APPLIED DAMAGE TOLERANCE COURSE (SEPT 2009)

September 7-11, 2009 Huntington Beach, California

TASS is pleased to announce that it will be holding an Applied Damage Tolerance Course for interested participants in the aerospace industry and for individuals who are actively involved in the analysis, substantiation, certification and maintenance of structural aspects of aircraft and aerospace structures. This active participation course gives the student a good mix of theory and problem solving that are relevant to their current work situations.

Join us at the Hyatt in Huntington Beach, California this September for this intensive five day educational experience in the concepts of fatigue, fracture, and damage tolerance analysis of aerospace structures.

COURSE OUTLINE

7th to 11th September, 2009 – Hyatt Regency Hotel, Huntington Beach, California

Applied Damage Tolerance

Course Description

This course is designed to deliver the design, analysis and testing fundamentals that are necessary for airworthiness engineers to substantiate fatigue and damage tolerance of aircraft and aerospace structures and components. Students participate in a combined lecture and classroom setting using real world problems from their own work situations to learn the concepts of fatigue, fracture and damage tolerance assessment. Other recent developments in the area of fatigue and fracture mechanics, including the virtual testing, multiscale modeling and simulation will also be discussed.

The course will be delivered by Dr. Bob Farahmand and Dr. Damian Horrigan of TASS Inc.:

Dr. Damian Horrigan, Chief Technology Officer, has over 15 years of aviation experience with 7 in airline senior management roles. Formerly Director of Engineering at Air New Zealand Engineering Services, he was responsible for the fleet management of the Air New Zealand jet fleets. Prior to that he was Design Engineering Manager for Air New Zealand and Ansett Airlines, managing all of the modification and repair engineering. He has subsequently performed a significant amount of structures engineering and damage tolerance analysis for Part 25 aircraft and is a FAA DER including delegation in Damage Tolerance. He has published over 20 papers in international journals and a wide number of papers in published conference proceedings.

Dr. Bahram Farahmand, Chief Scientist, has over 30 years of fatigue & fracture mechanics analysis and testing experience with several major programs at Boeing. Dr. Farahmand is the former Boeing Technical Fellow, author of three books in the field of fatigue and fracture mechanics and the founder of virtual testing technique: Generating fatigue and fracture allowables through the extended Griffith theory by using a simple stress-strain curve (reducing cost and time of testing). Dr. Farahmand was involved in numerous programs at Boeing, author of several fracture control plans, numerous technical papers, and author of several inventions.

Who should attend?

This course has been tailored for interested participants in the aerospace industry and for individuals who are actively involved in the analysis, substantiation, certification and maintenance of structural aspects of aircraft. This is an active participation course which requires the student to come prepared with relevant example problems from their current work situations. Numerous key example problems are worked during the course and are intermingled between the classroom theories that are delivered through the week.

Benefits of attending

You will be able to have a much better understanding of damage tolerance assessment and substantiation techniques in the aerospace industry for application to:

- Modifications
- Repairs
- Corrosion prevention control
- Fatigue
- Widespread fatigue cracking
- Life assessment of pressurized tanks & welded structures
- Fracture Control Plans

Upon completion of this course, you will have firsthand experience in working on and completing a wide number of analysis problems that are of interest to all analysis engineers.

TASS INC
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Tel: +1(425) 821-2200 Fax: +1(425) 821-2210 www.tassinc.com

APPLIED DAMAGE TOLERANCE

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$1,995.00 USD

5 days of training
Training materials
Demo access to TASS INC online DTA tools
Breakfast, lunch and coffee breaks

7th to 11th September, 2009

Hyatt Regency Huntington Beach Resort & Spa

21500 Pacific Coast Highway, Huntington Beach, CA 92648, USA
PHONE 714-698-1234 HOTEL FAX 714-845-4990
www.huntingtonbeach.hyatt.com

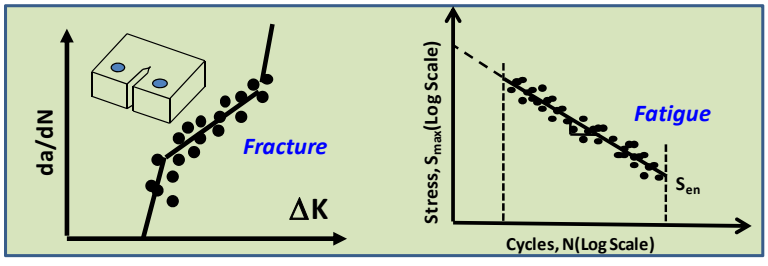
Ask for the TASS Inc. hotel room rate of $149.00 US per night
(additional reduced resort fee of $8.00 US per night will be charged by hotel)

