



MotorAdvantage findings for ACME Ltd

Executive Summary

ABB recommends that the motor considered on No.2 water pump be changed to a new IE3 premium efficiency motor at the point of failure. ABB further recommends that a local spare is held to minimise downtime due to high downtime costs.

Selected motor: No.2 water pump – 110kW

Hours run per annum	8,760
Energy Cost	9 p/kWh
Annual energy consumed kWh	845,263 kWh
Annual energy cost	£76,074
Estimated cost to rewind/repair	£5,300
Downtime cost (per hour) due to lost production	£400
Estimated time to remove, repair and re-install	48 hours
Estimated cost for time lost due to failure (48hrs x £400)	£19,200
Total cost for high efficiency replacement, incl installation	£8,200
Estimated annual cost saving from replacement	£3,577

Return on investment (energy saving only) estimate:

At point of failure:	<10 months
Prior to failure:	<31 months
Return on investment (including downtime)	
at point of failure	immediate

In the event of failure this application will cost ACME Ltd., over £9,000 per day. There is a policy to repair the motor in the event of failure, however this will take a minimum of 48 hours to complete.

The likelihood of imminent failure is low. However, consideration should be given to holding a spare motor locally as the costs of repair compared to cost of replacement if immediately available are considerably less. Regardless, serious consideration should be given to replace motor at next failure.

This application is a good candidate for applying a variable speed drive, generating further savings following a suitable appraisal.

We recommend further investigation of actual energy consumed and a non-intrusive test to determine insulation condition.

Background

ABB was asked to look at several applications with specific emphasis on the life cycle costs involved on the current electric motor to determine the following:

- How much energy the current installation is using

- Current policy in the event of failure of this motor and the financial impact this has on the organisation
- Improvements to be made with regards to stockholding, specification and energy saving opportunities

Location of No.2 water pump



Engineer's Report

No.2 water pump

Motor information and nameplate data

Motor Reference (Plant ID#)	PM-1234
Application	Number 2, water pump
Driven load	Centrifugal pump
Hours run per annum	8,760
Energy cost	9p/kWh

Manufacturer	Sample motors
Frame size	D315S
Mounting	V1 vertical flange
Installation date	1985
No. of rewinds	1
Date of last rewind	1996

Power (kW)	P	110
Voltage	V	415
Frequency	Hz	50
Speed	rpm	2900 (2 pole)
Current	A	185
Power factor	cos	0.9
Efficiency	Eff	91.2% (by calculation)
Operating duty (0% of rated kW)		80%

Energy saving opportunity

Existing annual energy consumed kWh	845,263 kWh
Annual energy cost	£76,074

Alternative high efficiency ABB motor	M4BP315SMB
Efficiency FL / $\frac{3}{4}$ L	95.9% / 95.7% IE3
New motor cost	£8,200
New motor installation cost	£850
Annual energy consumed kWh	805,517 kWh
Annual energy cost	£72,497

Annual energy saving	39,746 kWh
Annual energy cost saving	£3,577
CO ₂ saving p.a. (based on 0.5kg/kWh)	19,873 kg/kWh

Cost of failure

Cost to rewind/repair	£5,300
Downtime cost (per hour)	£400
Estimated time for rip out, repair and re-install (hours)	48
Downtime cost	£19,200
Total cost of failure (downtime and repair)	£24,500
Estimated life remaining	5 years

Engineer's Report

Replace or rewind at next failure

Existing motor type/frame	D315S
Cost to rewind/repair	£5,300
New motor type/frame	M4BP315SMB
New motor cost	£8,200
Annual energy saving	39,746 kWh
Annual energy cost saving	£3,577
CO ₂ saving p.a. (based on 0.5kg/kWh)	19,873 kg/kWh
Cost difference to replace	£2,900
Payback in months excluding downtime	9.7 months

Replace prior to failure

Existing motor type/frame	D315S
Existing motor efficiency	91.2%
New motor type/frame	M4BP315SMB
New motor efficiency (at operating point)	95.7% IE3
New motor cost	£8,200
Installation cost	£850
Total cost (including new motor and installation)	£9,050
Annual energy saving	39,746 kWh
Annual cost saving	£3,577
CO ₂ saving p.a. (based 0.5kg/kWh)	19,873 kg/kWh
Payback in months	30.4

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