

3.2. NON-DESTRUCTIVE TESTING METHODS

- ❖ Acoustic Emission Testing (AE)
- ❖ Electromagnetic Testing (ET)
- ❖ Ground Penetrating Radar (GPR) Laser Testing Methods (LM)
- ❖ Leak Testing (LT)
- ❖ Liquid Penetrant Testing (PT) Magnetic Flux Leakage (MFL)
- ❖ Magnetic Particle Testing (MT)
- ❖ Radiographic Testing (RT)
- ❖ Thermal/Infrared Testing (IRT)
- ❖ Ultrasonic Testing (UT)
- ❖ Visual Testing (VT)

Types of unaided viewing is,

- Direct viewing - Viewing of an object in the operator's immediate presence. This can be unaided or by using equipment.
- Remote viewing - Viewing of an object not in the operator's immediate presence. This can only be done using special equipment

The commonly using visual aids are,

- **Magnifying glasses** - It consists of lens with magnification power which can used inspecting area of not accessible. Some types of magnifier incorporate a small battery-powered bulb to provide illumination of the test-surface.
- **Fillet weld gauge** - It usually uses a leaf-type fillet weld gauge to measure the size of fillet welds for standard size. Microscopes - Microscopes come in a wide

variety of magnification ranges, microscope is a multiple element magnifier for providing high magnified image of small defect.

- **Computer equipment (remote viewing)** - A modern video scopes, due to their small size and flexibility, can provide access to internal areas inaccessible to Borescope. Illuminated magnifier Inspection Magnifier is highly useful for inspection of small parts and also for online visual quality evaluation.
- **Holography** - Holography is name given to the method of obtaining an accurate 3-D image of a given object. It is used for the NDT of surfaces of highly complicated and precision components without the dis-advantages of having to use a high power microscope. It can provide a record of the image of an entire surface which can be readily compared with that of a standard defect free surface.
- **Borescope** - It is optical instrument for remote viewing of objects. Borescope can have various angles of view: 0° direct, 45° fore-oblique, 90° lateral and 110° retro. Borescope consist of precision illumination system. The size of the visual field usually varies with the diameter, for a given magnification system. The size of the visual field usually varies with the diameter, for a given magnification system.
- **Magnifying Mirrors** - When inspection is not easily access magnifying mirror can be used.
- **Periscope**- It is an instrument used for remote observation of in areas. In simple periscope, two right angle reflecting prisms are combination with a series of lenses.
- **Endoscope** - It is bit superior than Borescope. Magnification factor of is obtained. Available up to smaller dia of 1.7 mm and length up to 150mm.

4. MATERIAL FACTORS THAT AFFECT VISUAL TESTING

❖ Surface Condition

- Cleanliness
- Colour

- Texture
- ❖ **Physical Conditions**
 - Specimen Condition
 - Shape and Size
 - Temperature
- ❖ **Environmental Factors**
 - Atmosphere
 - Humidity and Temperature
 - Safety
- ❖ **Physiological Factors**
 - Physical Comfort
 - Health, mental attitude, fatigue and test item position

5. ADVANTAGES

- ❖ Simple method to perform
- ❖ Examination can be performed quickly
- ❖ Low-cost method
- ❖ Minimal training
- ❖ Non Destructive Testing
- ❖ Minimal equipment
- ❖ Virtually any component can be examined anywhere on the surface.
- ❖ Speed
- ❖ Applicability to irregular shapes
- ❖ Field mobility

6. DISADVANTAGES

- Inspector training necessary.
- Good eyesight required or eyesight corrected to 20/40.
- Can miss internal defects.
- Report must be recorded by inspector.

- Open to human error.
- Providing adequate
- viewing
- Angles, sensitivity, resolution, and
- Illumination may be costly.
- Visual testing requires a line of sight to the test surface and lighting
- Adequate to detect and interpret anomalies of interest. Visual testing is sometimes limited to component geometry: size, contour, surface roughness, complexity, and discontinuity orientation.

7. APPLICATIONS

- Examining the surface condition of a component Examining alignment of mating surfaces.
- Checking presence of leaks

8. EXAMPLE OF SOME APPLICATION VISUAL TESTING

Visual test of welds in connections

- In majority of industries for testing of welds, fillet weld gauge safety limit is checked in limits by using codes.
- Surface is cleaned well to ensure free from rust, dirt etc.
- By inspecting irregularities, depth of penetration of weld and discontinuity the detected is used.