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## ***“Let's Do The Twist” - A Simple Perspective on AC Induction Motors***

The AC induction motor has become the workhorse of industry and, over the past 123 years, it has evolved to be powerful, reliable, efficient and adaptable in both fixed speed and variable speed applications. As materials, manufacturing techniques and cooling provisions have improved, these workhorse motors have become smaller and more powerful.

**Why has the AC induction motor fared so well and why is it so reliable?** I'm glad you asked. The simple answer is Simplicity of Design. Unlike DC motors which certainly have their place, AC Induction motors typically employ only a handful of component parts and of these, only the bearings which carry the rotating mass known as the Rotor are generally susceptible to normal wear over time.

**Before we dig in, let me ask a question:**

***In what year was the AC Induction Motor invented and by whom?***

**The first person to [email me](#) the correct answer (for the sake of time stamping) will win a \$25.00 Lowes Gift Card!**

While maintenance on AC induction motors is minimal and relatively simple, some preventative measures should be applied respective of installation and environment. Also, it is a measure of good discipline especially on critical applications to establish some benchmark data so that predictive analysis may be incorporated into your maintenance routine to measure and respond to out of tolerance vibration and even temperature data. These are signs indicating that maintenance should be budgeted and scheduled before forced downtime as a result of failure impedes your process, production or critical operations.

**What defines critical?** Any unplanned downtime that impedes operations at an unbearable cost to scheduling and profitability ought to be considered a smoking gun.

**What are the basic parts of an AC Induction Motor?**

**Frame:** The frame is the exterior housing and may come in many shapes and sizes. In addition, all frames fall into size categories based either on NEMA “National Electrical Manufacturers Association” or IEC “International Electrotechnical Commission” standards. Frames are available in Open, Drip Proof, Totally Enclosed Non-Ventilated, Totally Enclosed Fan Cooled, Water Cooled and more.

**Stator:** This is the fixed core of windings and laminations within the frame through which an electrical current is induced, in turn generating a magnetic field which the rotor will chase. The number of stacked windings or poles will determine the base speed of the motor expressed in RPMs or Revolutions Per Minute.

**Bearings:** These are the enclosed rotating “freewheeling” devices which carry the weight of the Rotor and Shaft assembly. Bearings may be sealed with special gaskets to keep out dust and contaminants which could and likely would impede performance and reduce mechanical life if allowed to pass the seals. All motors will have at least one set of end bearings while some larger and specialty motors may have multiple bearings to disperse and balance the weight over a longer span.

**Rotor Shaft:** The shaft carries the rotor and keeps it properly balanced on the bearings. Typically, both ends of the rotor shaft extend out the Frame or Motor Housing where one end may be used to mount a cooling fan and / or turn a motor speed Tachometer, Encoder or Resolver to provide feedback for Speed, Direction and Position. The opposite end of the rotor shaft drives the actual load either directly through a coupling or perhaps via belts and pulleys or a Mechanical Power Transmission device such as a gear reducer.

**Rotor:** The rotor is the rotating mass of stacked laminations which does the work of turning the rotor shaft.

***Stay tuned for more next quarter... Torque, Speed, Slip, Horsepower, Motor Nameplate Data and more!***