IMTT Rotary Inspection System

Aircraft NDI challenges these days often involve detecting cracks that are deeply hidden under thick and multiple layer aircraft structures or under thick composite structures. Conventional NDI technologies are now reaching their respective limitations in detecting these cracks effectively and reliability. Such limitations include the insufficient depth penetration into the lower layer cracks or the inability to inspect through the gap in between layers effectively for the hand held systems. The limitations also include the extreme high cost, portability and practicality for other high end permanently mounted systems.

IMTT's Rotary Inspection System provides a unique and innovative approach to detecting these deeply hidden cracks from the surface allowing for …

SURFACE ACCESS EXTERNAL INSPECTION
HIGH SENSITIVITY & RELIABILITY

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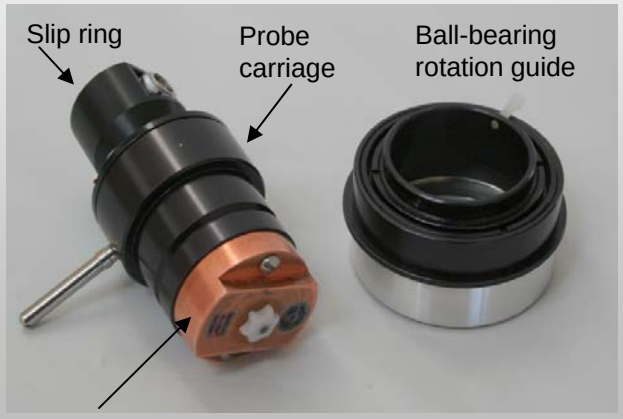
Manual Rotary Probe RF4 ROT V4

Specifications

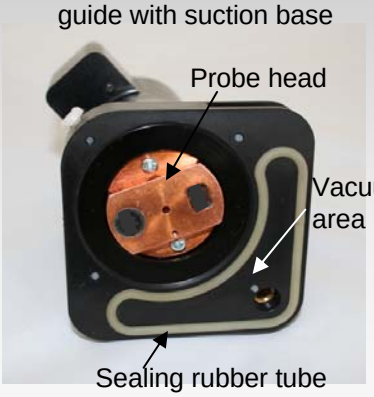
Dimensions: 1.4"(L) 1.4"(W) 3.4"(H). Weight: 0.4lbs Probe drive frequency: 0.2kHz – 10kHz

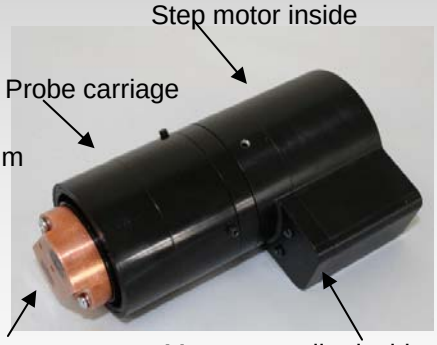


Automated Rotary Scanner with Probe RF4 ROT V4

Specifications

Dimensions: 5.0”(L) ,2.7”(W), 1.9”(H) Weight: 0.8lbs Probe drive frequency: 0.2kHz – 10kHz
Scan range: 0-360° Resolution: 1° Speed: 0 - 20 revolutions/s





