

Aircraft Risk Analysis

KEYWORDS

Risk Assessment

Probability of Fracture

Fatigue

Fracture

Failure

Damage Tolerance

Inspection Interval

PROF

POD

EIFS

Crack Growth

Aircraft Usage

Random Variables

Sensitivity Studies

Economic Life

Hazard Rate

MIL-STD-882D

JSSG-2006

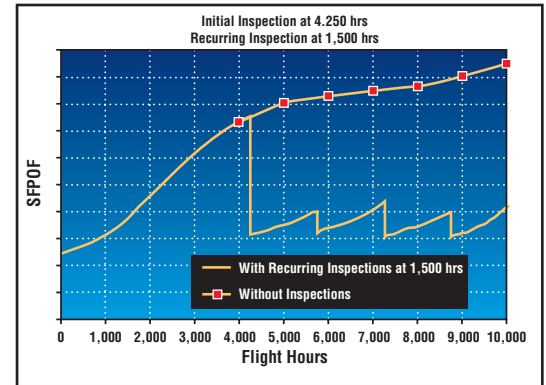
Training/Short Course

Southwest Research Institute® (SwRI®) structural engineering specialists use probabilistic methods to perform risk assessments to quantify the safety and useful service life of aircraft structures in terms of probability of failure and hazard rate. These analyses evaluate alternative usage, maintenance and inspection scenarios in terms of safety-of-flight risk and can be used to make planning decisions by balancing safety, cost and readiness of the aircraft system.

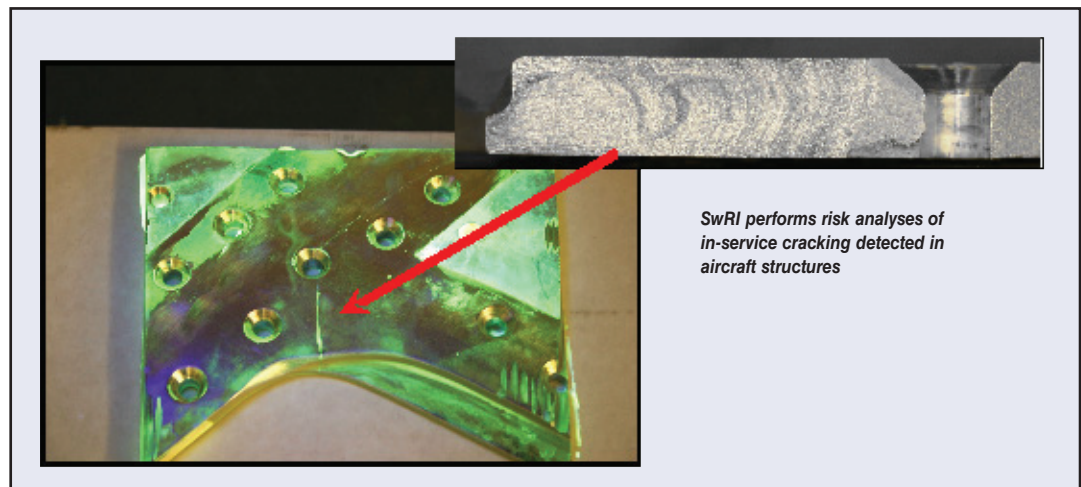
SwRI engineers use analysis tools such as the USAF probability of fracture (PROF) software and other advanced probabilistic methods contained in SwRI's NESSUS® and DARWIN® software to assess the effects of variabilities and uncertainties in loadings, material properties, fatigue and fracture models, flaw sizes, and inspection methods on the risk of structural failure.

Capabilities

- Risk evaluations of in-service cracking
- Evaluation of safety and economic impacts of service life extensions
- Risk-based evaluations of inspection, repair and/or modification plans
- Single aircraft and fleet-wide risk analyses
- Development of random variable probabilistic distributions for risk analyses
- Probabilistic fatigue and fracture analyses
- Equivalent Initial Flaw Size (EIFS) distribution development using in-service cracking and teardown data
- Probability of Detection (POD) curve development for nondestructive inspection method
- Interpretation of risk analysis results in terms of MIL-STD-882D and JSSG-2006
- Economic life evaluations
- Sensitivity studies
- Risk assessment workshops and training



Single-flight probability of failure (SFPOF) results with and without recurring inspections



Experience

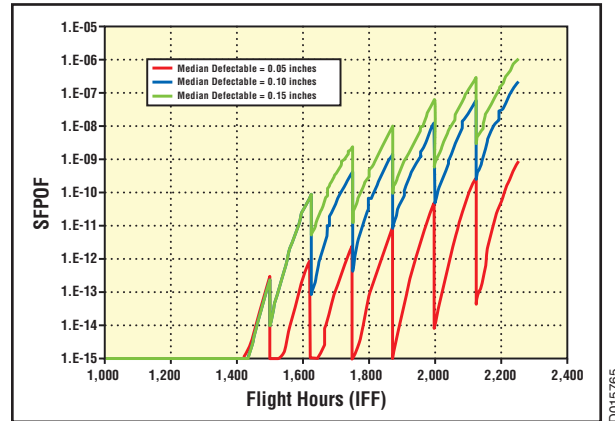
- Damage Tolerance Risk Assessment of T-38 Wing Skin Cracks
- Risk Assessment of T-37B Fatigue Critical Locations
- Risk Assessment of the A-10 Wing Aft Lower Cover at Rear Spar Cap (WS 23)
- Risk and Economic Implications of DADTA for F-5 Foreign Operators
- Probabilistic Structural Analyses of Fatigue and Fracture
- Advanced Probabilistic Fracture Mechanics and Life Evaluations of Turbine Rotor Blade Attachments

Analysis Tools for Risk Assessment

- PROF
- DARWIN®
- NESSUS®
- Weibull Analyses



Benefiting government, industry and the public through innovative science and technology



SFPOF for recurring inspections and different detectable flaw sizes



Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,100 employees who perform contract work for industry and government clients.

We welcome your inquiries.

For additional information, please contact:

Joseph W. Cardinal, P.E., Staff Engineer
Structural Integrity Analysis
(210) 522-3323
joseph.cardinal@swri.org

Structural Engineering Department
Mechanical Engineering Division
Southwest Research Institute
6220 Culebra Road (78238-5166)
P.O. Drawer 28510 (78228-0510)
San Antonio, Texas

www.swri.org
www.structural-engr.swri.org