

Monthly Informative Application Guidelines, with respect to *Motors & Drives* to keep you better INFORMED.

APPLICATION GUIDELINE #22

(Energy Consumption Facts – Rewind? Or Replace?)

Brought to you by your Motor & Drive Specialists.....

The savings potential on using mature, proven efficiency technologies and practices is enormous. On average, the manufacturing sector could reduce industrial motor energy use by 11-18%.

Energy costs and potential savings according to select industry groups:

Selected Industry Groups	Motor System Costs	Motor Energy		Savings as % of Operating Margin
		Costs/Total Operating Costs	Estimated Savings per Yr.	
Paper Mills	\$4.6 mm	6.5%	\$659,000	5.0%
Petroleum Refining	\$5.6 mm	1.4%	\$946,000	1.0%
Industrial Inorganic Chemicals	\$1.6 mm	10.4%	\$283,000	6.0%
Paperboard Mills	\$3.0 mm	6.4%	\$492,000	5.0%
Blast Furnaces and Steel Mills	\$6.0 mm	2.1%	\$358,000	2.0%
Industrial Organic Chemicals	\$1.3 mm	1.0%	\$91,000	1.0%
Industrial Gases	\$1.1 mm	21.7%	\$116,000	13.0%
Plastics Material and Resins	\$1.5 mm	1.5%	\$121,000	1.0%
Cemet, Hydraulic	\$2.2 mm	9.6%	\$219,000	4.0%
Pulp Mills	\$1.7 mm	6.7%	\$483,000	5.0%

Showcase Energy Saving Examples:

Company	Type of Plant	Energy Savings kWh/Year	Savings as % of Initial Sys. Energy	Annual cost Savings	Payback on Invest (Years)
General Dyanmics	Metal fabrication	451,778	38%	\$68,000	1.5
3M Company	Laboratory facility	10,821,000	6%	\$823,000	1.9
Peabody Coal	Coal processing	103,826	20%	\$6,230	2.5
Stroh Brewery	Beer brewing	473,000	52%	\$19,000	0.1
City of Milford	Municipal sewage	36,096	17%	\$2,960	5.4
Louisiana-Pacific	Strand board	2,431,800	50%	\$85,100	1.0
City of Trumbull	Sewage pumping	31,875	44%	\$2,614	4.6
Nisshinbo California	Textiles	1,600,000	59%	\$100,954	1.3
Greenville Tube	Stainless steel tubing	148,847	34%	\$77,266	0.5
Alumax	Primary aluminum	3,350,000	12%	\$103,736	0.0
OXY-USA	Oil field pumping	54,312	12%	\$5,362	0.5
City of Long Beach	Waste incineration	3,661,200	34%	\$329,508	0.8
Bethlehem Steel	Basic oxygen furnace Steel mil	15,500,000	50%	\$542,600	2.1
Total/Average		38,663,734	33%	\$2,166,330	1.5

Motor Facts:

- Motors can have a 30 to 40 year service life
- The average integral HP motor is repaired 3 or more times during its life *
- The average integral HP motor consumes 4 to 10 times it's initial cost in electricity per year (120 to 300 times it's original cost over it's service life)
- Equivalent of a car costing over \$100K per year to run
- The installed base of integral HP motors in North America is greater than 100 million units
- Industrial electric motors use over 25% of the electricity sold in North America
- Manufacturers sell about 2.2 million units a year
 - >1.2 million to new equipment builders
 - >1 million to replace failed motors in user facilities

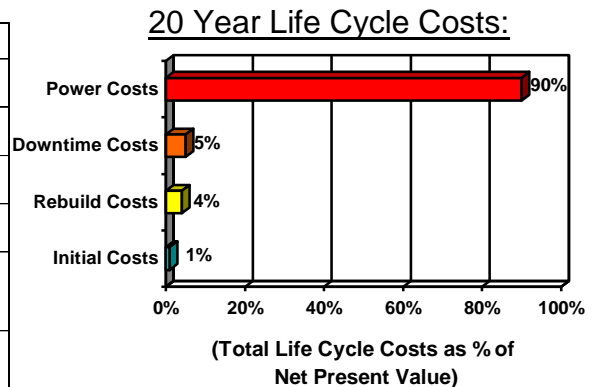
Total cost comparison of operating Standard, Rewind, EAct and EQP III

	HP	Initial Cost	Efficiency	Hours Run	Cost kWh	Annual cost of electricity	Simple pay-back in years
Standard	25	N/A	89.3%	8760	\$0.045	\$8,233	
EQP III	25	\$925	93.6%	8760	\$0.045	\$7,855	
Cost Difference:		\$925				Annual Energy Savings \$378	2.4
Rewind	25	\$660	89.3%	8760	\$0.045	\$8,233	
EQP III	25	\$925	93.6%	8760	\$0.045	\$7,855	
Cost Difference:		\$265				Annual Energy Savings \$378	0.7
EAct	25	\$825	92.4%	8760	\$0.045	\$7,957	
EQP III	25	\$925	93.6%	8760	\$0.045	\$7,855	
Cost Difference:		\$100				Annual Energy Savings \$102	1.0

