



Synchronous Motors

For the Paper Industry

Electric Machinery (EM) synchronous motors incorporate special features making them the right choice for use in the corrosive environments found in paper mills.



Synchronous motor driving a grinder in a paper mill.

Ranges

Output: 500 to 25,000 HP
Speed: 180 to 1,800 RPM
Voltage: 2,300 to 13,800 VAC
Power factor: 0.8 leading to 1.0 unity

Advantages

- **Higher efficiency**
Synchronous motors have a unique and merited position as the most efficient electrical drive in the industry and are often 1-2% more efficient than induction motors.
- **Power factor correction**
Synchronous motors can operate at leading power factors, providing VARs to the power system, reducing demand charges often caused by induction motors.

• Constant speed

Synchronous motor speed is unaffected by line or load conditions, providing greater operating flexibility. Starting and pull-in torques are designed to accommodate electrical system requirements and load limitations.

Rotor

• Rotor construction

The rotor consists of a spider on which the field poles, amortisseur (cage) windings and brushless exciter armature are mounted. All material used in the coil insulation system will be Class F material. Field coils consist of a copper conductor of rectangular wire or copper strap with each layer treated with a suitable filled epoxy resin or aramid fiber.

• Rotor poles

The rotor poles are comprised of steel laminations pressed and bolted together to withstand rotational and electrical stresses and are mounted to the spider rim by bolts, studs or dovetails. The wirewound poles are then epoxy bonded layer-by-layer to hold the windings firmly.

• Rotor cage bars

Phosphorous-free brazing of cage bars prevents chemical corrosion which can cause machine failure.

• Rotor shaft

The shaft will be forged steel or rolled steel, accurately machined and smoothly finished where required.





Vacuum pump drive



Synchronous motor with PMDP™ enclosure driving a refiner.

Stator

• Stator construction

The stator is composed of a supporting structure, a core of electrical laminations and insulated windings. High grade silicon steel laminations that build up the core are precision punched from core-plated sheets. Pressed and held between end plates, these laminations are stacked in the support structure and spaced for radial ventilation to ensure even cooling throughout the core. The frame is welded and machined to withstand stresses exerted by electrical and mechanical forces in the core and provide low vibration levels.

• Stator winding insulation

The Duraguard™ insulation system is a vacuum pressure impregnated epoxy-mica insulation system that provides Class F thermal capability, outstanding dielectric properties, superior moisture and chemical resistance and the superb mechanical integrity of an epoxy resin system. It is a sealed insulation system capable of passing the water immersion test as specified by NEMA MG 1 and IEEE 115. Abrasion-resistant coating is available for protection in demanding environments.

Brushless Excitation

The brushless excitation system eliminates periodic brush and collector ring maintenance and replacement. Solid state excitation components are rated conservatively to provide dependable service and long life. Electric Machinery EM's Sync-Rite™ system applies the field automatically at the proper rotor angle to ensure smooth synchronization.

Industry standards

Electric Machinery EM manufactures synchronous motors to meet all current industry standards including NEMA MG 1, IEEE 115, and ISO 9001:2000 standards. Motors can be designed to match your existing machines space limitations, shaft heights, and mounting foot locations to minimize installation costs.

Paper Mill Construction Features

- PMDP™ enclosure provides splashproof protection for wet locations.
- Durable high tin base babbitt bearings to withstand higher temperatures.
- Stainless steel collector rings on brush type motors last longer, reduce maintenance, and resist corrosion.
- Durable epoxy prime and finish paints protect your investment from corrosion.

Applications

Typical applications include chippers, refiners, vacuum pumps, grinders, fan pumps, and variable speed fans.

These special features are standard when the application is specified:

Chippers

- Stiffer frame construction has larger cross section at base to accommodate the intense shock and vibration associated with rigorous chipper duty.
- Rotor construction has higher strength materials incorporated with a larger rim cross sectional area at the spider hub to resist high torsional peak vibration.

- End rings are copper or copper alloy construction to withstand heat cycling and provide long life.
- Motor is anchored with extra stator-to-base hold-down bolts and grouted in foundation.
- Stainless steel collector rings where collector rings are furnished.

Refiners

- Equipped with Electric Machinery EM patented oil-lubricated thrust bearing with high bidirectional axial thrust capability.

Vacuum Pumps

- Stator shift feature is available to fully expose rotor for easy maintenance.
- Double shaft extensions permit driving machines from both ends.

Experience

Electric Machinery EM has over a century of experience in designing, manufacturing and servicing large synchronous motors for the paper industry.



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