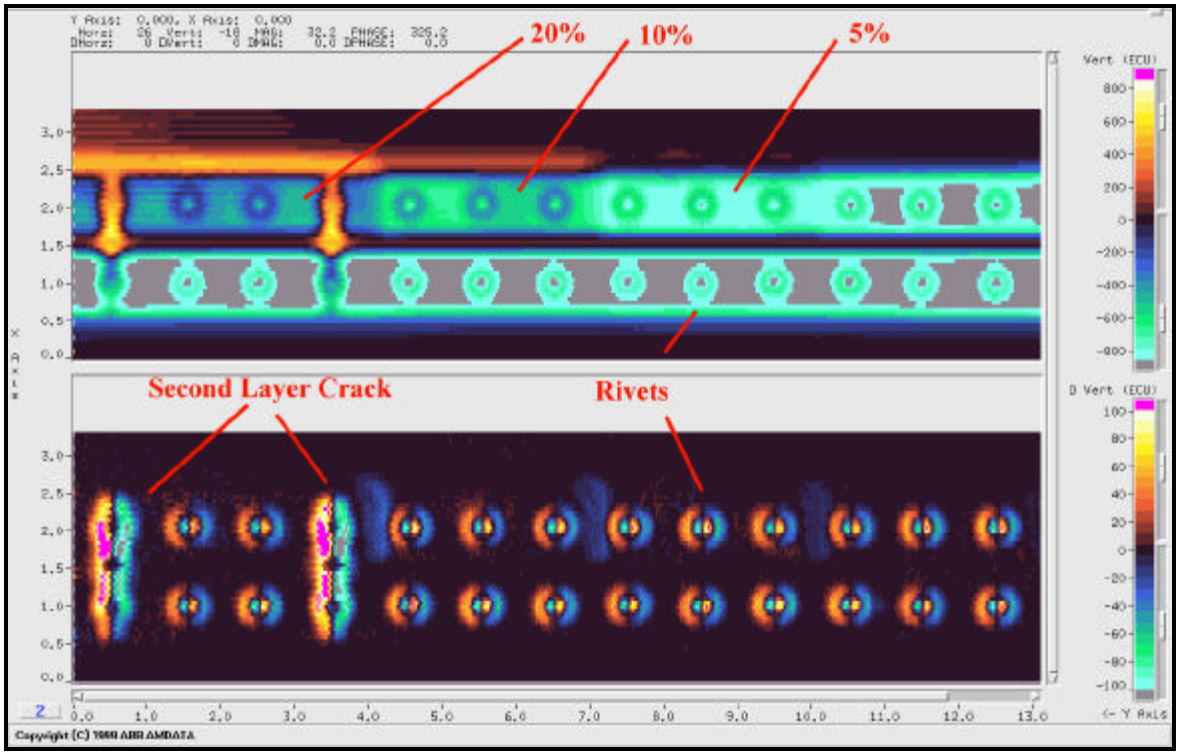
Eddy Current Imaging of Hidden Corrosion on Aircraft

Wesdyne AMDATA IntraSpect? Imaging System Application



Eddy Current Image of simulated corrosion obtained with Wesdyne AMDATA IntraSpect Eddy Current Imaging System

Sample Description

The sample fabricated for these tests consisted of two panels of 0.040" Aluminum. One of these panels had three simulated corrosion regions machined into them. These simulated corrosion regions reduced the wall thickness by 5, 10 and 20% (0.002", 0.004" and 0.008"). The two panels were riveted to a stringer that was also 0.040" thick. The stringer had two EDM notches to simulate cracks.

Inspection Method

An Eddy Current technique using a low frequency driver-pickup probe was used for this inspection. This probe type was selected due to its relative insensitivity to lift-off and its increased power at depth in the material.

The system was calibrated by setting the lift-off signal horizontal and to the left. By doing this a positive vertical response indicates less material and a negative going response indicates more material.

An AMDATA IntraSpect Eddy Current Imaging system was used for data acquisition and analysis.

Results

The results of this inspection are shown in the image above.

The upper C-scan is a plan view of the vertical amplitude of the Eddy Current data.

The black region is the single layer outer skin panel. This is also defined as the null point (0 value) for the image.

The gray colored region is the stringer region with a total thickness of 0.080". The circular green indications are the rivets.

The simulated corrosion is seen as the colors progressing from the larger negative value (green) towards a less negative value (blue). The brown colored region is the portion of the panel with corrosion that is not over the stringer.

The horizontal black region is due to the gap between the two outer panels.

The lower C-scan shows the first spatial derivative of the vertical eddy current data. This patented feature shows the slope of the signal rather than its amplitude.

The simulated cracks in the stringer are clearly shown in this image and their signal strength is not affected by stringer edge effect nor the gap between the two outer panels.

In addition, the lower image shows a blue colored signal at the transition point form one thickness to the other. This signal is also not altered by the edge affect of the edge of the stringer.

Since real corrosion consists of regions of changing thickness rather than uniform transitions, the derivative C-scan can be used to detect corrosion in regions where spatial resolution is normally difficult due to component geometry.

AMDATA IntraSpect Imaging Systems

Wesdyne AMDATA
20 International Drive
Windsor, CT 06095
(USA)

Voice: **(860) 731-1683** FAX: (860) 731-1674
e-mail: glenn.p.gagner@us.westinghouse.com
Web Site: www.amdata-technologies.com