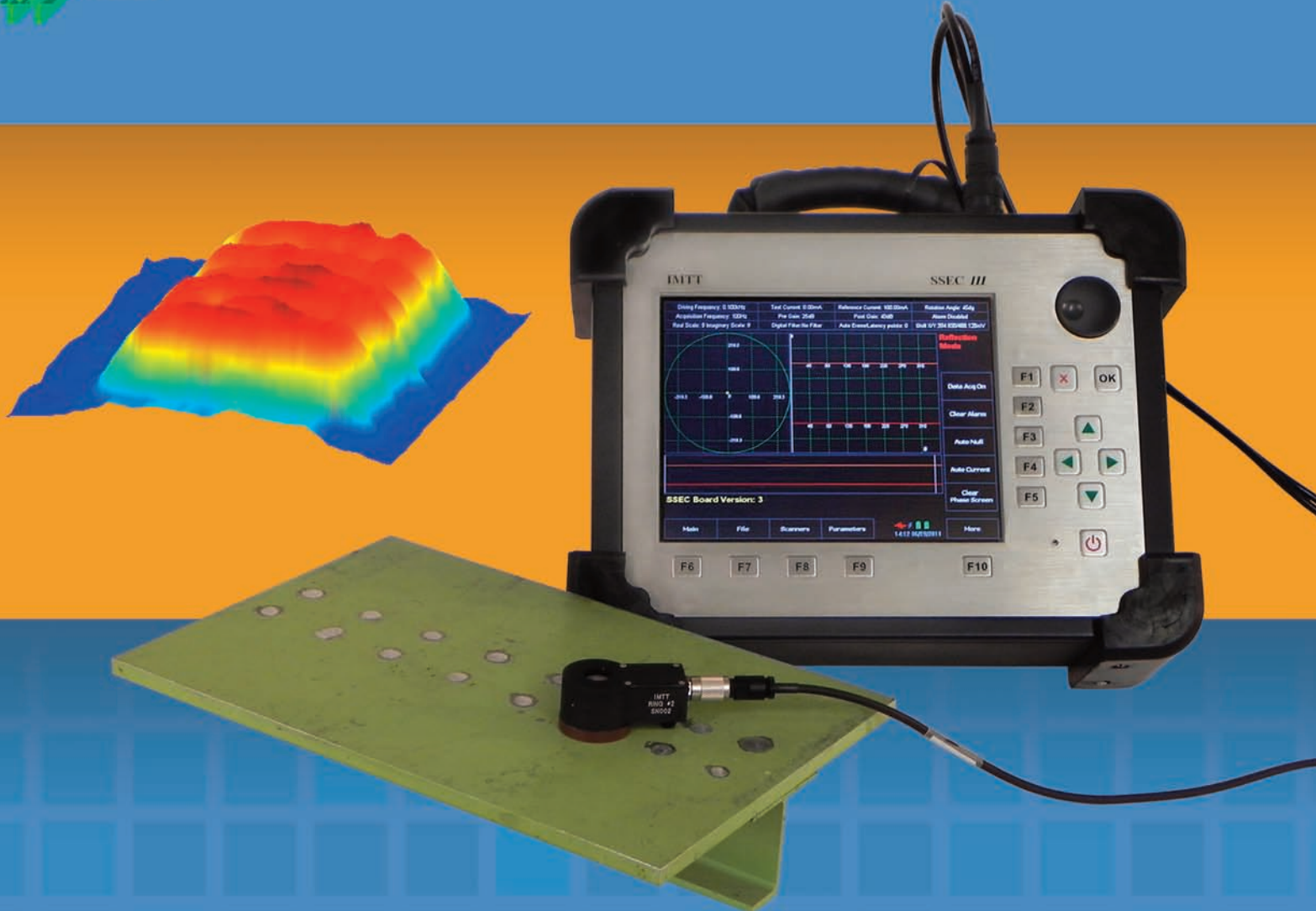


## Super Sensitive Eddy Current Instrument



### *Unique Features*

- Higher sensitivity and larger gain to work with the extremely weak signal from an RFEC probe
- With moderate modification of the conventional EC instrument it is capable of working with FG RFEC probes as well as conventional EC probes
- Fully computerized system capable of on the spot automatic control, signal processing and pattern recognition
- Small, portable and lightweight (2.4 lbs.)

# Aircraft Structure Crack Detection Using Remote Field Eddy Current (RFEC) Technique

Aircraft NDI challenges often involve detecting cracks that are deeply hidden under the thick and multiple layer aircraft structures. Conventional NDI technologies are now reaching their respective limitations in detecting these cracks effectively and reliably. Such limitations include the insufficient depth penetration into the lower layer cracks and 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.

