MEMOLUB®

Lubrication of Electric Motors

Over lubrication of electric motors can be the cause of many failures :

- Damage to the seals
- Winding contamination by lubricant
- Temperature increase
- Grease shortening life and mechanical components failures
- Amperage and energy consumption increase

QUESTION

CASE STUDY 2005/05 : Fan bearing lubrication, results for the customer : temperature drop from 110°C to 50°C and energy consumption drop by 15 Amps. HOW MUCH DID THE CUSTOMER SAFE ?????????????????????????

Damages to seals

Damages to seals favors introduction of grease in the winding and damages the insulation of it. This will lead to motor rewinding.

Damage to bearings

Damages to bearings leads to wear of shafts and cages and favors heating and damages to the winding.

Over Lubrication

Over lubrication example

Estimates of daily lubricant quantity

Only for horizontal Electrical Motors

KW	HP	Shaft	Speed	Grease amount/Day
1500	2011	200	1200	0.65
884	1185	160	1000	0.33
374	501	120	1000	0.33
344	461	110/95	1450	0.33
300	402	110/95	1450	0.33
200	268	90	1480	0.33
195 - 100	261-134	85	1450	0.16
95-50	127-67	85-60	1450	0.16
49-20	65-26	60-50	2950	0.16

Cost of electric motor rewinding

- Cost of a motor of 75HP/56KW : 2000 to 2500€
- Cost of rewinding: +/- 30% of motor initial cost

Consequences of poor rewinding

- Motor efficiency drop of 1.5 to 3%
- Increase in Amperage and energy consumption
- Cost of rewinding approx. 30% of initial cost
- Motor is rewinded only 2 to 3 times during its lifetime

Amperage increase after rewinding

- Initial Amperage for motor 75HP/56Kw
  - =(HPx746W)/(Phase x √3 x PF x E)
  - =(75 x 746W)/(415v x 1.732 x 0.85 X 0.85)
  - = 107.7 amps
- Amperage after rewinding
  - =(HPx746W)/(Phase x √3 x PF x E)
  - = (75 x 746W) / (415v x 1.732 x 0.85 x 0.83)
  - = 110.3 amps

Where PF = Power factor (fixed data given by OEM)

E = Motor Efficiency (Variable)

Increase in energy consumption

- Consum. After rewinding– Initial consum.
  - *110.3 A – 107.7 A = 2.6 A*
- Conversion in kWh
  - (2.6A x 415V x √3 x 0.85 x 0.83)/1000W= 1.32kWh
- Cost
  - Use 24h/d = 1.32kW x 24 x 0.05€ (tarif kWh)
  - = 1,58€ per day or 578€ per year
  - + cost of rewinding

Applications examples

Example 1

CASE STUDY 2005/05 : Fan bearing lubrication, results for the customer : temperature drop from 110°C to 50°C and energy consumption drop by 15 Amps.
HOW MUCH DID THE CUSTOMER SAFE ???????????????????????

Exemple 1

Situation Before
- Amperage = 309
- Temperature Brg 1 = 110°C

Situation After
- Amperage = 294
- Temperature Brg 1 = 50°C

Savings
- 15 A x 415V x 1.732 x 0.85 (PF) x 0.85 (E) /1000Kw
- = 7.79KW x 24h x 0.05 (tarif) = 9,35€ per day
- = 3.412€ per year

Exemple 2

Before use of MEMOLUB

After use of MEMOLUB

EXEMPLE 2

<u>Situation Before</u>

- Amperage = 9.1
- Temperature Brg 1 = 82°C
- Temperature Brg 2 = 84°C

<u>Situation After</u>

- Amperage = 8.5
- Temperature Brg1 = 71°C
- Temperature brg 2 = 74°C

<u>Savings</u>

- 0.6 A x 415V x 1.732 x 0.85 (PF) x 0.85 (E) /1000Kw
- = 0.31KW x 24h x 0.05 (tarif) = 0.37€ per day
- = 136€ per year

Temperature increase often reflects amperage and energy consumption increases

Exemple 3 – Exhaust Fan Bearing

Situation Before
- Amperage = 58
- Temperature Brg 1 = 80°C
- Temperature Brg 2 = 80°C

Situation After
- Amperage = 55.2
- Temperature Brg 1 = 65°C
- Temperature Brg 2 = 65°C

Savings
- 2.8 A x 415V x 1.732 x 0.85 (PF) x 0.85 (E) /1000Kw
- = 1.45KW x 24h x 0.05 (tarif) = 1,74€ per day
- = 635€ per year

Cost in electricity of an electric motor

- Amperage calculation

  =(HPx746W)/(Phase x √3 x PF x E)

- Conversion in kWh

  =(A x Phase x √3 x PF x E)/1000W

- Example

  - **motor 150 HP**

    =(150 x 746) / (415 x 1.732 x 0.85 x 0.85) = 215 A

    = 215 x 415 x 1.732 x 0.85 x 0.85 = 111KWh

    = 111 x 24 x 0.05 = 133€ / day

    = 133 x 365 = 48.600€ year

Comments

- Average, electric motors counts for 75% of electric consumption of a modern industrial plants.
- In some industries, the number of electric motors can be quite impressive (over a few thousend).
- Generally, more the temperature drops, more the electric consumption will also drop.