

GE Energy's DC Motor Repair Services can help you improve performance, reduce maintenance costs and maximize productivity. DC motors are designed to provide flexible performance for demanding applications—and total plant output may depend on them. The complexity of these motors requires a high level of repair and service expertise to maximize their output and uptime. Trust your DC motors to GE and the many years of knowledge and expertise we bring to their manufacture and repair.

### The Complexity of the DC Motor

DC motors often have many more parts than do AC motors. And, unlike most AC motors, they do not share generic designs. In fact, DC motors have undergone many design changes and improvements over the years. Consequently, servicing and repairing them requires a higher level of engineering knowledge and craft expertise. Here are just a few examples of the complexity involved in DC motors:

- The rotating armature winding must be formed, filled and supported properly to overcome contamination, thermal stress and torsional and centrifugal forces.
- The need for current commutation complicates the rotating armature structure.
- Coil insulation is often quite thin to maximize the rating. Proper repair requires not only technologically advanced materials, but exacting processes in coil manufacture and installation.
- Separate main fields and commutation fields mean extra windings, cable and connections.
- The brushes and brush rigging add more parts, requiring adjustment and maintenance.
- Conducting dust (carbon) contamination—as well as oil and moisture in many applications—is constantly present. Evaluation is critical to prevent improper operations.

### Failure Analysis – The Valid Approach to the Repair of DC Motors

Knowing when and how a motor failed, coupled with the ability to implement well-qualified solutions, leads toward greater life expectancy and improved performance. On-site, GE will study operating requirements, environmental conditions, original motor installation, and maintenance and operator practices.

Often, GE can solve problems with corrective redesign or modernization of the motor to better equip it for its application and environment. GE knowledge of failure patterns and definitive diagnostic techniques can pinpoint root-failure cause and reduce the chance of a repeat of the motor failure.

### Services Provided

- Basic overhaul service
- Failure and analysis
- Armature and field frame rewinds
- Upgrades, modifications, retrofits and exchange
- Parts and brush stocking programs
- Component design and custom-made components
- Maintenance programs including:
  - Equipment Management Program (EMP)
  - Digital Diagnostic Management Solutions (DDMS)
  - Condition Forecaster™ Monitoring



## Benefits

- Greater life expectancy
- Improved performance
- The peace of mind gained from GE's DC motor expertise

## Motor Performance

Critical to the longevity of DC motor life are the armature coils and field frame. Our expert knowledge and service keep these two elements at their highest levels.

### Armature Coils

Quality starts in the coils themselves. In modern DC motors, insulation materials must be very thin to provide the most room for copper within the slot and maximize the motor's rating. The wrong insulation or improper installation techniques will compromise the coil—and therefore the motor performance and life. Coil shape and fit are very important:

- Only one shape will fit uniformly and tightly within the specific motor's slot dimensions and available end winding space.
- Proper coil fit reduces the amount of flexing and distortion during installation and banding and prevents damage to the winding that can lead to later turn-to-turn failure.
- A tight fit is also critical because centrifugal and torsional forces are exerted on the coil during operations, and movement can lead to turn-to-turn failure. In addition, heat transfer from coil to core iron is an important element in long winding life, and it is enhanced by tight coils.

GE Energy uses genuine renewal parts on GE motors and competitive equipment. Our own Inspection & Repair services group sources coils using the latest materials and methods.

### Field Frame

Although the armature is the heart of a DC motor, the field frame—with its field poles, compensating poles, pole face bars and many connections—is also critical to long motor life. GE has in place all the technical resources and tooling for the care that the field and its components need.

- Field poles are normally subjected to:
  - Contamination by carbon dust, oil mist and moisture carried in the cooling air
  - Heat from motor operations
  - Abrasion from mechanical forces

For this reason, the field poles must be well sealed to prevent contaminants from damaging the coil and well-compacted for a solid heat transfer path for cooling and avoiding abrasion from vibration.

Service, repair and refurbishment standards at GE address these needs. GE uses original equipment manufacturing standards so that you receive quality comparable to a new machine.

- Compensation poles must also receive close attention if motor performance is to be maintained. These coils pass armature current, so the current-carrying capacity of the connections is critical. The wrong material selection or design changes can reduce the compensating effectiveness.
- Pole face bars carry armature current for motor commutation. Because they are large cross-sections that expand when they heat up, their insulation must adhere to very specific standards of manufacture and material selection or the insulation will crack or tear.



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