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## **Non Destructive Testing –**

**NDT** - use test methods to examine an object, material or system without impairing its future usefulness. Non-destructive testing is often required to verify the quality of a product or a system. Commonly used techniques are

- AET - Acoustic Emission Testing
- ART - Acoustic Resonance Testing
- ET - Electromagnetic Testing
- IRT - Infrared Testing
- LT - Leak Testing
- MT - Magnetic Particle Testing
- PT - Dye Penetrant Testing
- RT - Radiographic Testing
- UT - Ultrasonic Testing
- VT - Visual Testing (VI - Visual Inspection)

### **AET - Acoustic Emission Testing**

Acoustic Emission Testing takes advantage of the sharp sound that PCCP emits when it breaks or slips to identify areas of active distress within a construction. AET can be used to verify the structural integrity of pressure vessels, spheres, high temperature reactors and piping, coke drums, above ground storage tanks, cryogenic storage tanks and more. The inspection is executed externally and shut-down of the process may often not be necessary.

### **ART - Acoustic Resonance Testing**

After an impact a specimen will vibrate in certain characteristic modes and frequencies that can be measured by a microphone or laser vibrometer. Acoustic sonic and ultrasonic resonance analysis is a non-destructive testing technique that allows testing of a wide range of test objects. Typical detecting faults are cracks, cavities, detached layers, material inconsistencies, hardness deviation in materials.

### **ET - Electromagnetic Testing**

Electromagnetic testing is the process of inducing electric currents and/or magnetic fields inside a test object and observing the response. A defect in the test object may be detected where electromagnetic interference creates a measurable response.

### **IRT - Infrared Testing**

Infrared testing is a technique that uses thermography, an infrared imaging and measurement camera, to see and measure infrared energy emitted from an object. Can be used to heat development, lack of insulation, thin walls in constructions and more.

### **LT - Leak Testing**

Techniques used to detect and locate leaks in pressure containment parts, pressure vessels, and structures. Leaks can be detected by using liquid and gas penetrant techniques, electronic listening devices, pressure gauge measurements or soap-bubble tests.

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### **MT - Magnetic Particle Testing**

Magnetic particle testing is accomplished by inducing a magnetic field in a ferromagnetic material and then dusting the surface with iron particles. The surface will produce magnetic poles and distort the magnetic field in such a way that the iron particles are attracted and concentrated making defects on the surface of the material visible.

### **PT - Dye Penetrant Testing**

The dye penetrant testing can be used to locate discontinuities on material surfaces. A highly penetrating dye on the surface will enter discontinuities after a sufficient penetration time, and after removing the excess dye with a developing agent, the defects on the surface will be visible.

### **RT - Radiographic Testing**

Radiographic testing can be used to detect internal defects in castings, welds or forgings by exposure the construction to x-ray or gamma ray radiation. Defects are detected by differences in radiation absorption in the material as seen on a shadow graph displayed on photographic film or a fluorescent screen.

### **UT - Ultrasonic Testing**

Ultrasonic testing uses high frequency sound energy to conduct examinations and make measurements. Ultrasonic inspection can be used for flaw detection/evaluation, dimensional measurements, material characterization, and more.

### **VT - Visual Testing (VI - Visual Inspection)**

Visual testing or inspection offers a wide range of options to secure proper system or product quality.