ADVANCED SPECTRUM & DTA APPLICATIONS COURSE

SAVE THE DATE:

October 5-9 2026

Jacksonville, FL

Hampton Inn Orange Park

JAMES BURD

FAA DER Structures & Damage Tolerance
President, Aeronautica LLC

DR. SCOTT FAWAZ

FAA RS-DER Structures & Damage Tolerance

Class includes detailed review of 15 problems and trial access to Aeronautica's ASPEC Spectrum Program and detailed course book

ABOUT THE COURSE

This is a 40 hour course for the practicing stress and damage tolerance analyst. With a focus on civil and military certification, all aspects of damage tolerance analysis process are presented in detail. Everything from fatigue loads and spectrum to crack growth **analysis and setting inspection** intervals are covered. In depth discussion of problem idealization and solving provide a culmination of all course topics.

space is limited - register today by contacting:

HTTPS://AERONAUTICAUSA.COM/TRAINING/

About the Instructors

James Burd has over 35 years of experience in the aircraft industry as a structures, stress, and damage tolerance engineer. He graduated from North Carolina State University in 1987 with a degree in Aerospace Engineering. James started his career in the USAF where he served as the C-5 Aircraft Structural Integrity Program (ASIP) Manager. Upon leaving the USAF, James worked on several DOD related programs at L-3 Systems and Northrop Grumman including the full-scale fatigue test of the USN E-6A Milstar radome and the E-8C JStars ASIP program. Subsequently, James worked at Gulfstream Aerospace for several years eventually leading the fatigue and damage tolerance group and later worked at Lockheed Martin on the L-1011 aging aircraft program. From 1998 until 2004, James also served as a participating member on the Aviation Rulemaking Advisory Committee (ARAC) for Widespread Fatigue Damage (WFD) and the Aging Airplane Safety rule. In 1998, James became an FAA Designated Engineering Representative (DER) for Structures and Fatigue/Damage Tolerance. He presently retains delegations for Part 23, Part 25, Part 26, Part 27, and Part 29 regulations and has supported certification efforts on a large number of platforms. James currently supports engineering and certification projects for numerous civil and government projects with his team at Aeronautica.

Dr. Scott Fawaz graduated from the United States Air Force Academy in 1987 having obtained an Engineering Mechanics degree. In 1988, he received his Master of Aeronautical Engineering from the Air Force Institute of Technology. In 1997, he received his doctorate in Aerospace Engineering from the Technical University Delft, The Netherlands. He served 23 years in the United States Air Force working in aircraft structural integrity of new and aging aircraft. He had assignments at the San Antonio Air Logistics Center, Air Force Research Laboratory, and United States Air Force Academy (USAFA). At USAFA he was on the teaching faculty and directed the Center for Aircraft Structural Life Extension (CAStLE) from 2003 – 2010. After leaving the USAF, he led the fatigue and damage tolerance group for the Gulfstream G650. With several government and commercial contract awards for SAFE in 2011, Dr. Fawaz focused all his efforts at SAFE. From 2011 to 2022 he supported civil and military aviation basic and applied research; advanced technology development, demonstration and validation; and engineering and manufacturing development. Since retiring in 2022, he has shifted focus to teaching short courses. Dr. Fawaz is a FAA Designated Engineering Representative (DER) for Structures and Damage Tolerance with Repair Specification authority.

Advanced Spectrum & DTA Applications Course

This course is taught by both Dr. Scott Fawaz and Mr. James Burd. Both have over 35 years' experience in military and commercial fatigue and damage tolerance analysis. The course is aimed at engineers entering the field of damage tolerance, liaison engineers, experienced damage tolerance engineers and also military and civil regulators, DERs and Unit Members finding compliance with fatigue and damage tolerance requirements.

In the first three days, the class steps the student through a thorough review of the requirements and methods as follows:

- A review of all current commercial and military damage tolerance regulations as well as advisory guidance relating to fatigue and damage tolerance.
- An in-depth review of the methods for the establishment of mission profiles, usage, fatigue external and internal loads development, load histories and the process for spectra development.
- Details of fatigue and fracture mechanics to include materials, stress concentrations, stress intensity development and crack growth analysis methods. Residual strength concepts and widespread fatigue damage are also addressed.
- Development of structural inspection requirements and procedures.

Following these topics, the final two days walk the student thru 15 in-depth real world damage tolerance examples demonstrating the use of the previously reviewed methods on wing, fuselage and empennage structure to include special examples dealing with antenna installations, sonic fatigue and helicopters.

The students are provided with the following:

- Full hardcopy of the DTA Course Notes
- Analytical files for each of the 15 example problems
- One weeks access to Aeronautica's Aspec Spectrum Development Webtool
- Access to a large number of the public domain course references
- Certificate of completion at end of the course.

Upon completion, the student should have a thorough understanding of the criteria, methods and processes for the development of fatigue spectra and how to successfully utilize these in fatigue and damage tolerance analysis for the development of accurate inspection requirements. This course is a full 40 hours and the equivalent of a semester long graduate level course.