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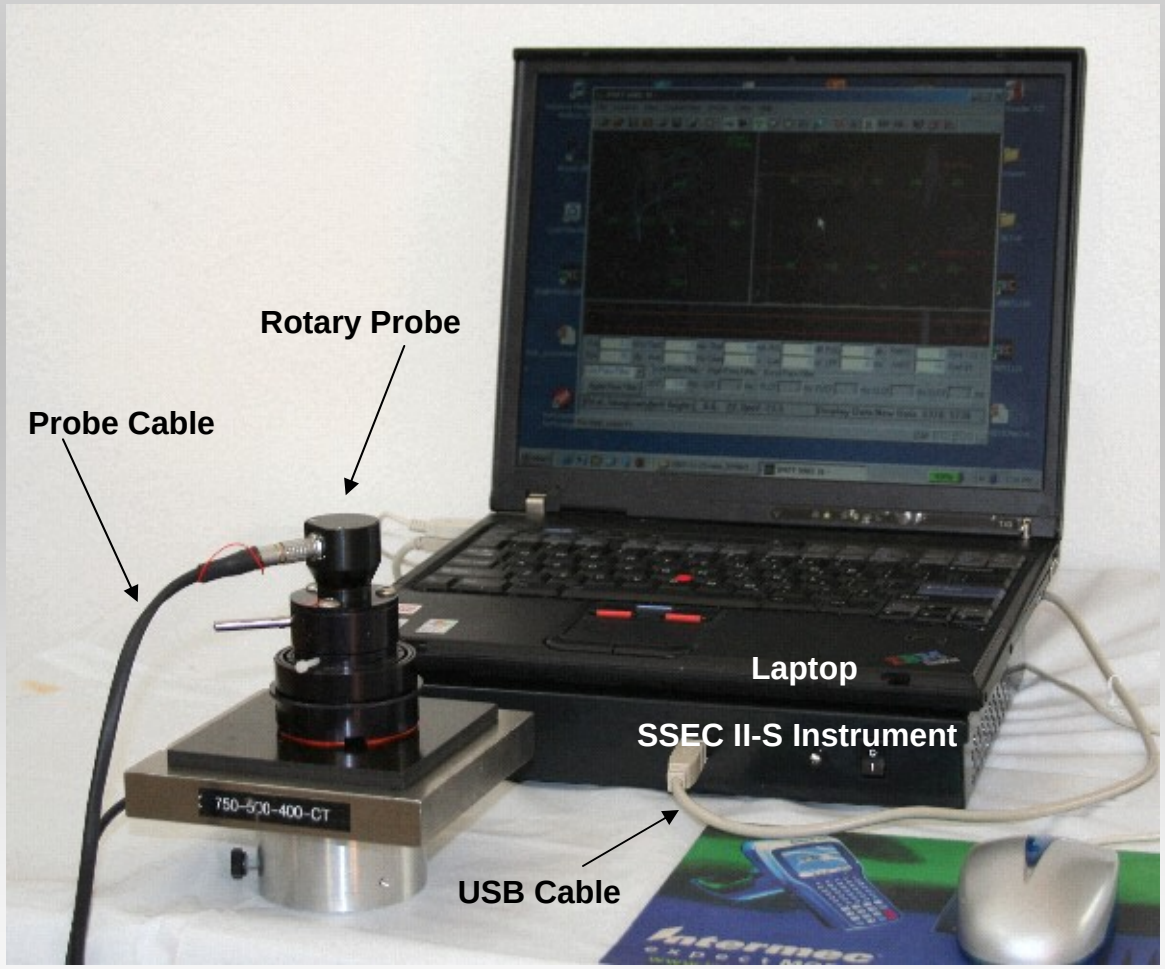
Rotary Inspection System

1. SSEC II-S Instrument
2. Laptop
3. USB Cable Connecting Instrument & Laptop
4. Rotary Probe
5. Probe Cable Connecting Probe to Instrument



