Andhra Pradesh State Skill Development Corporation

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Basics of induction Motors

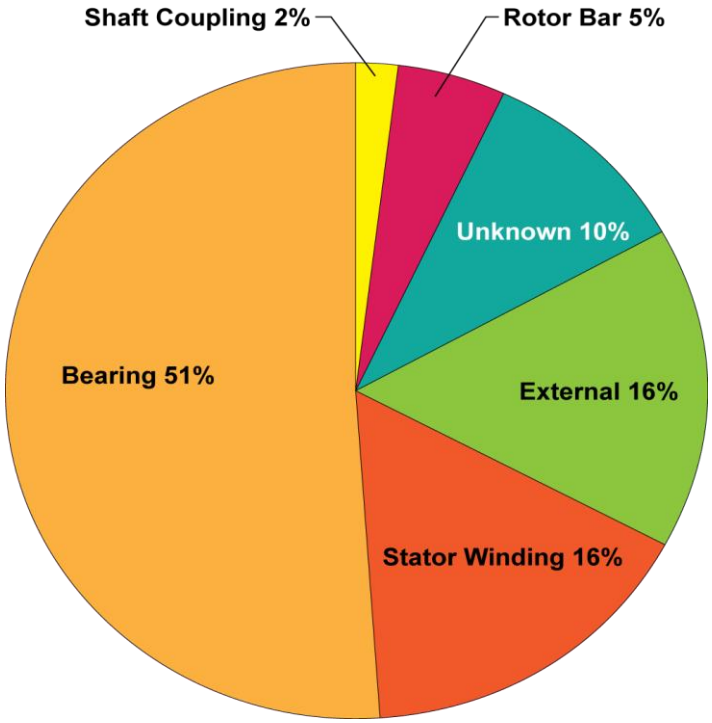
Trouble shooting of an induction motor

Before starting any troubleshooting

- Disconnect power to the motor before performing service or maintenance
- Discharge all capacitors before servicing motor
- Always keep hands and clothing away from moving parts
- Be sure required safety guards are in place before starting equipment

Motors don't fail just because of age or operating hours. Typical failures are caused by:

- Heat
- Power Supply Anomalies
- Humidity



General causes for motor failure

Heat

Temperatures over the design rating take their toll in various ways. Temperature also causes separation of greases and breakdowns of oils causing bearing failure.

Primary causes of overheating are:

- Overloading
- Too frequent starts
- High ambient temperatures (NEMA typical design is 40 ºC)
- Low or unbalanced voltages
- High altitude operation
- Inadequate ventilation i.e. damaged cooling fan, contaminated motor

Power Supply Anomalies

Ideal power is a perfect sine wave on each phase at the motor's rated voltage & frequency-rarely achieved. The following problems appear.

Harmonics: Cause overheating and decreased efficiency.

Overvoltage: At moderate levels is usually not damaging, but can reduce efficiency and power factor. (NEMA limit 110%)

Under-voltage: Increases current and causes overheating and reduced efficiency in fully loaded motors. It is relatively harmless in under-loaded motors. (NEMA limit 90% of rated).

Voltage unbalance: Causes overheating and reduced efficiency. Unbalance greater than 1% requires motor de-rating and motors should never be powered by a system with more than 5% unbalance.

Humidity

Humidity becomes a problem when the motor is de-energized long enough to drop near the dew point temperature.

- Moisture weakens the dielectric strength of electrical varnish and other insulating materials
- Contributes to corrosion of bearings and other mechanical components
- Moisture from the air can mix with certain particulate contaminants to create highly electro-conductive solutions.
- If the motor is warm insulation moisture can be reduced.