



The Leader in Industrial Repair

Guidelines for a Successful Motor Repair Partnership

Having a clear understanding between the client and the motor repair center will produce a more satisfactory experience.

It is important to provide the following information or answer the following questions.

- Complete nameplate information including manufacturer, horsepower, speed, voltage, phase, enclosure, catalog, part and/or model number as well as frame.
- What does the motor operate (a fan, blower, conveyor belt, pump)?
- How does the motor drive the load (direct drive, belted)?
- Is there auxiliary equipment attached like a clutch, gearbox or brake?
- Why do you think the motor needs repair (it smokes, it doesn't run, it needs preventative maintenance)?
- What is the motor's past repair history? Is it a "problem motor"?
- How is the motor started (across the line, soft start, adjustable speed drive, part winding start, wye start, delta run)?
- What is the operating environment (indoors, outdoors, subject to hazardous fumes or dusts, water spray)?
- When do you need the motor back? Will you authorize overtime work if necessary?
- Is the motor still under manufacturer's warranty?

You should expect the motor service center you select to provide answers to the following questions:

1. What are my repair/replacement options?

In the case of standard motors, repair may not always be the best option. The motor service center should be able to offer premium efficiency replacement alternatives to repair which may save you operating dollars. Bear in mind, *however that many motors*

are special and not readily available off the shelf. This may make repair the best option. Discuss this with your service center.

2. Do you have experience in repairing this type and size of motor? Do you have access to similar replacement motors?

The motor service center probably specializes in certain sizes and types of motors (AC and/or DC, vertical pump motors, single or three phase motors, gear motors). If the motor is an ordinary one, they should be able to offer replacement models to meet your needs in a timely manner.

3. How can we get the motor in for repair?

Most service centers will pick up the motor. In the case of a very large motor, or located at a remote site, some coordination with a crane or other material handling equipment may be necessary.

4. What standard will you use when repairing my motor? What is your warranty?

Many motor service centers are members of the Electrical Apparatus Service Association (EASA) and perform repairs to the **EASA Recommended practice for the Repair of Rotating Electrical Apparatus**. A clear understanding of the warranty offered will help avoid disagreements later. Remember that a warranty is only as good as the company behind it.

5. Are you an authorized warranty shop for this motor?

If the motor is under warranty, be sure the shop is authorized to perform warranty work.

After the motor has been inspected, you should expect to be told:

1. What is involved in the repair.

The service center should tell you if the motor needs rewinding or just bearing replacement and clean up. They should tell you what tests they performed to substantiate these findings.

2. How long will it take to complete the repair?

Remember, a good repair, including rewind, can take several days or more. Cutting corners on a repair can cost you money and even result in premature motor failure.

3. What will the repair cost?

You should expect to receive an accurate cost estimate for the repair. Remember, however, that repair costs can vary once the shop actually starts the repair because they may find hidden problems that were not readily apparent on the initial inspection. Be prepared to work with them to obtain the best repair possible.

4. What your options are.

Many service centers can offer repair/replacement options. In some cases the motor- because of age or type- may not be readily or economically replaced. In other cases, a new motor may be the best way to go. If the motor was designed specifically for an OEM, the replacement may have to come from the OEM. Work with your service center to find the best solution for you.

A good motor service center SHOULD:

1. **Conduct a stator core test before and after winding removal.** This will assure that the core has not been damaged during the repair.
2. **Repair or replace defective stator core laminations.**
3. **Calibrate all test equipment and measuring devices at least annually against standards traceable to the National Institute of Standards and Technology (NIST) or an equivalent standards laboratory.** This will insure the accuracy of the readings taken during repair.
4. **Measure and record winding resistance and room temperatures.** The resistance in all three phases should be balanced. If it is unbalanced by more than 5%, the motor should be tested further. It may need rewinding.
5. **Have the appropriate power supply for running the motor at rated voltage.** Measure and record no-load amps and voltage during the final test. Tests at reduced voltage may not reveal certain motor problems.
6. **Have a quality assurance program.** This will ensure that you get the same quality of repair each time.
7. **Have and use, at a minimum, the following test equipment: ammeter, voltmeter, wattmeter, ohmmeter, megohmmeter, high potential tester.** Other useful instruments include surge testers, core loss testers, dynamometers, tachometers, vibration meters, and milliohmmeters.
8. **Balance of the rotor.** Out of balance rotors can cause vibration, which can prematurely wear out the bearings, and increase friction losses. This results in loss of efficiency.
9. **Repair or replace a broken or worn fits and parts.** Bearing fits should be measured and if worn should be restored to manufacturer specifications. In the absence of manufacturer guidelines, EASA has published bearing fit charts to aid the motor service center.
10. **All relevant reporting and testing data, before and after the repair should be provided with delivery as well as root cause failure analysis.**

A good motor service center SHOULD NOT:

- 1. Overheat the stator. The safe limit for organic lamination insulation is 680 degrees F, for inorganic material measured at the core. Most service centers use heat to soften the old windings for removal. Overheating the stator during stripping can cause core damage.**
- 2. Sandblast the core iron. Blasting with sand or other hard materials can cause short circuits between laminations.**
- 3. Knurl, peen or paint bearing fits. Knurling, peening, or painting these fits could cause them to become loose in service.**
- 4. Use an open flame for stripping. Using uncontrolled heat causes loss of core plating, and can warp the core.**
- 5. Short the laminations when grinding or filing. Excessive grinding and filing can increase core losses resulting in decreased motor efficiency.**
- 6. Increase the air gap. Increased air gap produces higher magnetizing current, which increases stator and rotor copper losses and decreases power factor.**
- 7. Increase the resistance of the stator windings. Increased resistance results in increased stator copper losses and decreased motor efficiency.**
- 8. Make mechanical modifications without your prior approval. This includes, among other things, changing fans, types of bearings, shaft material and seals. Making changes in the manufacturer's original design can decrease motor efficiency.**
- 9. Change the winding design without your prior approval. This can affect the overall efficiency, torque and other characteristics of the motor.**

Additional characteristics you should expect from your motor service center:

- *Maintain a stable, knowledgeable and well trained staff to service your needs.***
- *Maintain a sound financial condition.***
- *Be environmentally responsible.***
- *Utilize best practices and procedures.***
- *Provide prompt and accurate quotations.***
- *Provide repair/replace options.***
- *Provide 24 hour emergency service, seven days a week.***
- *Provide prompt and courteous service.***