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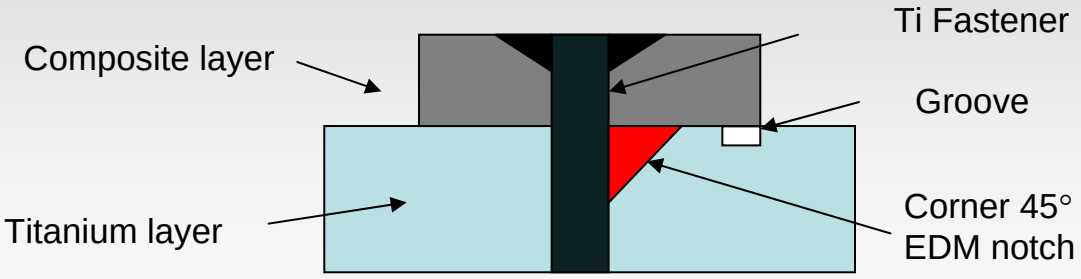
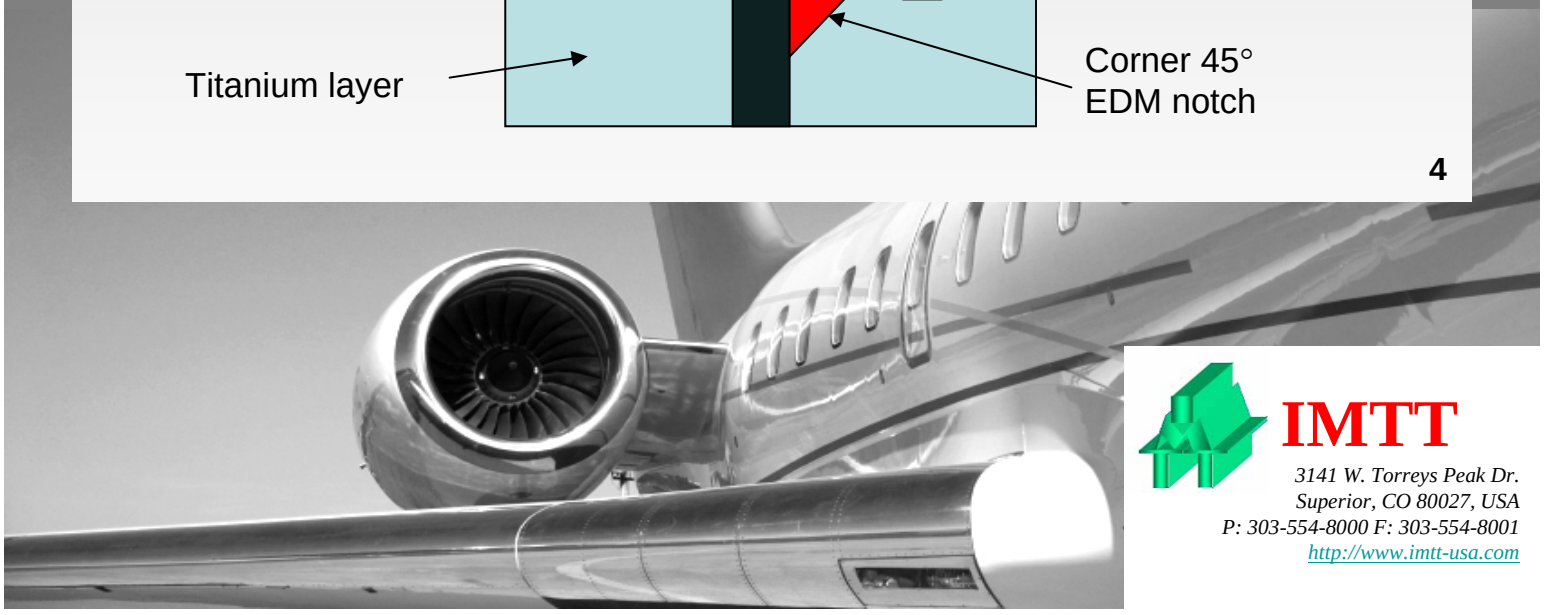
Application Example 1
Titanium Layer Inspection through Thick Composite Layer
Problem description

