Inspection par Ultrasons
Ultrasonic Inspection
**Principle**

The ultrasonic technique utilizes a high frequency probe which emits an ultrasonic beam that passes through an inspected object’s thickness. The signal reflects off each interface as the background echo and is received back by the original probe (reflection mode) or by a second probe opposite the transmitting direction from the first probe (transmission mode). The ultrasonic data is displayed in real time for interpretation by a certified level 2 Ultrasonic Testing inspector. The inspection technique must be validated by a certified level 3 UT Engineer.
Porosity, crack, inclusions, shrinkage, creep cracks, delamination defects, lack of fusion (bonding), fatigue cracks, tearing, shocks, corrosion, unbond, change in local thickness

**Application**

**FAULTS SELECTED BY ULTRASOUND:**

- Engine Blade inspection
- Sea Corrosion inspection
- Inspections of Welds
- Thickness Measurement
- Delamination/ Porosity in Composites
Equipment

Ultrasound - portable digital technology

Reference standards

Couplant

Angle probes

A-Scan station

Batteries

Multi-element equipment
Phased Array Technique
**Interpretation**

- **Voltage**: 50 V
- **Probe type**: Phased-array
- **Frequency**: 5 MHz
- **Elements**: 128
- **Impulsion type**: Linear
- **Sabot**: No
- **Control type**: Immersion
- **OL speed**: 3136 m/s
- **Gain**: 4.4 dB
- **Values range**: 0 to 7 mm
- **Scan step**: 1 mm
- **Encoder**: 1 axis of 250 mm

**A-scan in depth**

**B-Scan View on 250 mm scan path**

**C-Scan of 5 defects**
# Inspection

## Ultrasonic Techniques used by MPP

<table>
<thead>
<tr>
<th>Probe Type</th>
<th>Reference</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe without wedge</td>
<td>Reference point in the center of the active surface of the probe</td>
<td><img src="image1.png" alt="Probe without wedge" /></td>
</tr>
<tr>
<td>Probe with flat wedge</td>
<td>Reference point at the center of the wedge contact surface</td>
<td><img src="image2.png" alt="Probe with flat wedge" /></td>
</tr>
<tr>
<td>Probe with angle wedge</td>
<td>Reference point in the middle of the front edge of the wedge</td>
<td><img src="image3.png" alt="Probe with angle wedge" /></td>
</tr>
<tr>
<td>Probe with or without wedge</td>
<td>Reference point at the point of emergence of the beam</td>
<td><img src="image4.png" alt="Probe with or without wedge" /></td>
</tr>
</tbody>
</table>

### Phased Array or conventional technique

### Immersion Technique

**Caliber - 4 faults**

**Defect marking**
# Capacity

<table>
<thead>
<tr>
<th>Method</th>
<th>Equipment / Techniques</th>
<th>STAFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT Radiographic Testing</td>
<td>• Digital radiography (from 50KV – 320KV)</td>
<td>2 RT Level1</td>
</tr>
<tr>
<td></td>
<td>• Resolution from 50 µm – 200 µm</td>
<td>2 RT level 2 and 1 RT3</td>
</tr>
<tr>
<td>UT Ultrasonic Testing</td>
<td>• Immersion Testing</td>
<td>1 UT level 1</td>
</tr>
<tr>
<td></td>
<td>• Thickness measurement</td>
<td>2 UT level 2</td>
</tr>
<tr>
<td></td>
<td>• Phased Array Pulse Echo</td>
<td>1 UT level 3</td>
</tr>
<tr>
<td>PT Penetrant Testing</td>
<td>• Red Dye or Fluorescent penetrant</td>
<td>4 PT level 2</td>
</tr>
<tr>
<td></td>
<td>• Alkaline or Solvent Degreasing</td>
<td>1 PT level 3</td>
</tr>
<tr>
<td>MT Magnetic Particle Inspection</td>
<td>• Hand yokes</td>
<td>3 MT level 2</td>
</tr>
<tr>
<td></td>
<td>• Stationary MT bench</td>
<td>1 MT level 3</td>
</tr>
<tr>
<td>IRT Infrared Thermography Testing</td>
<td>• Hot air heater or 4 x 1000 W Halogen heaters</td>
<td>2 IRT level 2</td>
</tr>
<tr>
<td></td>
<td>• IR Camera Flir T450sc</td>
<td>1 IRT level 3</td>
</tr>
<tr>
<td>ST Shearographic Testing</td>
<td>• Hot air heater or 4 x 1000 W Halogen heaters</td>
<td>1 ST level 1</td>
</tr>
<tr>
<td></td>
<td>• Optrion Digital Shearographic Camera</td>
<td>1 ST level 3</td>
</tr>
<tr>
<td>ET Eddy Current Testing</td>
<td>• High and low Frequency Eddy Current Testing</td>
<td>2 ET level 2</td>
</tr>
<tr>
<td></td>
<td>• Rotating Probe ET</td>
<td>1 ET level 3</td>
</tr>
<tr>
<td>VT Visual Testing</td>
<td>• Direct VT of welds, castings and composite parts</td>
<td>1 VT level 2</td>
</tr>
<tr>
<td></td>
<td>• Indirect VT (endoscopy and digital microscope 220x)</td>
<td>1 VT level 3</td>
</tr>
</tbody>
</table>
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