ISBN 0-9775169-1-1

Motors

Motors – You have the power to save!

15

Eco-efficiency for the Marine Industry Fact Sheet

Do you want to

- ☑ reduce the running costs of your motors and fans?
- ☑ improve the efficiency and life span of your motors?
- ☑ reduce vibration and noise and increasing maintenance costs?
- ☑ reduce your consumption of fossil fuels and production of greenhouse gases?

An electric motor uses up to eight times its purchase price in electricity annually![1]

Check to see if you are managing your motors and fans efficiently

Motors are used to drive fans, air compressors, pumps and many other processes. Eco-efficiency opportunities to reduce energy consumption come from careful selection and good maintenance.

☐ When purchasing a new motor, do you always consider the operating costs as well as the purchase price (see table 1)?

Table 1: Payback periods for purchasing high efficiency motors[2]

Motor rating	High efficiency 11 kW	Standard 11 kW	High efficiency 45kW	Standard 45kW
Pole *	4	4	4	4
Efficiency %	92	88.5	94.6	93.1
Hours of operation	6,000	6,000	6,000	6,000
Average energy cost (c/kWh)	15.125	15.125	15.125	15.125
Purchase price	$922	$877	$2,390	$1,680
Annual operating cost	$10,845	$11,268	$43,168	$43,911
Payback on premium	1.3 months		12 months	

* Number of sets of three way electromagnetic windings in a motor 4 poles – 1,800 rpm base speed

☐ Are variable speed drives installed on your motors? Variable speed drives reduce energy consumption by adjusting the motor speed to continually match the load (see table 2).

Table 2: Savings due to installation of a variable speed drive (VSD)[2]

	5.5kW motor with no VSD	5.5 kW motor with VSD
Annual energy use	44,000 kWh	35,200 kWh
Annual energy cost	$6,655	$5,324
Annual energy saving		$1,331
Cost of VSD		$1,295
Payback		1 year

Assumption: 8,000 operating hours per year, 20% reduction in energy consumption due to VSD, electricity cost 15.125c/KWh

- [ ] Since air temperature and humidity affect energy efficiency, do you ensure that the motor is located in a well-ventilated area?
- [ ] Do you plan work schedules to reduce motor running time? Does more than one motor need to run?
- [ ] Do you conduct professional rewinding of worn out motors, which can restore a motor to its original level of efficiency?
- [ ] Do you ensure that motors are not oversized? An under-loaded motor costs more to run and wastes more energy than two smaller motors (see table 3).

Table 3: Replacing an oversized motor[3]

Current motor	New motor	Annual savings
7.5 kW (40% loaded)	3.7 kW (76% to 80% loaded)	823 - 1209 kWh
		$125 - $183

Assumptions: Operating 2,500 h/yr, electricity costs 15.125 c/kWh

- [ ] Do you conduct regular inspections and maintenance of parts such as belts, couplings and chains? Increased friction increases energy consumption and reduces the life of the belt. Ensure that all parts are lubricated. Check the alignment of any pulleys and the tension of any belts. Belts should not be unusually hot.
- [ ] Do you use efficient belts or direct drive connections? For example, inefficient v-belts used to connect fans to motors can reduce motor horsepower by 3% to 5%.[4]

Exhaust fans and filter systems

Exhaust fans and filter systems are used for ventilation and the removal of airborne emissions such as dust, solvents and odours. To improve efficiency:

- [ ] Do you inspect and maintain your fan and filter systems regularly? For example, replace worn or loose belts, repair leaks in ducts and clean filters and any other air cleaning equipment.
- [ ] Are your systems sized and designed correctly for the application, and ideally positioned (e.g. close enough to the source of contaminants so that air is drawn away effectively)?
- [ ] Are fans only operated when necessary? Variable speed drives should be considered on fans used for ventilation.

Useful website

Motor solutions Australian Greenhouse Office – www.greenhouse.gov.au/motors/motorselector/m2.htm

How much is your business spending on operating motors?

1. How much power do you consume running your motor? Assume 100% load.

hours of daily operation (hrs)	x	power rating (kw)	x	days of use each year (days)	=	power consumption (kWh/yr)
	x		x		=	

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

cost for electricity ($/kWh)	x	power consumption (kWh/yr)	=	annual cost to run the motor ($/yr)
	x		=	

References

1. AGO (2005) Selecting the Best Motor and Equipment, Australian Greenhouse Office, Department of Environment and Heritage, Canberra. Retrieved 07-01-2005 from: www.greenhouse.gov.au/motors/reference/r2.html
2. TECO (2003) Premium Efficiency Motors, TECO Group of Companies, Sydney. Retrieved 12-12-2005 from: www.teco.com.au
3. USDE (2006) Replacing an Oversized and Underloaded Electric Motor, U.S. Department of Energy, Energy Efficiency and Renewable Energy, Industrial Technologies Program, Washington DC, USA. Retrieved 17-08-2006 from: http://www1.eere.energy.gov/industry/bestpractices/pdfs/mc-2463.pdf
4. EDR (2001) Using a System Approach to Drive Power, California Public Utilities Commission, San Francisco, CA, USA. Retrieved 12-12-2005 from: www.energydesignresources.com/docs/end-23.pdf

For further information

Ecobiz can assist you to reduce costs and improve eco-efficency 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

SD3432 06/06