

Rotating Eddy Current Probe for Detecting Cracks under Raised Fastener Heads

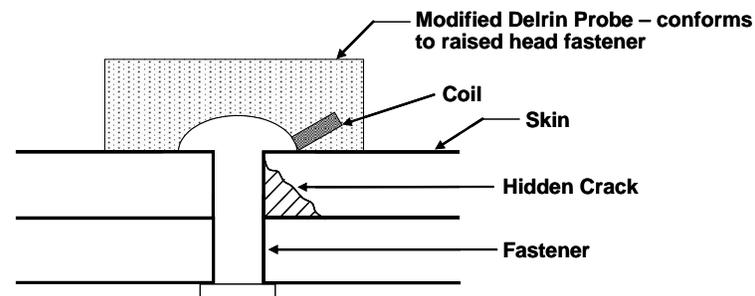
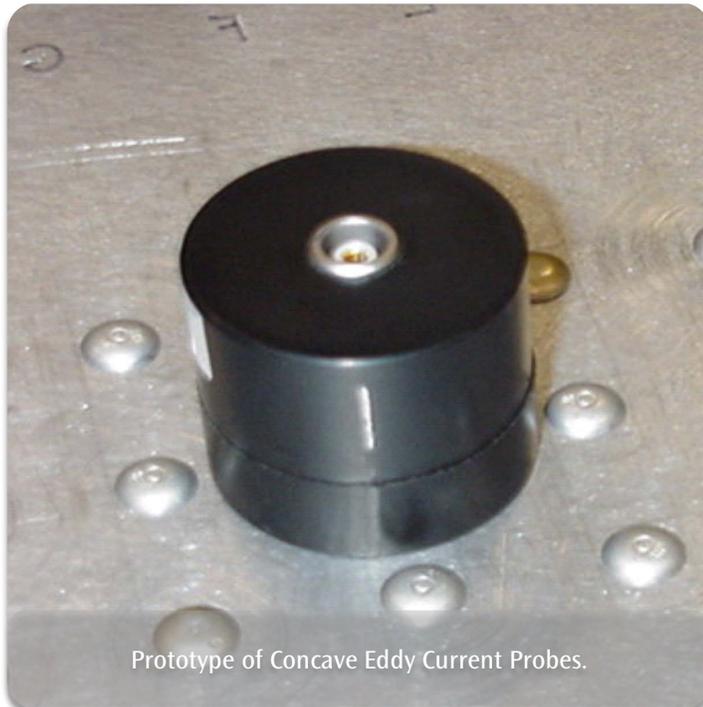
US Patent #7,352,176, #7,902,819

Technology Readiness Level: 8

Actual system completed, tested, fully operational

TECHNOLOGY SUMMARY

Early detection of fatigue damage from repeated cyclic loading is critical to ensuring the safety and reliability of aircraft, rotorcraft and many civil structures. This damage typically initiates under the head of the fastener and emanates outward over time. Conventional eddy current probes, such as pencil or ring probes, cannot detect cracks until after they extend out from under the fastener heads. Researchers at Sandia National Laboratories have developed an eddy current probe that generates fields directly below the fastener head enabling the detection of smaller cracks directly below the fastener head. This type of detection would typically only be possible after removal of the fastener. Improved detectability combined with ease of use reduces the labor required to inspect and repair the structure and enhances the safety and long-term viability of the structure. The probe is capable of in-situ calibration, which eliminates noise floor problems typically associated with high conductivity joints. Tests have shown that this probe is able to detect surface and subsurface cracks even in the presence of the high noise signals produced in high conductivity joints.



Angled Surface Crack

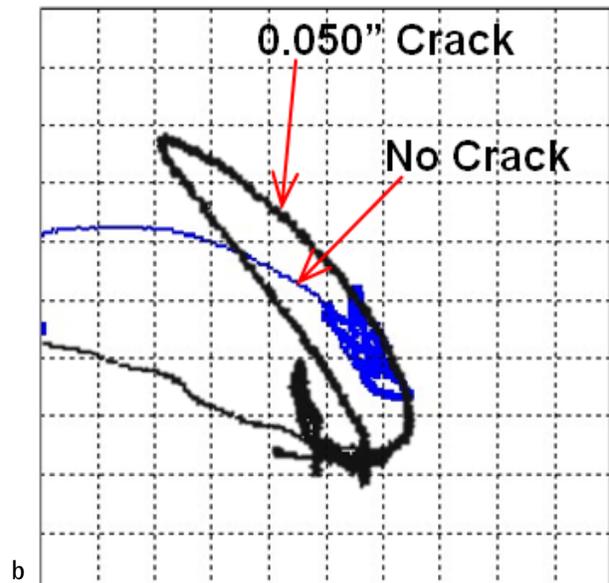
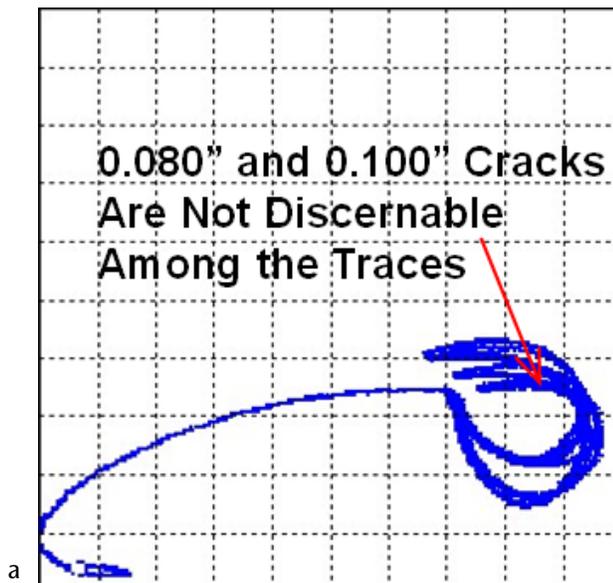


TECHNOLOGICAL BENEFITS

- Sensitive enough to detect cracks which may not even penetrate the surface of joint
- Compatible with high and low frequency coils, enabling crack detection in all layers of the joint

POTENTIAL APPLICATIONS

- Aircraft
- Automotive
- Rotorcraft
- Military
- Civil structures
- Oil and gas



Impedance plane of plots of a highly conductive joint obtained using (a) a conventional sliding probe and (b) the Sandia National Laboratories rotating eddy current probe. The rotating probe can detect cracks under the fastener head that the conventional probe cannot detect.

CONTACT US

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<https://ip.sandia.gov>