

# Fluorescent Penetrant Inspection (FPI) - Overview

## NDT Inspection Method Applicability

Fluorescent Penetrant Inspection methods (a.k.a., FPI and a form of PT) are typically used to detect cracks, micro-shrinkage, or other discontinuities that are *open or otherwise connected to the surface* of a part being inspected.

In general, FPI can be applied at any point during the manufacture and/or in-service use of an applicable part. Applicable parts are those made of ferromagnetic or non-ferromagnetic material, including some plastics and ceramics. FPI cannot be used on parts with interfering coatings or contaminants. Surface defects as small as .015" (.38mm) can be reliably detected with FPI. In some cases it is also used to detect defects as small as .005". In the case of porous materials such as some castings, FPI is also used - but to detect much larger discontinuities.

In aerospace applications for example, FPI is commonly used on aluminum, titanium, and magnesium alloys, stainless steel, brass, and copper as well as graphite-epoxy composite materials.

## Inspection Service Overview

The following are the basic steps involved in conducting an FPI examination:

- A. Receipt/Traveler Documentation
- B. Pre-Inspection Cleaning & Drying
- C. Apply Fluorescent Penetrant
- D. Removal of Penetrant & Drying
- E. Developer Application
- F. Visual Inspection under UV Lighting
- G. Evaluation & Disposition of Any Indications
- H. Post-Inspection Cleaning
- I. C-of-C Documentation
- J. Pack & Ship



Developed part under inspection in UV Room



Inspectors in FPI Work Line

## Benefits of Contracting MTC for FPI Services

We are a Nadcap certified facility with qualified NDT personnel in accordance with MIL-STD-410. We are a self-owned company, providing **independent** inspection services, free of any potential conflict of interest.

As of 2003, we have 41 years of FPI service experience. Our FPI staff includes Level II and III personnel. Our general turnaround is within 24 hours for typical batch sized jobs.

We offer the following range of FPI techniques:

- Fluorescent penetrants for all sensitivity levels (i.e., up to and including Level 4 Ultrahigh)
- Removers: Water soluble, both Lipophilic and Hydrophilic Post Emulsified (oil based), and Solvent removable
- Developers: Dry Powder, and Wet Non-aqueous

The vast majority of the FPI we do is laboratory based, using a hydrophilic post emulsified remover and a dry powder developer. We also do some field inspection work using FPI, typically using a solvent remover, and a non-aqueous wet developer.

## Applicable Codes & Standards

Metals Testing Company's FPI methods comply with and have been approved for numerous aerospace and miscellaneous applications. A *sampling* of such specifications and requirements that we are approved for include:

- General Electric Specification P3TF2
- Pratt & Whitney Specification FPM
- Rolls Royce Specification RPS 702
- SAE's AMS 2645
- MIL-STD-6866
- ASTM E1417

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