AFRL Test Panels:

1. 0.60” – 0.75” thick Titanium layers with groove, w/ or w/o a corner EDM Notch
2. 0.25” – 0.50” Graphite epoxy composite layers
3. Titanium fastener





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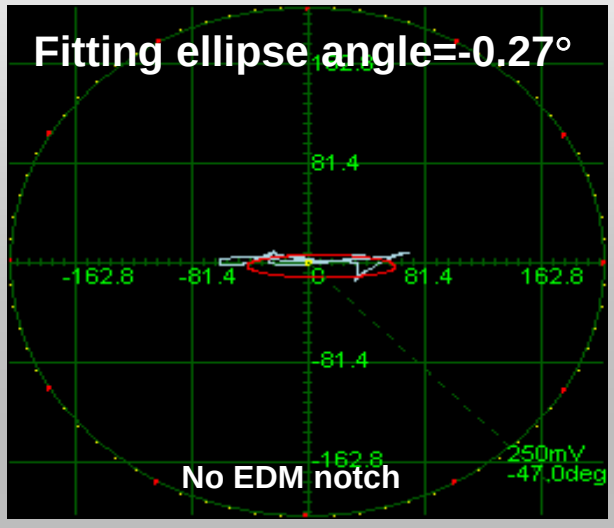
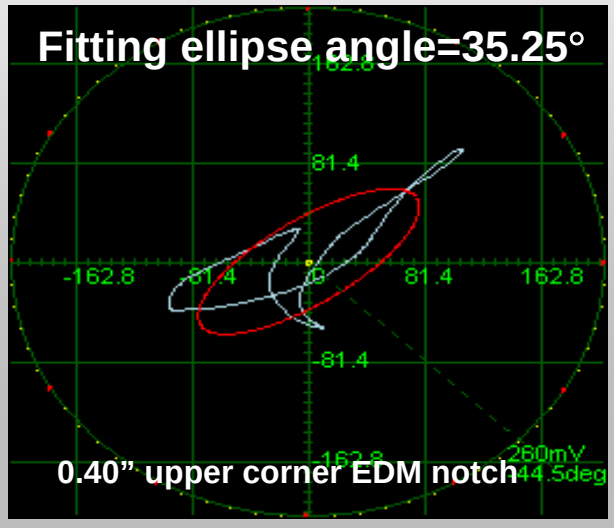
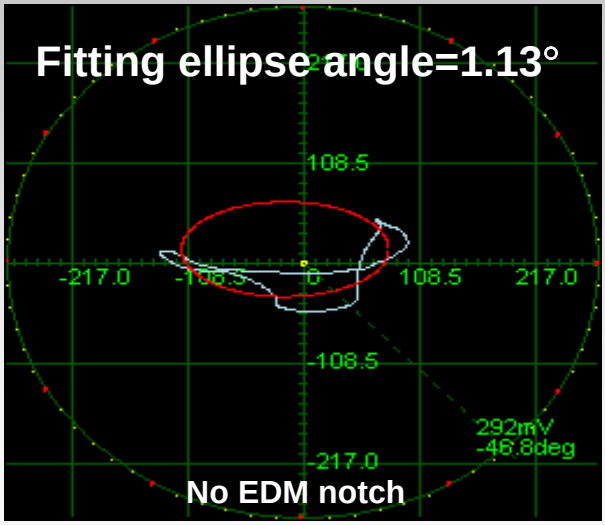
Application Example 1
Titanium Layer Inspection through Thick Composite Layer
Typical test results

