IDCON INC
8081 Arco Corporate Dr., Raleigh, North Carolina 27617
Phone (919) 847 8764, Fax (919) 847 8647
E-mail: info@idcon.com, Web site: www.idcon.com

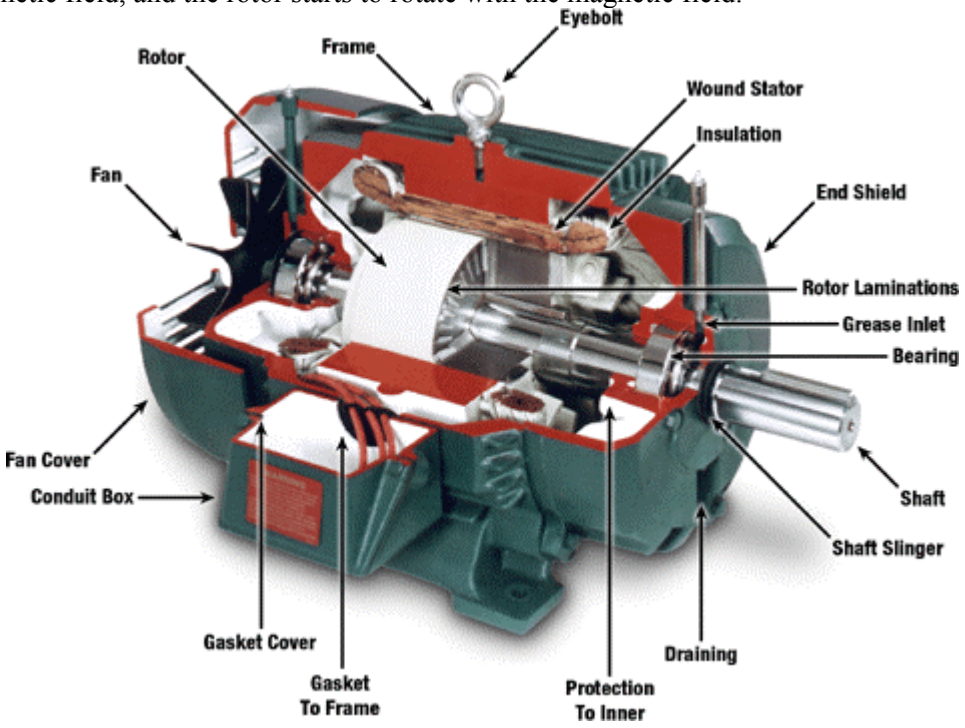
CMS100R
SAFETY FIRST!

