

The logo consists of the letters 'M51' in a bold, white, sans-serif font, centered within a dark blue square.

Stress Analysis of Composite Materials

5 Day Course

10 to 14 September 2018 - Amsterdam

Course Objectives

Two aspects that make composite materials unique are that they possess anisotropic behaviour and are a laminated structure. We speak of composite structures as orthotropic, heterogeneous materials. As such, the behaviour of composite materials requires deeper understanding of materials behaviour and structural mechanics. This course on the stress analysis of composite materials delves into a detailed mathematical appreciation of the performance of composite laminated structures. Here the participants obtain both an analytical understanding of composite materials that is enhanced with a practical appreciation of composite material physical behaviour. Throughout the delivery of the course content the participants are challenged with the why and how composite materials behaviour and perform.

By the close of this 5-day course the participants will be confident in the detailed understanding and knowledge of how composite materials work analytically and in practice. Several tutorial exercises will aid the participants understanding into the analytical content of the course that is reinforced with practical insight.

Pre-requisites:

Participants on this course are expected to have a very good understanding of composite materials and appreciation of structural mechanics and stress analysis principles. Participants with an engineering or materials science degree is essential to understand the material presented on this course. It is highly recommended that participants have completed course ENC101 or equivalent before attending this course.

Course Program - ENC102

DAY 1

- Introduction to Composite Materials
- Composite Constituent Materials-Review
- Composite Manufacturing Processes-Review
- The Coordinate Axis Systems at the Ply and Laminate Levels
- Development of Ply Properties (Tutorial)
- Testing of Composite Lamina for Mechanical Properties

DAY 2

- On-Axis In-Plane Stress/Strain and Stiffness/Compliance of a Laminate
- Off-Axis In-Plane Stress/Strain and Stiffness/Compliance of a Laminate
- The Transverse and Through-the-Thickness Approach
- In-Plane Extension, Bending and Coupling Stiffness Matrices [A], [B] and [D]
- Exercises in Determining the [A], [B] and [D] Matrices
- The Four-Ply Panels-Part 1

DAY 3

- Sandwich Structures and the Flexural Stiffness Matrix (+Tutorial)
- Stress Analysis of Composite Beams (+Tutorial)
- Stress Analysis of Composite Plates (+Tutorial)
- Stress Analysis of Composite Cylinders (+Tutorial)

DAY 4

- Simplified Stress Analysis-The Hart-Smith Approach (+Tutorial)
- Hygrothermal Stresses and Strains (+Tutorial)
- Unbalanced and Unsymmetric Laminates (+Tutorial)
- The Four-Ply Panels-Part 2

DAY 5

- Failure Criterion – An Introduction
- Simple Failure Criterion
- Complex Failure Criterion
- Failure Criterion Tutorial
- Real World Experiences
- Class Project

**Course Instructor****Rikard Benton Heslehurst, PhD**

CPEng, FIE Australia, FRAeS, FSAMPE, AIAA, ACSS, SAE, Composites Australia, EAA, Spitfire Association

Rik has worked in the composites industry for more than 30 years. He started his career as an aeronautical engineering officer in the RAAF with postings as an F/A-18 airworthiness engineer, and Officer in-charge of the RAAF Materials and Process Engineering. More recently Rik retired as an academic with the University of New South Wales (UNSW) at the Australian Defense Force Academy where he lectured and conducted research in aircraft and airframe design and composite structures design and analysis. . Rik also consults for several organizations; including Raytheon, NASA, USAF, Boeing, Lockheed-Martin, Bombardier, Pratt and Whitney. Rik is the chair of the Australian Chapter of SAMPE and works part-time for Composites Australia. *Please consult our website for Rik's complete bio.*

Training Venue

To be announced

Training Cost

\$1,950.00 per student for the 5 day training period - Attendance will be limited to 12 students

Enrollment

Enroll via our website at www.m51resources.com