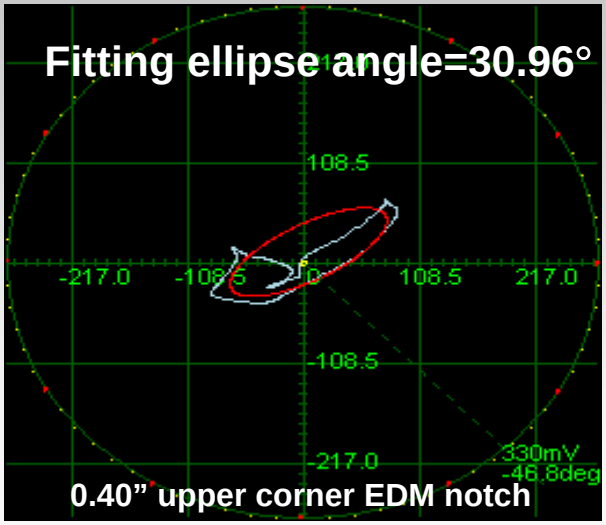
0.35” thick composite on top of 0.60” thick Ti layer with a curved groove





0.50” thick composite on top of 0.60” thick Ti layer with a curved groove





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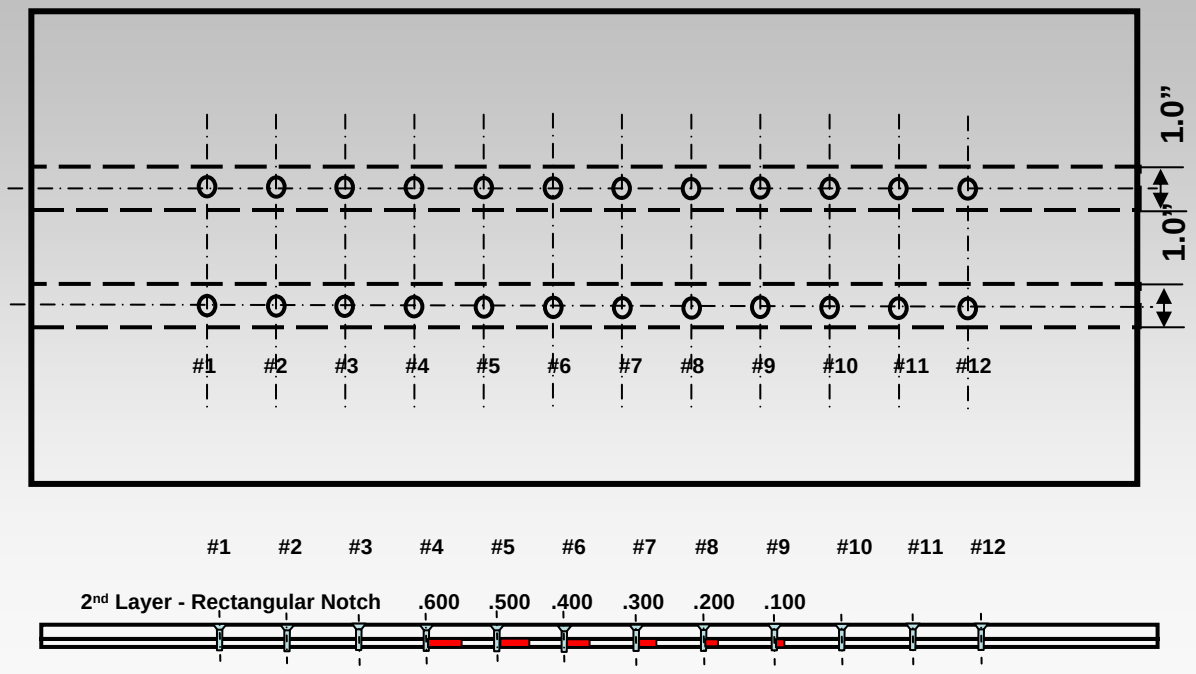
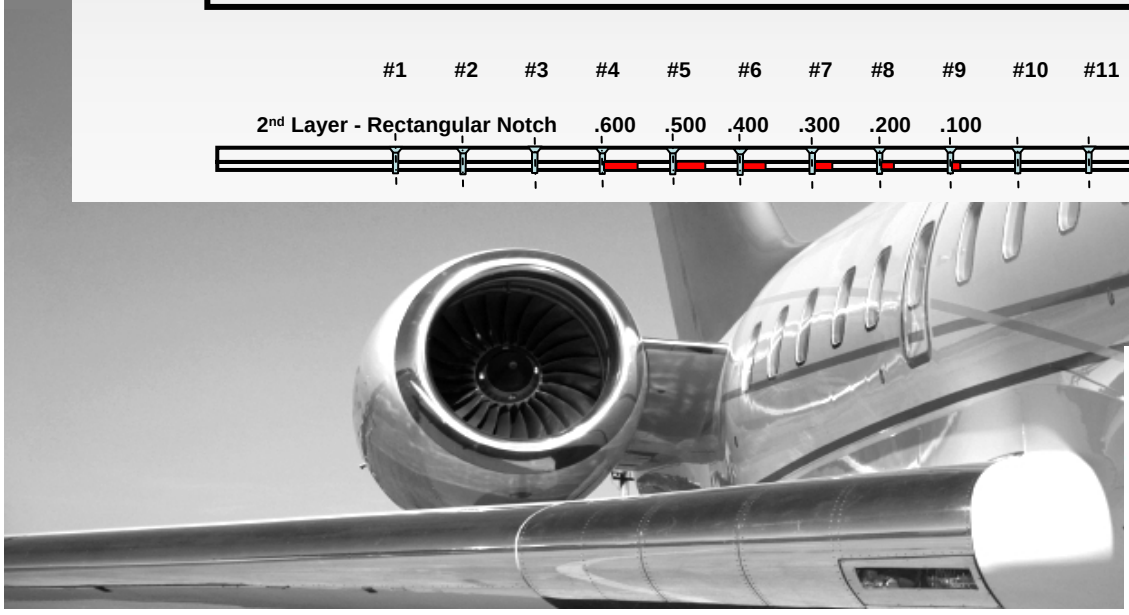
Application Example 2
Inspection of C130 Lower Wing Structure
Problem description