CONDITION MONITORING STANDARD Version 1.2
MOTOR - AC

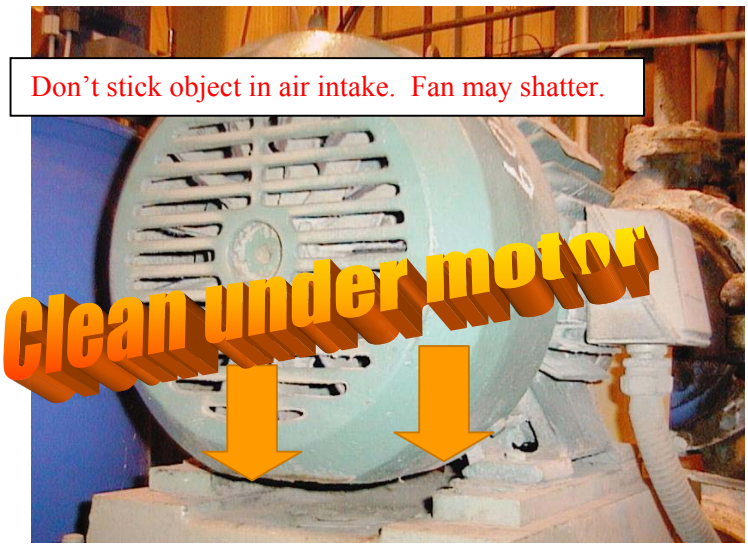
Basic Function

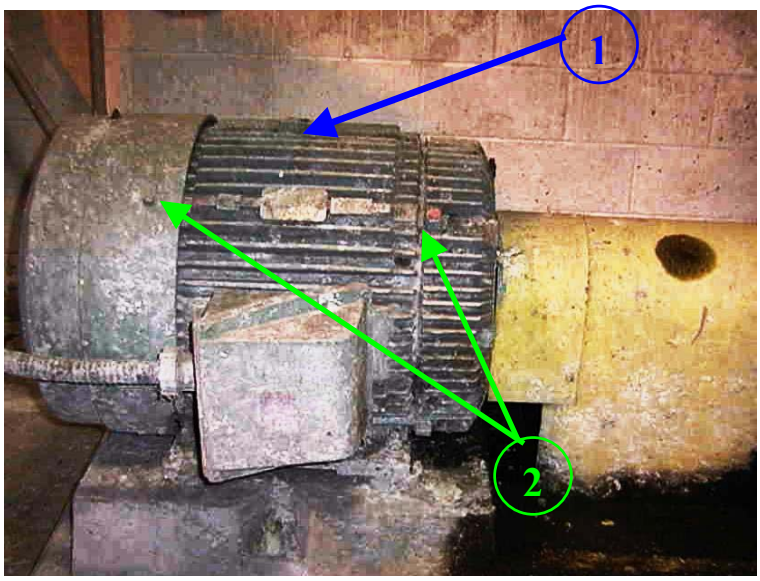
An Alternating Current (AC) motor has two major components, the stator and the rotor (see picture). The stator creates a rotating magnetic field. The rotating magnetic field acts on the rotor, causing it to spin due to the rotating magnetic torque.

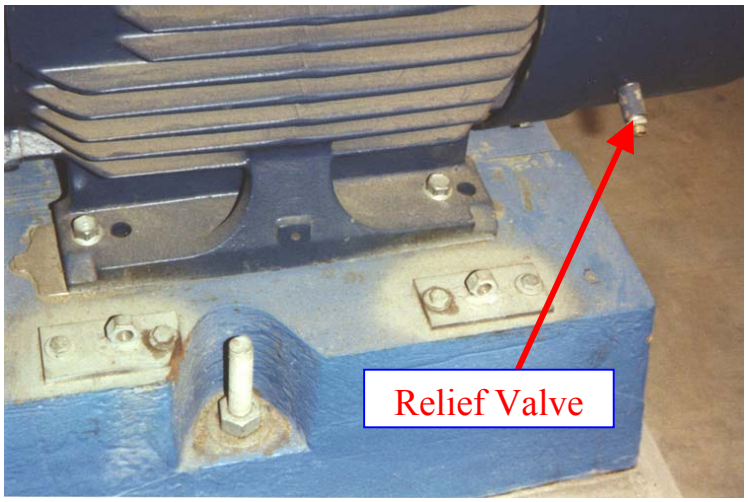
The rotating magnetic field from the stator is produced by the currents that are flowing through the stator windings. The stator windings have several "poles". The poles are activated by the current at different times, causing the magnetic field to move (rotate). The rotor is built of a number of magnets. The rotor magnets react to the rotating magnetic field, and the rotor starts to rotate with the magnetic field.



Courtesy: Reliance motors

KEY	HOW	WHY
Air Intake	Check for broken air intake fan and clogged air intake. If it is hard to see fan while motor is operating, use a stroboscope. It is recommended to paint the fan in a bright color when rebuilding or buying new motors, that way the fan can easily be seen from a distance. Fan cover can also be painted matte black to improve visibility of fan.	Temperature rise reduces motor life, see below.
Detailed cleaning	Clean the cooling fins & bearing housings from all dirt, stock & grease. Clean cooling inlet & outlet fan area, making sure that the air flow is not blocked in any way. Note: The airflow outlet & gap under the motor can be overlooked, make sure that these spots also are cleaned.  	18°F (10 °C) increase in temperature decreases electrical life of motor by 50%. **Safety issue:** Some motors have no guard/cover on bottom of motor. Beware of electric hazard!
Water/ Humidity	Check for unnecessary water, or humidity around motor, especially check that electrical connections are not exposed to water or moisture.	**Safety issue.** Will also cause winding damage (even if motor is made to withstand water there are limits for how long and how much water a motor can withstand). Water can cause a short in the motor and leakage to ground.

