

APPLICATION NOTES



Microstructure and crack testing on rotor shafts using eddy current

As a central component of electric motors, rotor shafts ensure the torque transfer from electrical energy to kinetic energy. Without the rotor shaft, an electric vehicle would not move. Withstanding very high loads requires high-strength and sophisticated components. Non-destructive eddy current testing is suitable for detecting material and microstructural defects before they make it into a vehicle. For example, cracks or hardness defects are detected at an early stage and defective components can be sorted out accordingly.



Fig. 1: Modern electric motor

The MAGNATEST D testing instrument with encircling coils adapted to the test areas is used for microstructure testing of the rotor shafts. Low-frequency eddy currents are induced in the material. The different microstructural and hardness states as well as alloy constituents change the receiver currents and thus allow conclusions to be drawn about the material properties of the test part. In this way, critical areas of the rotor shaft can be quickly checked after induction hardening and the components sorted accordingly.



Fig. 2: MAGNATEST D & encircling coil

For subsequent crack detection, the STATOGRAPH CM+ eddy current test system is used in conjunction with highly sensitive differential probes. The probe scans the material surface, especially in the area of the tothing and the radii, for defects such as hardening cracks. Such surface defects lead to irregular propagation of eddy currents in the material. This is detected by the probe and displayed as a signal.



Fig. 3: STATOGRAPH CM+



Fig. 4: Typical eddy current signal in case of crack

For the microstructure testing of rotor shafts, we recommend the MAGNATEST D testing instrument with an encircling coil. This ensures standardized testing of the material properties and thus sorting of the components. For additional crack detection the testing system STATOGRAPH CM+ with differential probe is used. For further information, please visit our homepage at: foerstergroup.com