1st layer – 0.250” 7075-T7351
2nd layer – 0.140” thick & 1.0” wide 7075 T7351
Steel fasteners





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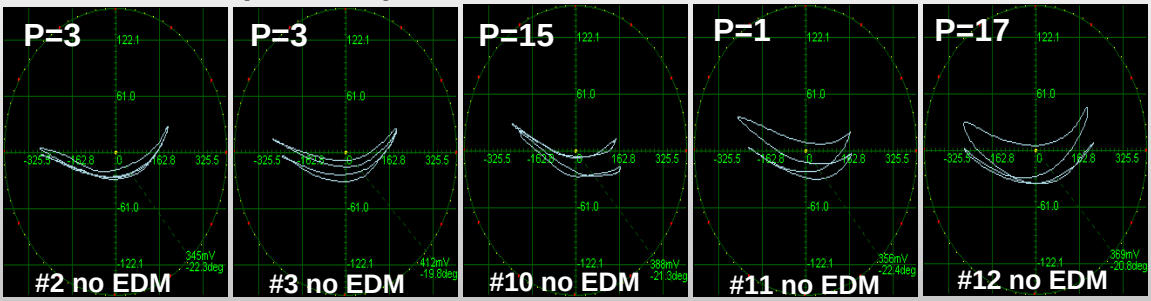
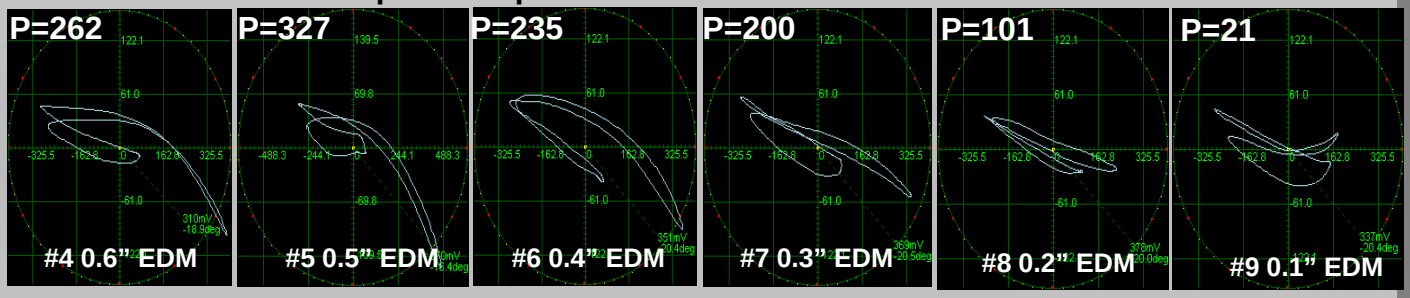
Application Example 2
Inspection of C130 Lower Wing Structure
Typical Test Results

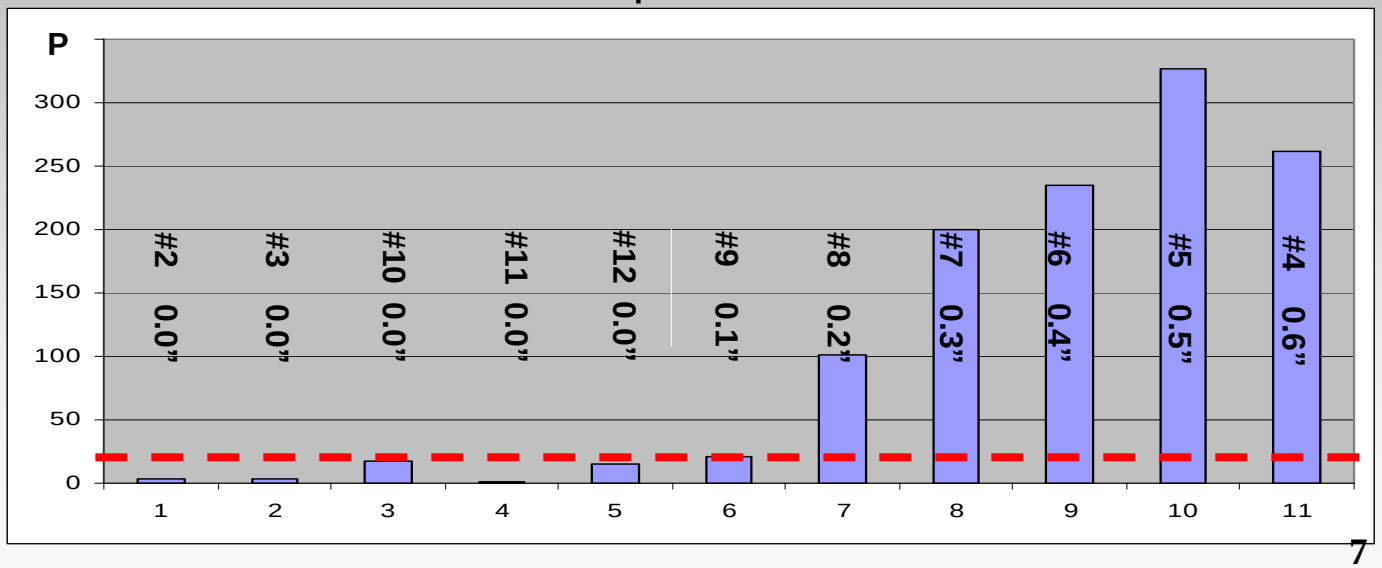
Impedance planes from no-notch fastener holes



