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Magnetic Particle Testing (MT) | Magnetic Particle Inspection (MPI)

How magnetic particle testing (MPI) detects surface discontinuities

Magnetic Particle Testing (MT), also known as **Magnetic Particle Inspection (MPI)**, is a widely used **non-destructive testing (NDT)** method for detecting surface or near-surface discontinuities in ferromagnetic materials. It applies to components such as finished articles, billets, hot rolled bars, castings, and forgings. The process consists of magnetising the part under inspection, applying magnetic particles, and interpreting the patterns formed when those particles are attracted to magnetic leakage fields caused by defects.

MT can be carried out using **visible or fluorescent particles**, in either wet (fluid suspension) or dry powder form. Visible wet particles—typically black—may be used with white contrast paint to enhance visibility. Dry particles are available in red, black, yellow, and grey. Fluorescent MT, which is more sensitive, uses only wet particles and requires a UV-A lamp and a darkened inspection area. Contrast paint is not typically used in fluorescent inspections.

The magnetic field can be generated using different techniques: the yoke method (indirect), prod or clamp (direct), and bench methods such as headshot (direct) or coil (indirect). A power source is generally needed both for magnetising the part and operating the UV-A light in fluorescent testing.

THE Applus+ SOLUTION

Certified MPI services with qualified technicians and trusted equipment

Applus+ provides magnetic particle testing services using equipment and materials sourced from reputable manufacturers whose products meet code requirements. Our procedures are carried out according to a written practice in compliance with **ASNT SNT-TC-1A**, ensuring quality and consistency.

Our certified technicians are trained to deliver accurate inspections and are available to support clients as challenges arise throughout industrial operations.

Target customers

Industries and components where magnetic particle inspection applies

Magnetic particle inspection can be applied at any stage of a product's life cycle—from initial ingot forming and forging, to final machining or welding, and even after the component has entered service. This flexibility makes MPI valuable for ongoing quality assurance.

Industries that commonly use MPI include:

- Structural steel
- Automotive
- Petrochemical
- Power generation
- Aerospace
- Maritime
- Food processing
- Paper production

Commonly detected discontinuities include:

- Cracks
- Laminations
- Seams
- Porosity
- Pipe
- Cold shuts
- Hot tears
- Lack of fusion

These flaws are either at the surface or close enough to be revealed by the magnetic field. Applus+ helps clients detect such defects early to preserve product integrity and reliability.

Key customer benefits

Operational benefits of using magnetic particle testing in industry

Modern industrial complexity and the demand for safe, reliable components require inspection methods that ensure high performance. When properly applied, magnetic particle testing offers the following advantages:

- Greater product reliability through early defect detection
- Improved production processes by identifying issues early for timely correction
- Lower costs due to fewer returns and less rework
- Overall enhancement in quality assurance

Magnetic particle testing remains a key part of the Applus+ portfolio of **non-destructive testing services** for ensuring consistent quality and operational safety.