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Compressed air

Compressed air – It's not just hot air, it's your money!

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Eco-efficiency for the Marine Industry Fact Sheet

Do you want to

- reduce how much you spend on compressed air?
- improve the reliability of your air supply?
- reduce and simplify the maintenance of your air supply?
- reduce production of greenhouse gases?

It is essential to operate your system as efficiently as possible!

Compressed air systems are typically only 10% to 20% efficient, with the rest of the electricity input lost as waste heat. ^[1]

Check to see if you are managing your compressed air efficiently

- Do you regularly service and maintain the compressor system?
- Is your system correctly designed and sized? Consider replacing large compressors operating at part load with smaller systems that can operate at full load. For large multi-compressor systems, consider an electronic control system that can match supply with demand.
- Do you regularly check for leaks by shutting off all other equipment and listening, or by using an ultrasonic leak detector (see table 1)?
- Do you ensure that high pressure air is not used for purposes such as cleaning, cooling or drying, when low pressure air from blowers or fans would be sufficient?
- If the compressor operates under a range of loads, have you considered installing a variable speed drive?
- Do you ensure that the air pressure is properly matched to the system demand? If more pressure is needed, investigate reducing pressure drops by removing complex, unused or long lengths of piping, and ensuring that pipes are correctly sized (see table 2).
- Do you ensure that the temperature of the intake air is as low as possible, e.g. ducted air from a cool, shaded area outside (see table 3)?

Table 1: Cost of compressed air leaks^[2]

Equivalent hole diameter (mm) (sum of all leaks)	Quantity of air lost per single leaks (m ³ /year)	Cost of leak (\$/year)
Less than 1 mm	6,362	\$144
From 1 mm to 3 mm	32,208	\$731
From 3 mm to 5 mm	117,633	\$2,669
Greater than 5 mm	311,738	\$7,073

Assumption: 700 kPa system operating for 2,000h/year, electricity costs 15.125c/KWh

Every 50kPa increase in pressure increases energy consumption by 4% ^[2]

Table 2: Potential costs and energy savings that can be made by reducing air pressure^[2]

Air pressure reduction

Average load (kW)	50kPa		100kPa	
	Energy savings (kWh/yr)	Cost savings (\$/yr)	Energy savings (kWh/yr)	Cost savings (\$/yr)
7.5	1,195	\$182	2,390	\$361
11	1,755	\$265	3,510	\$531
15	2,390	\$361	4,780	\$722
22	2,945	\$446	5,890	\$891
30	4,380	\$662	8,760	\$1,325
37	5,975	\$904	11,950	\$1,807
55	8,760	\$1,325	17,520	\$2,651
75	12,750	\$1,928	25,500	\$3,857
110	18,350	\$2,775	36,700	\$5,597

Assumptions: 700 kPa system operating for 2,000 hrs per year, electricity costs 15.125 cents/kWh

Every 3°C reduction in inlet temperature reduces energy consumption by 1% ^[2]

Table 3: Potential costs and energy savings that can be made by reducing the temperature of compressor inlet air^[2]

Reduction to intake air temperature

Average load (kW)	6°C reduction		10°C reduction	
	Energy savings (kWh/yr)	Cost savings (\$/yr)	Energy savings (kWh/yr)	Cost savings (\$/yr)
7.5	300	\$45	495	\$76
11	440	\$66	725	\$110
15	600	\$91	990	\$150
22	880	\$132	1,450	\$219
30	1,200	\$182	1,980	\$299
37	1,480	\$223	2,440	\$369
55	2,200	\$333	3,625	\$548
75	3,000	\$454	4,950	\$749
110	4,400	\$666	7,260	\$1,099

Assumptions: 700 kPa system operating for 2,000 hrs per year, electricity costs 15.125 cents/kWh

Useful websites

Compressed air calculator:

SEDA Energy Smart - www.energysmart.com.au/wes/DisplayPage.asp?PageID=53

Buying new equipment calculator:

Australian Building Greenhouse Rating - www.abgr.com.au/tenants/tenantsCalcTEMH1.asp

How much is your business spending on compressed air each year?

1. How much power do you consume running your compressor (assume 100% load)?

hours of daily operation x power rating x days of use each year = power consumption

(hrs) x (kW) x (days) = (kWh/yr)

2. How much is it costing you annually to run your compressor?

cost for electricity x power consumption = Annual cost to run compressor

(\$/kWh) x (kWh/yr) = (\$/yr)

3. Options for improvement?

References

1. EM (2005) Technical Information Sheet - Compressed Air Systems, Efficiency Maine, Augusta, Maine, USA. Retrieved 12-12-2005 from: www.energymaine.com/business/pdfs/Compressed_Air_TDS.pdf
2. SEDA (2000) Energy Smart Compressed Air Calculator, Sustainable Energy Development Authority, Sydney. Retrieved 12-12-2005 from: www.energysmart.com.au/wes/displayPage.asp?PageID=53

For further information

Ecobiz can assist you to reduce costs and improve eco-efficiency in your business Call 1300 369 388 for further information.

Eco-efficiency Project Officer
Marine Industries and Fibre Composites Group
Department of Tourism, Regional Development and Industry
Telephone: 07 3227 5756
marine@dtrdi.qld.gov.au
www.marine.industry.qld.gov.au