



Nondestructive Testing Systems with Magnetic Flux Leakage (MFL)

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Ferromagnetic components used in mechanical, automotive and civil engineering are mostly subject to high mechanical loads. Cracks, which may form during manufacture or in use, may lead to a complete failure of the component in the worst case. Flaw detection directly after the production or a regular inspection of the components (especially in civil engineering) is necessary.

In industrial production of ferromagnetic components predominantly magnetic particle testing is used. This testing method is indeed nondestructive, but its implementation is associated with high personnel expenses. Automation of the process is complicated by the fact that the magnetic powder accumulates in any existing indents. This degrades the contrast and makes an automatic detection of the flaw indication more difficult.

The automotive industry needs alternative testing methods for process-oriented crack detection.

However, in civil engineering there is a lack of nondestructive testing methods for fracture detection and localization. Even if the critical areas are known, the construction currently has to be damaged to expose the elements which have to be tested.

The probe-assisted magnetic flux leakage (MFL) testing method is used for the detection of cracks and fractures in ferromagnetic materials. The magnetic flux leakage testing uses the same physical principle as magnetic particle testing; in magnetized components an increased magnetic field strength (flux leakage) occurs at the crack mouth.

Manual or manipulator-operated highly sensitive magnetic field sensors with or without contact to the test surface are suitable to detect the magnetic flux leakage. Sensor rows or matrices thereby enable rapid testing of complex components (e.g. gearing). The process can be fully automated and integrated into the production process. This facts and further benefits like high detection sensitivity offer various possibilities for implementation in testing systems.

