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DETECTION OF HIGH-TEMPERATURE CORROSION ON TURBINE BLADES

High-temperature corrosion on turbine blades can weaken the material unnoticed and compromise operational safety. Permeability measurement with MAGNETOSCOP detects even small areas of sulfidation and supports reliable condition assessment.



THE CHALLENGE

Turbine blades in aircraft engines and energy applications face extremely high temperatures and demanding operating conditions. Although nickel-based alloys are designed for these environments, prolonged thermal exposure can lead to high-temperature corrosion known as sulfidation. Above approximately 700 °C, sulfur-containing compounds can react with the blade material and progressively attack the alloy. Even small affected areas weaken the material and increase the risk of cracking and component failure. As early-stage sulfidation is often not visible, maintenance requires a sensitive method that detects material changes before significant damage occurs.

THE SOLUTION

Sulfidation changes the magnetic properties of the affected material: while the nickel-based alloy of an intact blade is essentially non-ferromagnetic, corrosion creates locally ferromagnetic areas. Highly sensitive permeability probes detect these changes, and the signal increases with the extent of damage. For manual inspection during maintenance, the probe P-P-2-5 is guided across the relevant blade areas with the portable MAGNETOSCOP 1.070. For automated processes, the MAGNETOMAT 1.790 operates up to four probes in parallel, allowing larger areas or multiple inspection positions to be evaluated efficiently.



THE RESULT

Permeability measurement detects even small areas affected by sulfidation that may not yet be visually apparent. Maintenance personnel gain an additional means of assessing the condition of turbine blades and identifying critical material changes at an early stage. The measurement is non-destructive and can be performed manually or integrated into automated inspection processes. Depending on the application, the MAGNETOSCOP enables flexible, localized measurements during maintenance, while the MAGNETOMAT increases inspection throughput through parallel operation of several probes.

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MAGNETOSCOP

Portable Solution For Magnetic Field and Permeability Measurement



PROBES AND SENSORS FOR MAGNETOSCOP & MAGNETOMAT

Flexible Solutions for Magnetic Field and Permeability Measurements



MAGNETOMAT

PC-supported magnetometer for measuring magnetic flux density and relative permeability

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