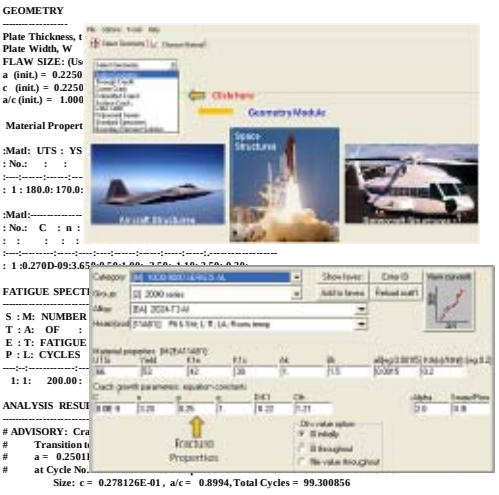
For more information or to register for this course, please contact:

training@tassinc.com
TASS INC.
12016 115th Avenue NE Suite 100
Kirkland, WA 98034 USA

Tel: +1(425) 821-2200

Book early as class size is limited in order to assure appropriate instructor – student time for problem solving.





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Course Outline

DAY 1

Introduction And History of Failure: Several structural failures will be reviewed – Lessons learned

Fundamentals of Fatigue (S/N): High cycle fatigue and variability of fatigue data, Crack initiation, Intrusion and extrusion concepts, Cumulative damage, Minor's rule and limitations, Constant life diagram

Strain to Life Concept: Low cycle fatigue, Hysteresis loop, Softening & hardening, Coffin Manson strain to life (ε/N), Universal slope method

Neuber's concept: Neuber's relationship, Modified Neuber's relationship, Residual stresses, Stress concentration, Fatigue notch sensitivity factor

Factors Influencing Fatigue Life: Mineralizing, Shot peening and laser peening

Examples – Problem Solving

DAY 2

Sonic Fatigue: How to prevent sonic failure

Griffith Energy Approach: Fixed grip and constant load concepts, Energy release rate, Theoretical strength

Linear Elastic Fracture Mechanics (LEFM): Stress intensity factor concept, Mathematical derivation of K, Geometry and load corrections, Irwin's crack tip plasticity, Von Mises and Tresca yield criteria, Crack tip plastic shape and size, Plane strain and stress fracture toughness (KIc & Kc), Dependency of Kc on plate geometry, Material anisotropy, Resistance curve concept

Examples – Problem Solving

DAY 3

Part-Through Cracks: Surface crack stress intensity factor, Fracture toughness, KIe, Leak before burst concept

ASTM Testing Standards: The ASTM E391, ASTM E561, ASTM E720

Elasto-Plastic Fracture Mechanics: The J-Integral, JIc tests, Fracture mechanics of ductile metals theory, Virtual testing

Fatigue Crack Growth Rate: Three stages of crack growth, Paris and the FNK equations, ASTM E647 requirements, Effect of residual stresses on crack growth, Crack closure concepts, Law of similarity

Examples – Problem Solving

DAY 4

Variable Amplitude Loading: Flight cycles, Cycle counting techniques, Exceedence concept, Rain flow technique, ASTM E1049, Equivalent cycle, Retardation phenomenon

Residual Strength: Residual strength diagram, width effect & requirements, Net section yielding, Feddersen concept, Multi site damage & failure criterion, Wide spread fatigue damage, Stiffened structure and crack arrest, Plastic collapse & failure diagram

TASSGRO Tutorial

Examples – Problem Solving

DAY 5

Fracture Control Plan: Main elements of FCP, NDI inspection methods (liquid, magnetic, Eddy, ultrasonic & Radiographic), Initial flaw size & probability of detection, special inspection

Environmental Effects: Environmental assisted corrosion, Examples of corrosion, Intergranular crack corrosion, Hydrogen embrittlement, Factors causing stress corrosion, Pit corrosion & fatigue life, Pit corrosion & crack growth, Establish the threshold value (KIEAC & KEAC), da/dt versus DK, ASTM E1681,

Bolted Joints: Critical region of a bolt, Threaded fasteners & Kt, Preload & fatigue life**,** Fracture analysis of a bolted joint

Welded Joints: Fusion welding, Porosity, Residual stresses, Mismatch, Friction stir welding (FSW), Parameters affecting the FSW, Static & fracture test of welded joints, Heat affected zone, nano-welding

Examples – Problems Solving