Advanced Spectrum and DTA Course Outline

Oct 5-9, 2026

1. Certification
    a. FAA Requirements
    b. Military Requirements
    c. FAA Guidance on Fatigue Management
    d. Repairs and Alterations
    e. Part 26 WFD Requirements
    f. New Requirements – Radomes/Antennas
    g. Part 25.571 and AC 25.571-1D
2. Aircraft Service Usage
    a. Detailed Review of Large Transport Fatigue Loads Usage
    b. Detailed Review of General Aviation Fatigue Loads Usage
    c. Detailed Review of Military and Restricted Category Fatigue Loads Usage
3. Fatigue Loads Part I
    a. Discussion of Aircraft Sources of Fatigue Loading
    b. Review of Importance of Service History
    c. Examples of Various Aircraft Source of Fatigue Loading
4. Fatigue Loads Part II
    a. Review of Mission Profiles and Usage Load Histories
    b. Methods & Development of External Aircraft Level Fatigue Loads
    c. Methods & Development of Internal Airframe Fatigue Loads
5. Environmental Effects
    a. Dynamic Ground Condition Effects
    b. Dynamic Flight Condition Effects
    c. Discrete Load Source Events
6. Spectrum Development
    a. Example Development of Spectra for a Large Transport
    b. Example Development of Spectra for a Narrow Body Transport
    c. Comparison of Flight-by-Flight Spectra versus Single Cycle Spectra
7. Special Considerations
    a. Acoustic/Sonic Fatigue
    b. Effects of Buffet Loading
    c. Accounting for Aerodynamic Loading
    d. Composite Structures
    e. Impact of Fuselage Interior Loading and External Stores
8. ASPEC Overview
    a. Background of Flight-by-Flight Spectrum Generation Code ASPEC
    b. Overview of ASPEC Capabilities

9. DTA Process
    a. Overview of the fatigue problem
    b. Crack initiation and crack growth
    c. Microstructurally small cracks
    d. Industry Standard Methods
    e. Damage Tolerance
        i. Selection of analysis details
        ii. Stress analysis
        iii. Initial flaw assumptions
        iv. Equivalent initial flaw size
        v. Probabilistic methods
10. Stress Intensity Solutions
    a. Similitude
    b. Superposition
    c. Compounding
    d. Bending restraint
    e. Bulging
    f. Lugs
11. Material Data
    a. MMPDS
    b. Resistance to stress corrosion cracking
    c. Design considerations
    d. Fatigue crack growth rate data
    e. Plane stress vs plane strain
    f. Approximating data
    g. Metallic material data for DTA
12. DTA & ICA
    a. Cracking scenarios
    b. Crack growth models
    c. Detectable flaw sizes
    d. NDI Methods
    e. Inspection threshold and intervals
    f. Inspection program
    g. Residual strength
    h. DTA Examples
13. Strength
    a. Criteria
    b. Single Load Path
    c. Multiple Load Path
    d. Summary
    e. References

14. Widespread Fatigue Damage (WFD)
    a. Criteria
    b. WFD Prone Structure
    c. WFD MED Examples
    d. MED Analysis & Impact to Residual Strength
    e. WFD Impact on Alterations a& Repairs
    f. Summary
    g. References
15. Problem 1 -- Cessna 172 Lift Strut
    a. Objective - To develop the fatigue stress spectrum for the lower fuselage attachment of the wing strut.
16. Problem 2 – Wing Attach T28
    a. Objective: To illustrate a case history of a wing failure due to severe load usage and the resulting redesign to improve the fatigue life.
17. Problem 3 – Wing Spar P2V
    a. Objective: To show a case history example where the critical detail originated at a critical detail on the lower front spar due to poor design detail and poor manufacturing quality control.
18. Problem 4 – Wing Panel P3A
    a. Objective: To illustrate the impact of the variability in manufacturing quality on wing structure subject to a severe utilization.
19. Problem 5 – Wing Spar DC-6
    a. Objective: To illustrate a case history of wing fatigue cracking due to high loading in a redundant airframe wing structure.
20. Problem 6 – Wing Panel Splice 707
    a. Objective: Illustrative example of lower wing structure exhibiting fatigue cracking due to fastener shear load transfer in a longitudinal skin splice. Also provides a detailed example for structures with complex loading and the use of multi-channel spectra.
21. Problem 7 – Fuselage Attach OV10A
    a. Objective: Illustrative example showing the analysis for a critical wing to fuselage attach fitting and the impact of variation in mission utilization.
22. Problem 8 – Fuselage Frame A320
    a. Objective: To show the impact that internal cabin equipment can have on the fatigue life of fuselage structure.
23. Problem 9 – Fuselage Stringer Splice 737
    a. Objective: Illustrative example showing how to address the airframe impact resulting from major modifications to portions of the interior of the fuselage structure.
24. Problem 10 – Fuselage Panel 777
    a. Objective: Example to demonstrate the method for the flight-by-flight spectrum development for the crown on a wide body transport and the resulting damage tolerance analysis for multiple load path structure.

25. Problem 11 – Vertical Tail Attach P2V
    a. Objective: To illustrate the development for fatigue spectra of vertical fins and the resulting damage tolerance analysis.
26. Problem 12 – Fuselage Antenna A321
    a. Objective: To demonstrate the development of fatigue spectra for the installation of large antennas on fuselage structure.
27. Problem 13 – 707/C-135 Pylon Attachment
    a. Objective: To demonstrate the development of sonic fatigue spectra and its incorporation into the basic airframe spectra and the resulting analysis.
28. Problem 14 – Helo Fuselage CH47
    a. Objective: To demonstrate the development of fatigue spectra for helicopters and the resulting analysis.
29. Problem 15 -- Accounting for Post Buckled Effects in Spectra Development
    a. Objective to understand the process for accounting of post buckled effects in crack growth analysis as it relates to general aviation, large transport and military type aircraft.
30. Repairs and Modifications
    a. Design Stress
    b. Stress Concentrations
    c. Screening Approaches

Takeaways

a. General
b. Stress analysis
c. DTA and fracture mechanics
d. Fatigue loads and spectrum
e. Certification and airworthiness