## FG RFEC Technique versus EC Techniques (ECT)

### ECT

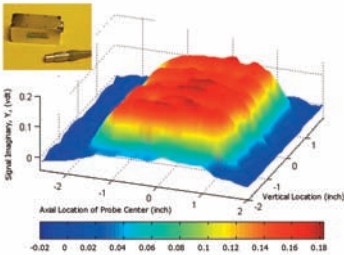
- Impedance  $Z$  is proportional to total flux,  $\Phi$ . In a reflection probe induced voltage  $V$  is proportional to  $\Phi$ , too.
- A flaw causes very limited change in  $\Phi$ , since also in  $Z$  or  $V$ .
- The change in  $\Phi$  caused by a deeply hidden flaw may be less than 0.001% - 0.0001%.
- Different approaches have been used to cancel/ compensate the normal signal and separate out the flaw signal. However, a perfect separation of the two signals is practically impossible.
- Signal level is high, but flaw-induced signal variations are low. The ratio of flaw signal to normal-signal is low. This limits the gain value can be used in an instrument.

### FG RFEC

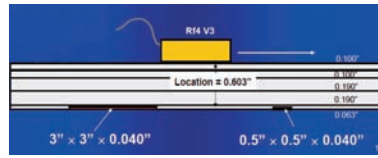
- $V$  is proportional to a portion of the flux,  $\Phi_{RF}$ , that has passed through the test object twice and represents the local condition of the object between the driver and receiver.
- The presence of a defect results in a large change in  $\Phi_{RF}$ , and also in  $V$ .
- The change in phase of  $\Phi_{RF}$  has a linear relation with the wall thickness.
- Signal level is low, but flaw-signal/normal signal ratio is high. This allows higher gain for a given flaw signal.

## Corrosion Detection in Thick and Multilayer Structures

3" x 3" x 0.040" 5th Layer Bottom Side corrosion, f=200Hz  
Total Thickness = 0.643", Location = 0.603"

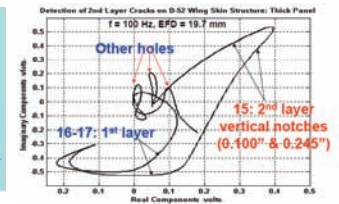
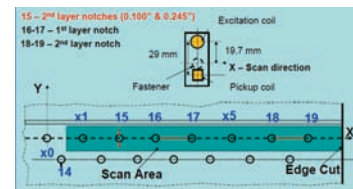


5 Layer 2021 T3 Aluminum Specimen  
0.1" + 0.1" + 0.19" + 0.063"  
Total Thickness = 0.643  
Corrosion on Bottom of 5th Layer  
Location = 0.603



## Crack Detection in Thick and Multilayer Metallic Structures

Sliding Probe Example  
Detecting 2nd Layer Notches in 0.25" + 0.25" Thick  
B-52 Wing Spar Structure



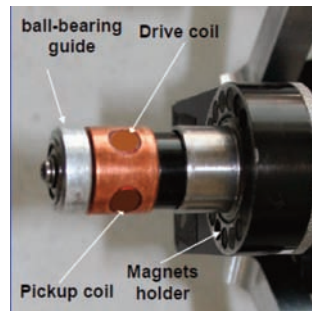
Detecting Crack in 0.25" + 0.25" Thick  
B-52 Wing Spar Structure

## Crack Detection in Bolt Hole Through Bushing

### Features

- Fatigue cracking at fastener holes is a common problem in aircraft.
- A repair bushing to return the hole to its nominal diameter after crack removed.
- Subsequent reinspection of the repaired hole often requires removal of the bushing.
- This approach results in significant downtime and labor costs and potentially damaging to the integrity of the aircraft structure.
- The Bushing Inspection System provides a unique and innovative approach to detecting these under bushing cracks.

- No bushing removal required, high sensitivity, superior efficiency and reliability.



## Custom Solutions

NDT Solutions, Inc. specializes in innovative designs and solutions to difficult NDT problems. Let our team of development experts build you a system customized to meet or exceed your expectations.

IMTT and NDTs reserve the right to modify or change the specifications of any of its products without notice and without incurring any responsibility for modifying previously manufactured products.



NDT Solutions, Inc.  
10-1 Airport Rd. • New Richmond, WI 54017  
Tel: 715.246.0433 • Fax: 715.246.0466 • Email: [sales@ndts.com](mailto:sales@ndts.com)  
[www.ndts.com](http://www.ndts.com)