs, benefiting the bottom line. So, how can you evaluate blower efficiency and compare competitive products?

Efficiency And Motor Power

Blower thermodynamic efficiency has a direct impact on motor power, meaning, a more efficient blower will consume less motor power, and hence less electrical power. AIRPOWER™ blowers operate at peak isentropic efficiencies of up to 79%, with a minimum of 70% efficiency achieved over most of it's useable operating range. With competitive products generally well below these efficiency levels, power consumption differences can be significant.

EXAMPLE: A Z40 *AIRPOWER*™ Blower is specified to deliver 70 in-H2O at 1,000 CFM. The efficiency, as tested in accordance with SAE Standard J-1723, is 77% at this operating point. What is the required motor power for the Z40, and how does it compare to a competing blower operating at 50% efficiency?

ANSWER: From the application bulletin, Chart #1, a Z40-165 is selected. Chart #2 of this bulletin indicates this same blower will operate at 13.9 HP. Calculate the blower power of the competing product from the following:

$$HP = CFM \times 528 \times \left[\left(\frac{P + 407}{407}\right)^{.286} - 1\right] \frac{1}{\eta_c} \times .000425 = 20.8$$

where P is the pressure, 70 in-H2O, and the term η_c is the efficiency, or 0.50 in this case. The power difference is 20.8-13.9, or 6.9 HP, with the *AIRPOWER*™ unit representing a 33% reduction in power consumption. To evaluate annual operating cost impact, an energy calculation is performed as follows:

$$6.9 HP \times .746 {}^{kW}/_{HP} \times 1.15 pf \times .10 {}^{\$}/_{kWhr} \times 8 hr \times 365 {}^{d}/_{yr} = \$1{,}728$$

Consider the above "typical", assuming a local energy cost of $0.10 per kWhr, and an 8-hour, 365 day operation. Use data specific to your application duty and local energy costs. Note also that manufacturers occasionally publish power requirements and/or curves to establish power at specific operating points. In this case, power consumption comparisons can be made directly, followed by an energy calculation to estimate annual operating cost differences. To better illustrate expected annual operating cost impact, Vortron has tabulated a variety of operating scenarios in the following table. Values are provided at local energy rates of $0.06, $0.10, and $0.14 per kWhr. This generally covers the range of typical energy costs found in industrial areas across the United States. Saving 2 HP when operated continuously, in a high energy cost area can result in over $2,000 operating cost savings!

Draw your own conclusions.

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Annual Operating Cost Savings Estimator — Use this table to estimate annual energy cost SAVED based upon calculated (or advertised) blower power difference, in horsepower:

		Motor Power Difference (HP)				
		2	4	6	8	10
Energy Cost = $0.06/kWhr	4 hr/day @ 250day/yr:	$103	$206	$309	$412	$515
	8 hr/day @ 365 day/yr:	$301	$601	$902	$1,202	$1.503
	16 hr/day @ 365 day/yr:	$601	$1,202	$1,804	$2,405	$3,006
	24 hr/day @ 365 day/yr:	$902	$1.804	$2,705	$3,607	$4,509
Energy Cost = $0.10/kWhr	4 hr/day @ 250 day/yr:	$172	$343	$515	$686	$858
	8 hr/day @ 365 day/yr:	$501	$1,002	$1,503	$2,004	$2,505
	16 hr/day @ 365 day/yr:	$1,002	$2,004	$3,006	$4,008	$5,010
	24 hr/day @ 365 day/yr:	$1,503	$3,006	$4,509	$6,012	$7,515
Energy Cost = $0.14/kWhr	4 hr/day @ 250 day/yr:	$240	$480	$721	$961	$1,201
	8 hr/day @ 365 day/yr:	$701	$1,403	$2,104	$2,806	$3,507
	16 hr/day @ 365 day/yr:	$1,403	$2,806	$4,209	$5,611	$7,014
	24 hr/day @ 365 day/yr:	$2,104	$4,209	$6,313	$8,417	$10,521

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