KEY	HOW	WHY
Temperature	Scan clean areas of motor with an Infrared Temperature Gun (IR-Gun)  	**1.** High temperature in the middle of the motor may indicate damaged winding, or that motor operates close to maximum output capacity. **2.** Hot spots at the bearings may be caused by damaged bearings, misalignment, over- or under lubrication. Check if coupling is hot, if it is, the problem may be alignment.
Noise and Vibration	Listen for abnormal noise and vibration. Listen to the motor closely and try to detect any unusual noise. Vibration can be detected by: 1. feeling motor (subjectively) 2. take vibration reading with vibration pen 3. take full spectrum vibration reading 1. Try to detect unusually high vibration level by putting a hand on different spots on the motor. 2. If a vibration pen is used, it is usually enough to take the vibration reading in the horizontal plane (horizontally mounted motor). The highest vibration value will usually appear in the horizontal plane. To enable trending, mark where to take the reading on the motor. A general guideline for this type of equipment is not to exceed 0.25 in/s (about 6 mm/s). Be aware that this number is a rough guideline and is dependent on rpm, and bearing clearances. If a high vibration level is detected, lubricate the bearings while measuring the vibration level. The vibration level should go down as the grease hits the bearing. When the vibration level stops going down, make sure to stop lubrication. This will ensure that you do not over lubricate. Check the motor 2-3 days later and measure the vibration level again, if the vibration level is high, the lubricant has escaped, or the bearing is damaged. Ask vibration technician to check bearing. For motors in operation where the consequence of a failure costs at least twice as much as the cost of measuring a full vibration spectrum should be recorded every 2-3 weeks. Refer to vibration analysis tools ad procedures.	Noise and vibration can be caused by looseness in mounting or coupling, misalignment, worn bearings, damaged winding, broken air intake fan. Equipment near the motor may induce vibration. Over lubrication will either: 1. Increase the heat in the bearing due to increased resistance. Heat will reduce bearing and seal life dramatically. 2. Destroy bearing seal and expose the bearing to dirt which will reduce bearing life dramatically.

KEY	HOW	WHY
Motor Base	Check that all retaining bolts are tight & that they are free from corrosion, a corroded bolt and/or washer is a loose bolt, or it will become loose soon. Replace corroded bolts; make sure washers and bolts are made of the same material, or combinations of material that does not cause galvanic corrosion. Look for corroded and damaged base. Check foundation for erosion and damage. Make sure seal water from, for example, pump or agitator is not eroding the base.	Loose mounting bolts will gradually cause misalignment. Two dissimilar metals will corrode when put together. A damaged base and/or foundation will cause misalignment and vibration.
Electrical	Check for damaged wires. Inspect flexible conduit and make sure conduit is mounted correctly & not damaged. Check condition of junction box **Electrician:** Check leakage to ground. Take volt reading & check each phase for unbalanced voltage. Electrical unbalance will cause the same problem as if the motor is mechanically unbalanced	Exposed wiring is a safety issue. Exposed wiring can also cause short circuits and other electrical problems
Greasing	If there is a drain plug: Check that grease drain plug can easily move. Lubricate both bearings according to bearing recommendations. Make sure sealed bearings aren't greased by removing grease fittings, and drain plugs. Use a Lubechecker, or other vibration tool when greasing to monitor the amount of grease that reaches the bearing. Excess grease will go into motor winding.  If the motor has a grease nipple, but no relief fitting, all excess grease will go into the motor. This is usually the case with one-sided sealed bearings in motors. Note: Drain plugs are often painted (and gets stuck) by mistake.	If drain plug is not removed or relief valve is not moving freely, grease will push against bearing seals and destroy them, excess grease will eventually go into the motor winding, potentially causing winding insulation deterioration. Excessive greasing will cause the bearing to run hot due to too much resistance from the grease.  Lubechecker by SPM instruments