Impedance planes from notched fastener holes



Shape Factor P



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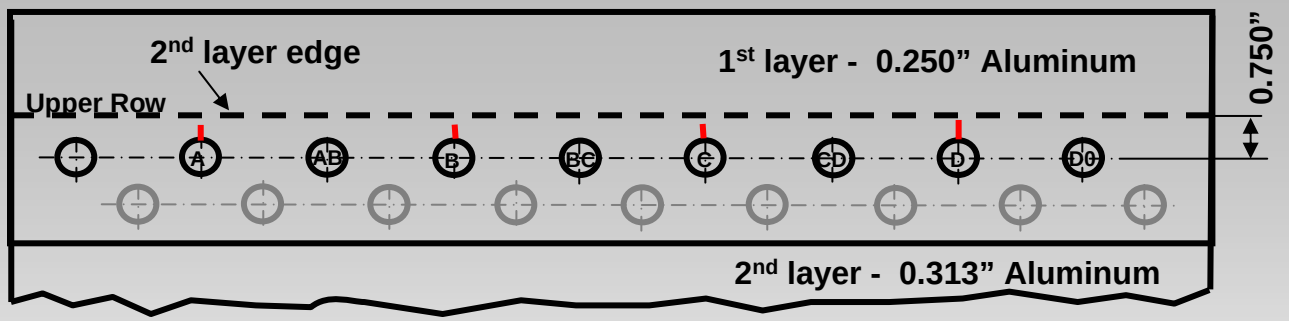
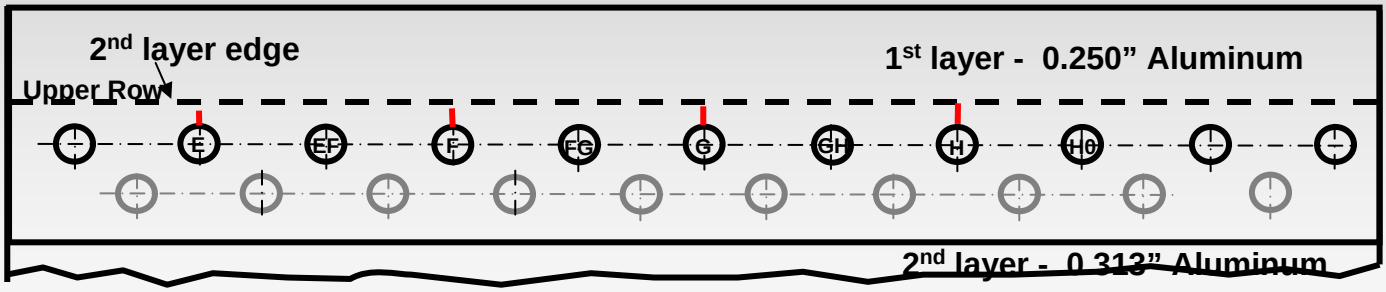
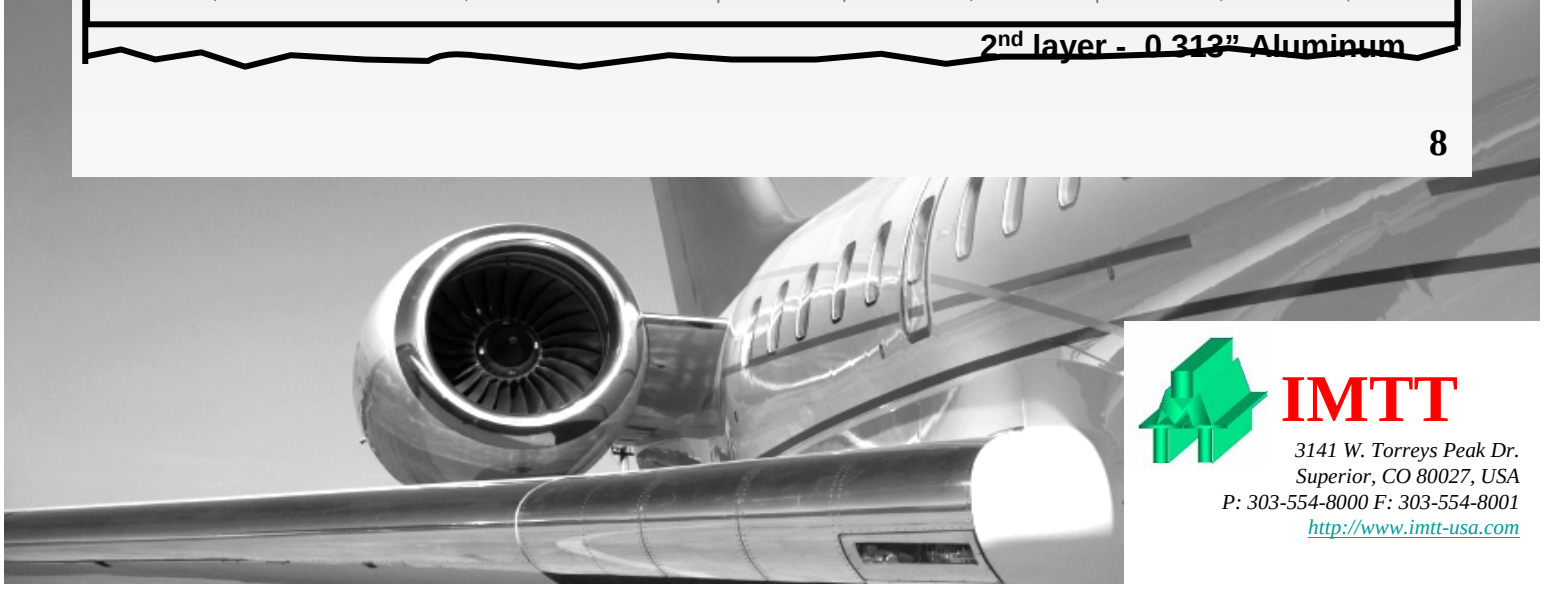
Application Example 3
Inspection of Boeing 707 Lower Wing Structure
Problem description

