As military and commercial aircraft age, they become progressively more susceptible to fatigue cracking and other forms of structural damage. These aging aircraft are continually evaluated for their ability to meet structural life requirements.

Bonded composite repair technology can be used to economically repair aging aircraft structures, often without removing components from the aircraft. Bonded composite repairs can be installed without creating additional damage, unlike conventional metal repair doublers that add fastener holes in an already fatigued critical part. Composite doublers also have the advantage of allowing tailoring of the doubler stiffness for applied loads and stress fields at the repair site.

Capabilities

Southwest Research Institute® (SwRI®) has designed, analyzed, tested and installed bonded repairs for various aircraft since the mid-1990s. SwRI has designed both metallic and composite bonded repairs for wing skin planks, pressurized transport fuselage structures, and complex three-dimensional fighter bulkheads. Software design and analysis capabilities include Pro/ENGINEER®, UGS® NX/NASTRAN, Graphite, MSC. NASTRAN®, ABAQUS®, StressCheck® and CRAS.

Experience

- Helped develop bonded repair guidelines for shape, thickness and material for USAF
- Designed and developed a curved panel test facility for testing bonded repairs of transport fuselage curved sections under combined loadings
- Designed, analyzed and tested a composite bonded repair on a large fuselage frame
- Developed and installed a prototype bonded repair for the F-16 341 bulkhead
- Designed, analyzed and installed a bonded repair on a full-scale fatigue test aircraft

KEYWORDS

- Aircraft Bonded Repair
- Composites
- Structural Design
- Stress Analysis
- Life Enhancement
- Fatigue
- Damage Tolerance
- Prototype Fabrication and Assembly
- Component Test
- Full-Scale Test