# *Energy Saving in Induction Motors -I*

Squirrel cage AC induction motor is the main work horse of industries & are estimated to consume approx. 70% of industrial power . This fact makes induction motor , a centre of attraction for all energy conservation drives . We will discuss possible energy saving opportunities with induction motors & various aspects for the same . There are 4 perspectives for energy saving in motors :

01. Motor efficiency
02. Loading patterns
03. Starting mechanism
04. Alternate technologies

This is the first article in the series of " Energy saving in motors " wherein we will discuss efficiency perspective of energy conservation .

## 01.Motor Efficiency :

Generally motors have two major losses .

a. Copper losses which depends upon the current flowing , which in turn depends upon the mechanical loading on the motor
b. Iron Losses, which depends upon the voltage supplied to the motor & are responsible for the magnetic field in the motor

Nameplate or design efficiency of the motor is the efficiency of the motor when it is loaded fully. So, nameplate efficiency is the sole result of the design & construction of the motor .

However ,the actual efficiency of the motor can be way different as it all depends upon :

a. Loading ( efficiency drops substantially as the loading reduces below 50%. Refer fig.1 )
b. Aging ( Estimated to be approx. 0.2% per year of use)
c. No. of rewinding ( Estimated to be approx. 3% per rewinding )

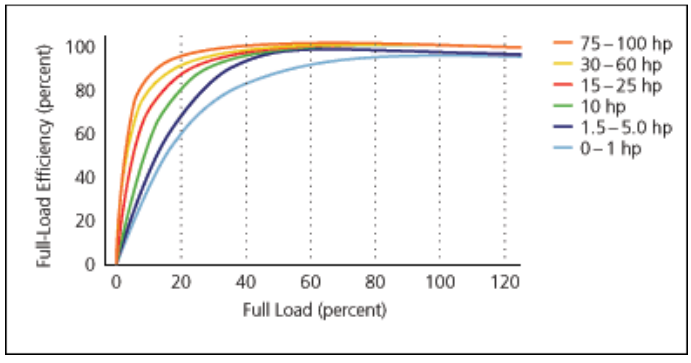


Fig.1

So, please ensure following to keep the actual efficiency of the motor to it's best..

01. Always buy IE3 motors.
02. Even if one replaces old motors upto IE1 efficiency std . by new IE3 motor without waiting for the old motor to fail. The cost of the new motor can be recovered within max. 2 years.
03. Do not rewind motors. It will be costlier if one calculates the life cycle cost.

Justification of the above decisions can only be given through the life cycle cost aspect. Life cycle cost is the amount which one incurs during the total life cycle of the equipment .e.g. In case of motors, the life cycle cost comprises of purchase cost, maintenance cost & energy cost during the life cycle ( approx. 10 years ). In case of motors, the energy cost is more than 85% of the life cycle cost. So, it is always a wiser decision to pay more purchase cost to reduce the energy cost.

I would like here to discuss one point to be noted while evaluating IE3 motors .

When one replaces the old motor with IE3 motor , apparently the instantaneous kW remains the same. Why ? Because the IE3 motors run with higher actual speed as the slip component is lesser than old motors. So, as they rotate with higher actual speed , they do more work in the same power consumption. So, Benefits of IE3 motors needs to be confirmed in terms of " Specific Energy Consumption". E.g. If a pump with old IE1 motor is filling a water tank in 40 min. then the same pump driven by an IE3 rated motor will fill the same tank within 30 min, keeping the instantaneous kW consumption same . So, energy consumed to pump 100 litres of water is less with IE3 motors. So, benefits of IE3 motors can be easily proved for closed loop applications , where speed control or switching on off of the motors is possible based on certain process parameters .

We will look at the other energy saving perspectives in next month....

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