- A new Buyer decides to “save” \$265 and rewind the standard efficiency motor
 - This decision cost you **\$7,182**
 $(\$378 - \$265) + (\$378 \times 19 \text{ years})$
- The same Buyer decides to purchase an EAct motor to “save” \$100
 - This decision cost you = **\$1,940**
 $(\$102 - \$100) + (\$102 \times 19 \text{ years})$

The cost of the motor is “insignificant” compared to the cost of the electric power required to run it. See the following examples:

	Automobile	60HP Motor
Purchase Price	\$20,000	\$2,000
Annual Use	20,000 miles	8,000 hours
Efficiency	12km/litre	93.6%
Fuel/Energy Cost	\$0.70/litre	\$.062 kWh
Annual Energy Cost	\$1,166	\$23,719
Energy Cost as % of Purchase Price	6%	1186%



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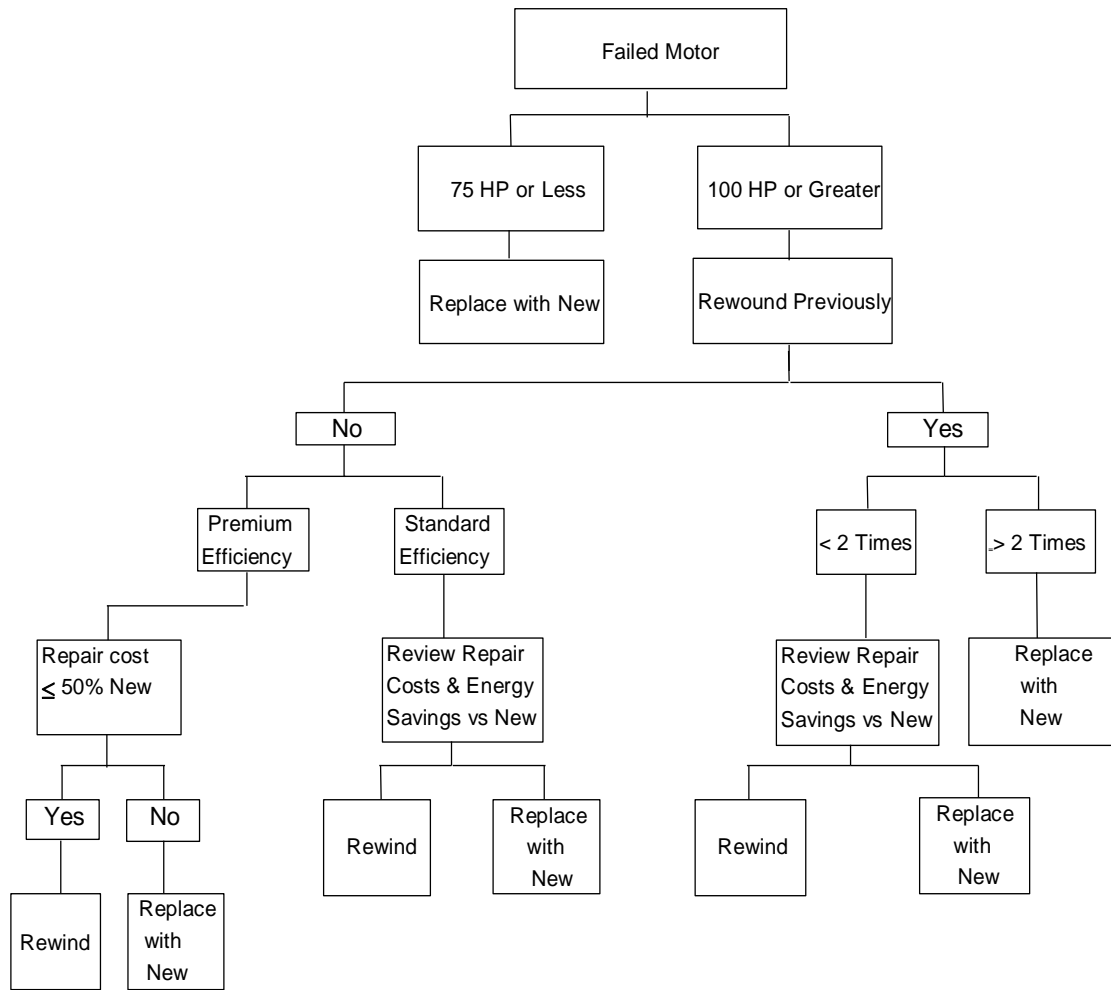
The extra cost of an energy efficient motor is often quickly repaid in energy savings.

$$\text{Annual energy savings} = \text{Hp} \times \text{Load} \times 0.746 \times \text{annual.hrs.} \times \text{Energycost} \times [100/\text{std Eff} - 100/\text{Premium Eff}]$$

The **annual value of a one point efficiency gain** (based on 8,760 hours of use at full load)

Horsepower	Annual Savings \$0.05/KWh	Annual Savings \$0.06/KWh	Annual Savings \$0.07KWh
5	\$23	\$28	\$33
10	\$44	\$53	\$61
20	\$83	\$100	\$117
50	\$194	\$233	\$272
100	\$381	\$457	\$533
200	\$735	\$882	\$1,029

Sample Decision Tree:



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