1. Two layer 7075 T structure, thicknesses – 1st layer 0.250”; 2nd layer 0.313”;
2. Steel fasteners;
3. 2nd layer EDM close 2nd layer edge. Fastener center – edge distance = 0.75”;
4. Vertical corner EDM notches towards 2nd layer edge;
5. List of EDM notch dimensions:
   - At fastener A – 0.100” (L) × 0.133”(D)
   - At fastener B – 0.130” (L) × 0.173”(D)
   - At fastener C – 0.150” (L) × 0.200”(D)
   - At fastener D – 0.170” (L) × 0.227”(D)
   - At fastener E – 0.200” (L) × 0.267”(D)
   - At fastener F – 0.220” (L) × 0.293”(D)
   - At fastener G – 0.250” (L) × 0.313”(D)
   - At fastener H – 0.300” (L) × 0.313”(D)







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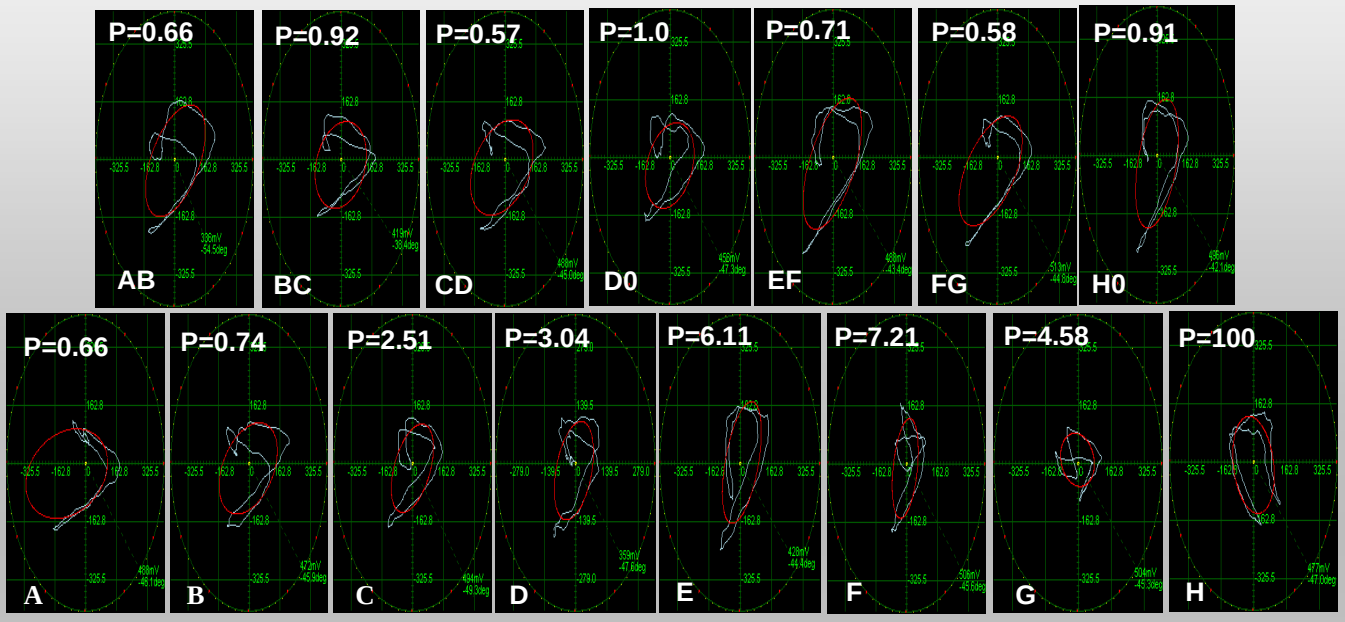
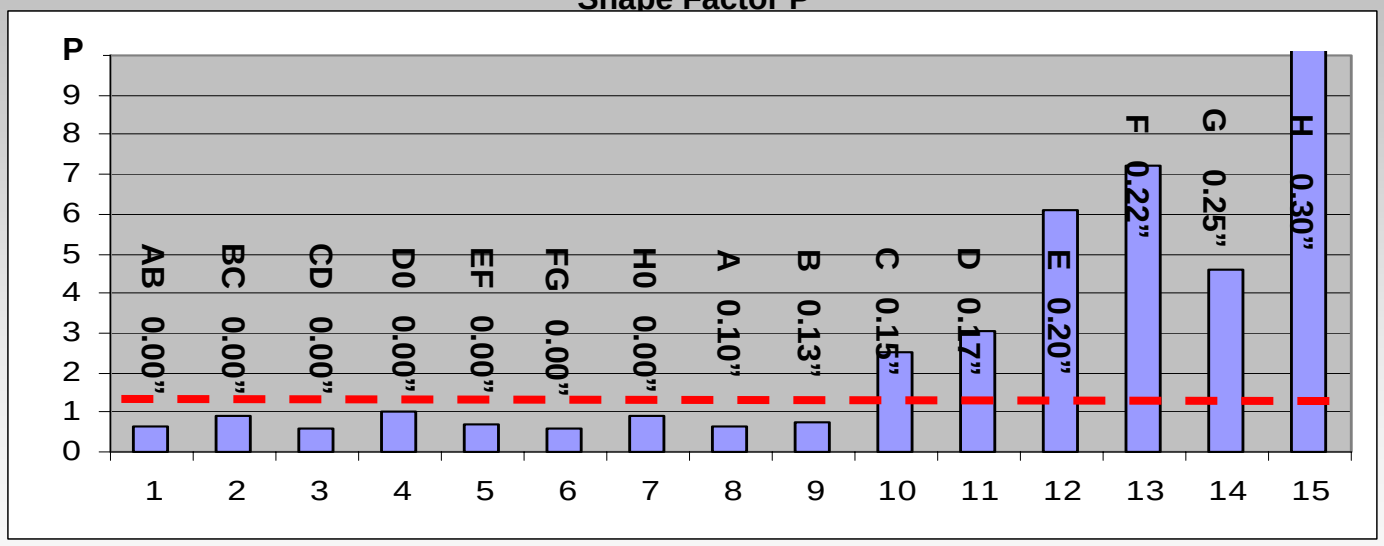
Application Example 3
Inspection of Boeing 707 Lower Wing Structure
Typical Test Results

Impedance Plans and ellipse curve fitting



Shape Factor P



Good fasteners **Notched fasteners**

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Instrument SSEC II-S

Special version for scanner control

General

- A modification of conventional eddy current instrument
- A computerized software system by connecting the instrument to a PC through a USB connector
- Accommodate IMTT's FG_RFEC probes and all other conventional eddy current probes
- Increased sensitivity
- Enhanced functions including:
  - Automatically optimizing drive current and pre-gain at given frequency
  - Added a new probe mode – simulated differential reflection mode for better background noise removal
  - Built-in custom signal processing algorithms
- Capable of control up to two step motors

Specifications

Frequency Range:

- 100Hz – 4MHz
- Driver output: ±8V; max. 100mA

Sample Rate: 100Hz-10kHz with a resolution of 12bit

Gain:

- Pre Gain: -20dB – 60dB
- Post Gain: 0 – 40dB

Filter:

- 30-1KHz hardware low pass filter
- 0-1KHz digital low/high/band pass filter

Phasing: 0 - 359º in 1º increments

Inputs / Outputs: DB-9 for probe, DB-9 for optical switch, USB-B connector to PC

Alarms: software setup alarms

Probe Types: reflection/RFEC probes, differential probes, absolute probes

Power supply: 110V 60Hz AC

Operating temperature: 0 – 55ºC (32ºF - 131ºF)

Storage temperature: -30ºC – 75ºC (-22ºF - 167ºF)

Humidity: 5 to 95%

Weight: 2.4lbs

Dimension:12"(L)x8.7"(W)x1.7"(H)

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