



**TOSHIBA**

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

**APPLICATION GUIDELINE #1**  
 (Energy Consumption Facts – Rewind? Or Replace?)

The savings potential by using mature, proven energy efficient technologies and practices are 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:

Showcase Energy Saving Examples:

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

Motor Facts:

- Motors can have a 30 to 40 year service life if properly serviced and maintained
- The average Low Voltage AC motor is repaired 3 or more times during its life. Each time it is rewound it is expected to drop approximately 0.5% in efficiency.
- The average Low Voltage AC motor consumes 4 to 10 times its initial cost in electricity per year (120 to 300 times its original cost over its service life). This is the equivalent of a car costing \$25,000 consuming over \$100,000 in gas per year to run.
- The installed base of Low Voltage AC motors in North America is greater than 100 million units.
- Industrial electric motors use over 25% of the electricity sold in North America.
- Low Voltage AC motor 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

# TOSHIBA

Total cost comparisons between operating a Standard Motor, a Rewound Standard Motor an EPACT and a NEMA Premium EQPIII Motor

	HP	Initial Cost	Efficiency	Running Hours	Cost per kWh	Annual Cost of Electricity	Simple Payback in years
Standard EQPIII	25	Motor is Existing	89.3%	8000	\$0.06	\$7,520	
	25	\$1,800	93.6%		\$0.06	\$7,170	
Cost Difference:		\$1,800		Annual Energy Savings		\$350	5.1
Rewound Std EQPIII	25	\$1,300	88.8%	8760	\$0.06	\$7,560	
	25	\$1,800	93.6%		\$0.06	\$7,170	
Cost Difference:		\$500		Annual Energy Savings		\$390	1.3
EPAct EQPIII	25	\$1,400	92.4%	8760	\$0.06	\$7,270	
	25	\$1,800	93.6%		\$0.06	\$7,170	
Cost Difference:		\$400		Annual Energy Savings		\$100	4.0

- A new Buyer decides to “save” \$500 and rewind the standard efficiency motor
  - This decision costs **\$7,300** over a 20 year life of the motor (\$390 x 20 years) – \$500 = \$7300
- The same Buyer decides to purchase an EPAct motor to “save” \$400
  - This decision cost you = **\$1,600** over a 20 year life of the motor (\$100 X 20 years) - \$400 = \$1,600

The cost of the motor is “insignificant” compared to the cost of the electric power required to run it. We all know how we fret about our car’s efficiency, well see the following example:

	Automobile 60 HP Motor	
Purchase Price	\$25,000	\$4,800
Annual Use	20,000 km	8,000 Hours
Efficiency	12 km/liter	95%
Fuel Energy Cost	\$1.00/liter	\$0.062/kWh
Annual Energy Cost	\$1,667	\$17,790
Energy Cost as % of Purchase Price	7%	371%

And we don’t expect to get 20 or more years of life from our car.

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

Annual energy savings = Hp x Load x 0.746 x annual.hrs. x Energycost x [100/std Eff – 100/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

## A Suggested Decision Tree:

