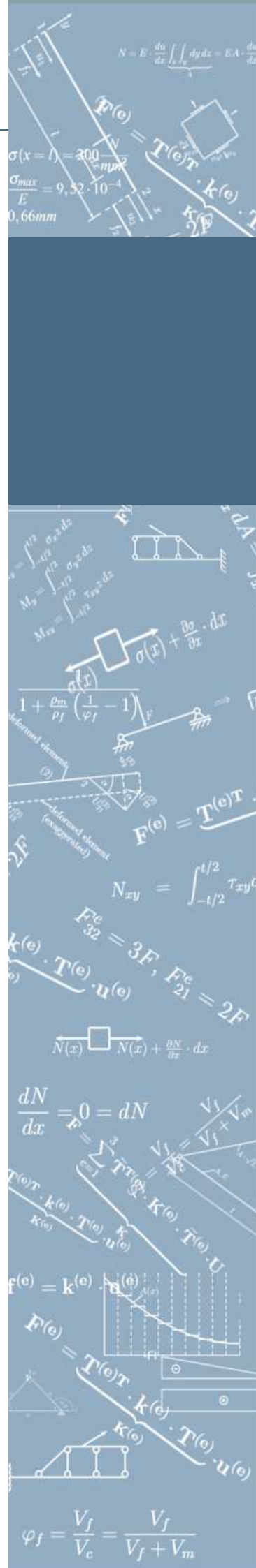




Training Courses Catalogue 2012

EN 9100:2003
BUREAU VERITAS
Certification



ACENTISS Academy provides training services tailored to meet the requirements of aerospace industry

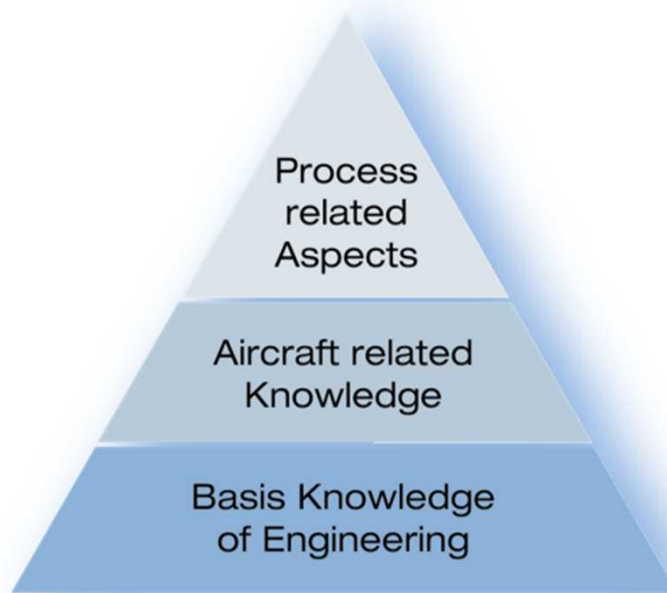
A three-level training concept provides courses starting with basic knowledge followed by advanced topics for more experienced participants. Workshop examples guarantee a strong link between the theoretical knowledge and real world applications.

The third level courses integrate the methods and processes into the customers projects and departments.

Lectures cover engineering topics including stress analysis for aircraft engineers, design and analysis of composite structures and finite element methods as well as project management related topics.

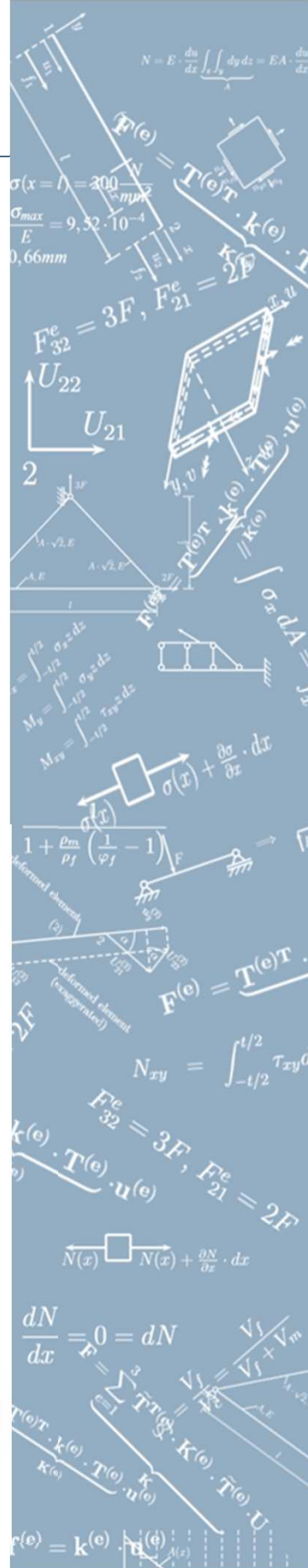
Training is held in Ottobrunn or at the customer's site.

In addition to the standard range presented here, ACENTISS offers individually designed courses for your company, customised to your needs.

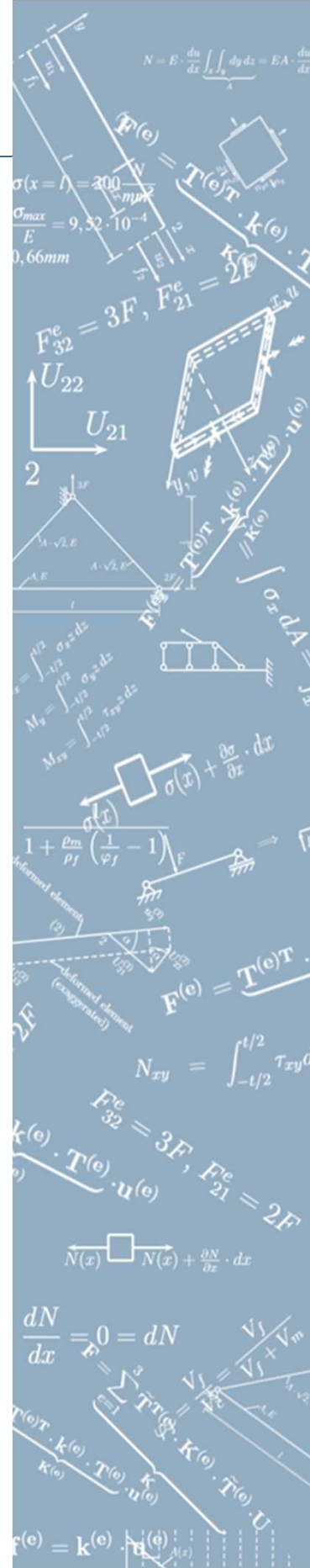


For further information on all courses featured in this catalogue please contact:

ACENTISS GmbH
Einsteinstr. 28 a
85521 Ottobrunn
Germany
academy@acentiss.de



Index of contents	Page
Introduction	2
Index of contents	3
Stress Analysis for Designer	4
Stress Engineer for Primary Structures – Basic	5
Stress Engineer for Primary Structures –Advanced	6
Finite Element Analyses for Stress Engineers – Basic	7
Finite Element Analyses for Stress Engineers - Advanced	8
Basic Knowledge of Composite Analysis and Design	9
Composite Design and Calculation	10
Fatigue for Designer	11
Introduction to Fatigue Analysis	12
Introduction to Strain Based Fatigue Analysis	13
Introduction to Multiaxial Fatigue Analysis	14
Aircraft Engineering	15
Organisation	16
Summary of Training Courses	18
Fax Registration Form	19



Stress Analysis for Designer

Registration Code: STRESS_DESIGN

Basic Mechanical Principles

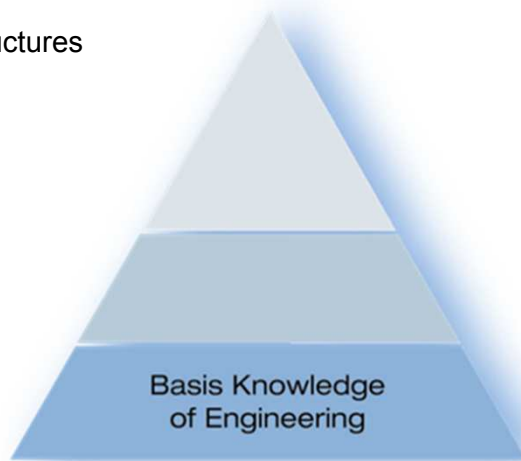
- Forces
- Moments
- Equilibrium Conditions
- Stresses
- Strain
- Cross Sectional Properties
- Supports
- Work Principles
- Units

Material Behavior

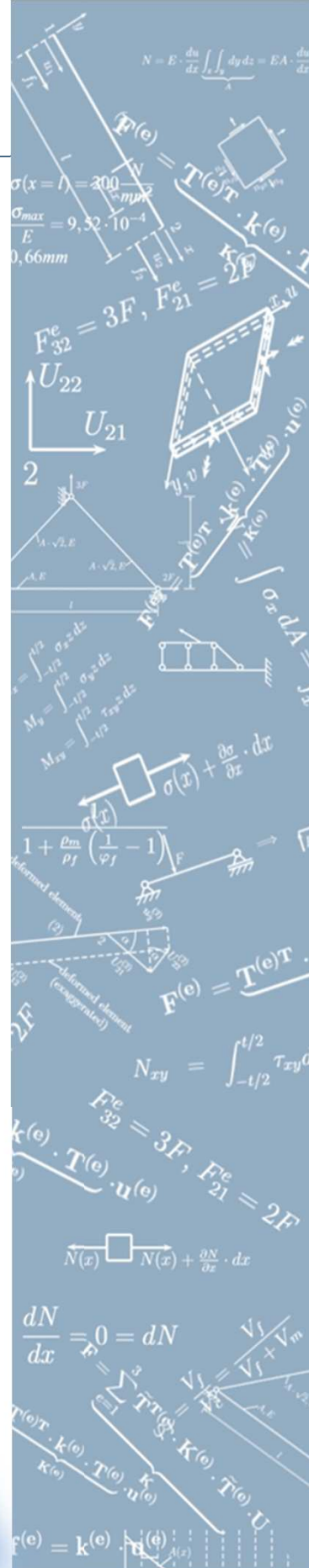
- Stress Strain Relation
- Isotropic Yield Criteria

Basic Knowledge of Elementary Theories

- Compression and Tension of Springs and Rods
- Bending of Beams/ Bars
- Torsion of Beams/ Bars
- Strain Energy of Structural Elements
- Displacements of Statically Determined Structures
- Shear Panels (Statically Determined)



Duration: 2 days



Stress Engineer for Primary Structures

Registration Code: STRESS_BASIC

Basic Knowledge of Elementary Theories

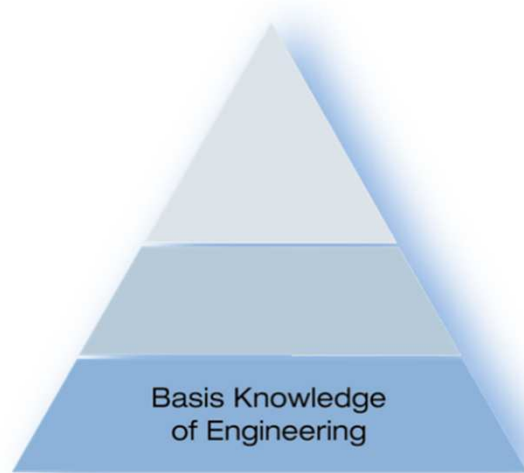
- Compression and tension of springs and rods
- Bending of beams/bars
- Torsion of beams/bars
- Truss structures
- Shear panels
- Displacements of statically determined structures
- Forces of constraints and internal forces in statically indeterminate structures

Membrane, Plates and Shells

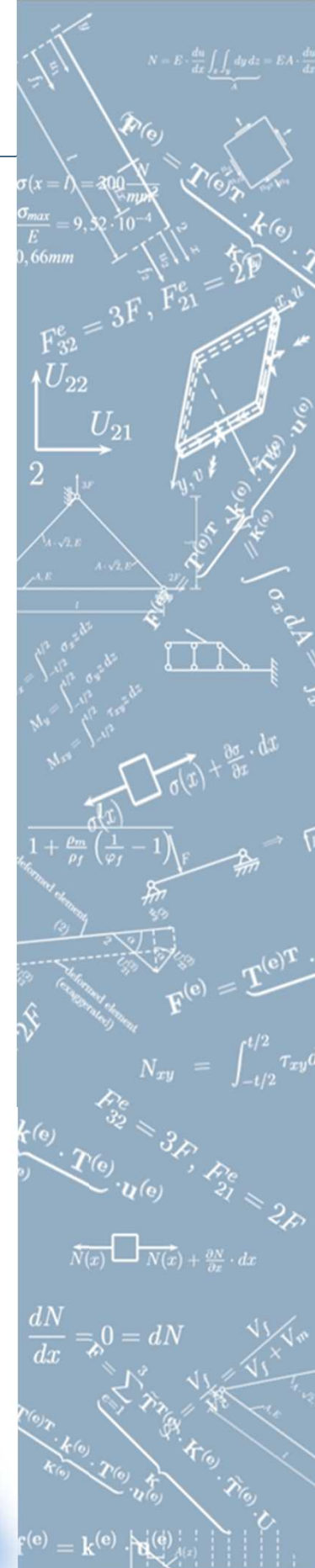
- Membrane theory of shells
- General theory of shells
- General equations of small deflection plate theory
- Analytical solutions for rectangular plates
- Analytical solutions for circular plates
- Effects of large deflections

Effects beyond Elementary Theories

- Rod on elastic foundation
- Rod with lateral contraction
- Inhomogeneous rods
- Plasticity of rod structures
- Beams on elastic foundation
- Curved beams
- Straight beams with large displacements
- Inhomogeneous beams
- Beams with variable cross section
- Plasticity of beams
- Warping torsion



Duration: 4 days



Stress Engineer for Primary Structures - Advanced

Registration Code: STRESS_ADVANCED

Buckling and Post Buckling

- Buckling of thin-walled structures
- Local and global buckling
- Torsional buckling
- Onset of buckling

Design and Analyses of typically A/C Primary Structures

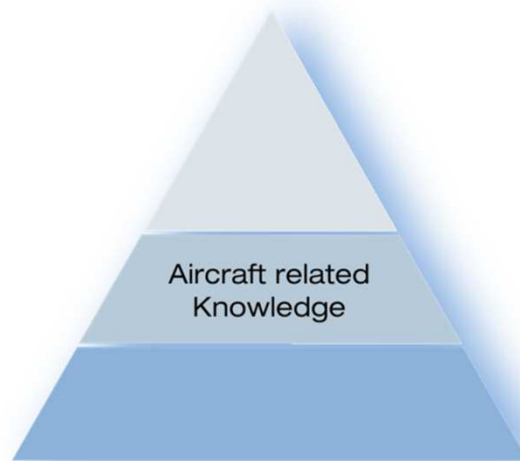
- Wing upper panel
- Fuselage panels
- Bracket (lug)

Nonlinearities

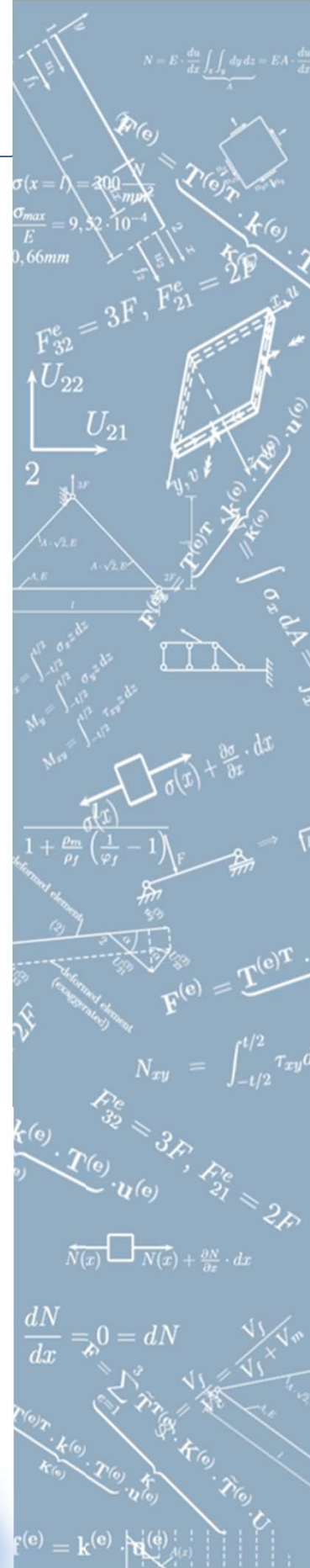
- Material nonlinearities
- Geometric nonlinearities

Dynamics

- Normal modes analysis
- Forced response analysis



Duration: 4 days



Finite Element Analyses for Stress Engineers - Basic

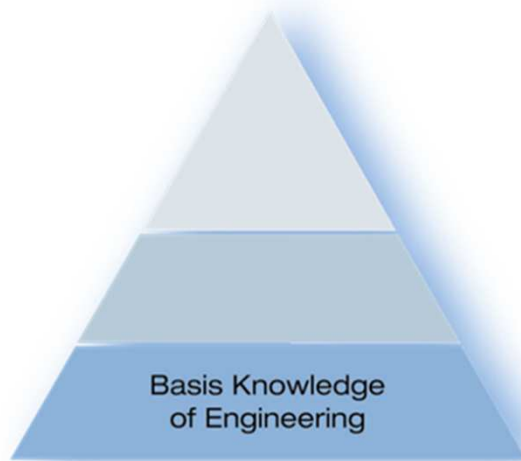
Registration Code: FEM_BASIC

Basic Knowledge of Finite Element Method

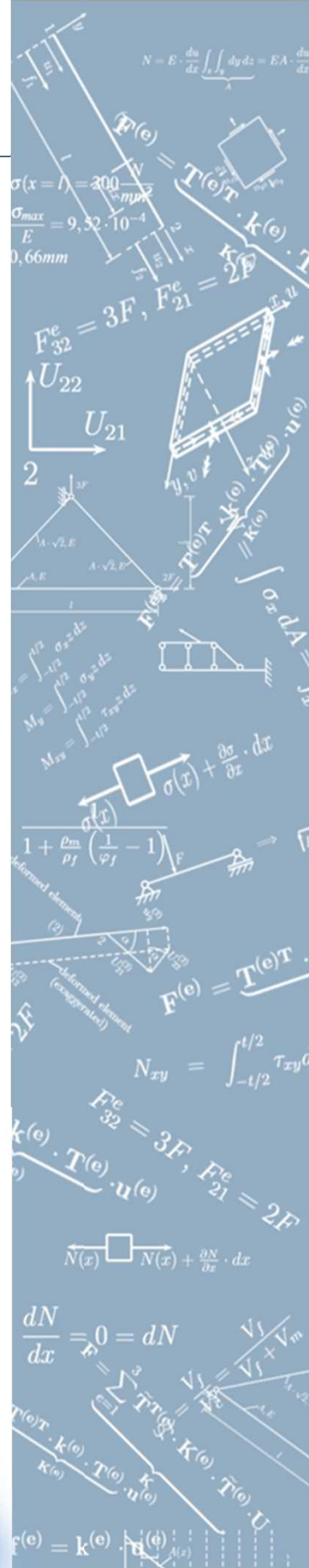
- The direct stiffness method
- Finite element modelling: mesh, loads, BC's
- Stiffness matrix of rod elements
- Stiffness matrix of plane beam elements
- Stiffness matrix of shell and plate elements
- The assembly process
- Solving the FEM equations
- Data recovery
- Post-processing

Fundamental Approach using FEM for Truss Design

- Finite element modelling: mesh, loads, BC's
- Post-processing
- Quality assurance of FE-analyses results
- Using FEM for plates and shells



Duration: 4 days



Finite Element Analyses for Stress Engineers - Advanced

Registration Code: FEM_ADVANCED

Applying FEM within A/C Structural Analyses

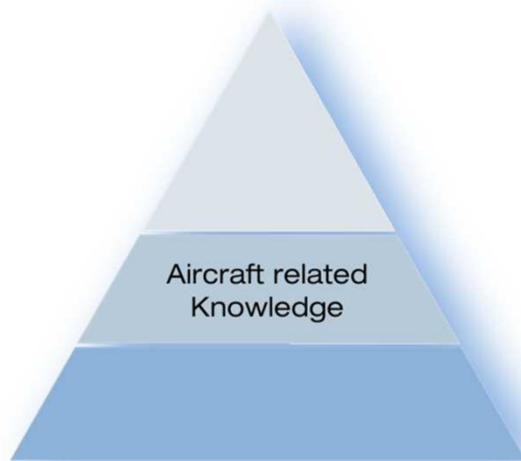
- Idealization of structural elements
- Super-element-technique
- Global-local analyses
- Strength and stress justification

Practical Details for FE-Calculations

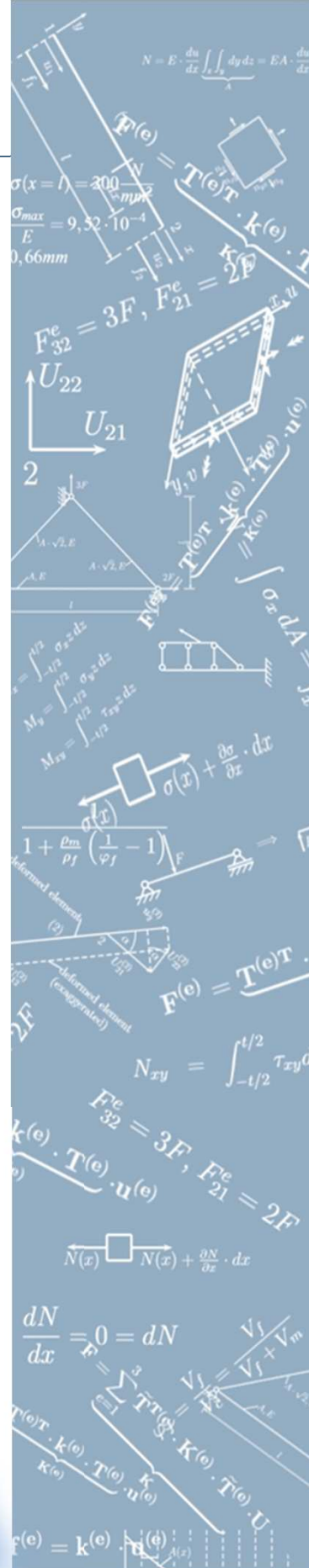
- Quality control methods
- Coupling of sub-models
- Load-introduction modelling (rivets, bolts, joints)
- Boundary conditions

Workshop Examples

- Lug
- Vertical fin
- Wing panel
- Fuselage structure (frame)



Duration: 3 days



Basic Knowledge of Composite Analysis and Design

Registration Code: COMPOSITE_BASIC

Components of Reinforced Plastics

- Fibres
- Resins
- Fabrics

Manufacturing Methods and Approaches

- Moulding processes
- Pultrusion
- Curing
- ...

Manufacturing defects and inspection

- Manufacturing defects
- Non-destructive inspection

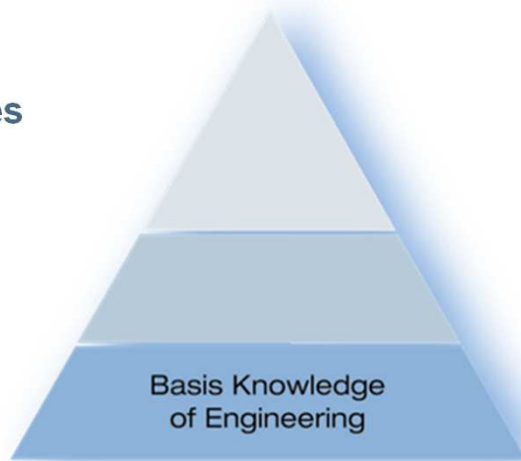
Design Principles

- Structures
- Laminates design
- Joints and load introduction
- Corrosion and material compatibility

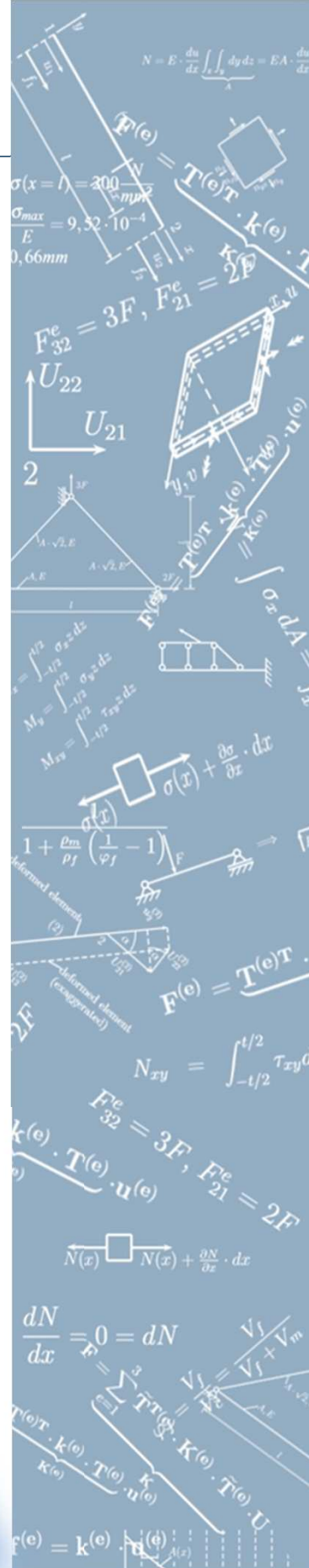
Mechanical Properties of Laminates

- Material law
- Plane stress constitutive equations
- Mechanical properties of a ply
- Classical laminate theory
- Failure criteria
- Buckling
- Joints
- Holes in Laminates

Repair concepts



Duration: 4 days



Composite Design and Calculation

Registration Code: COMPOSITE_ADVANCED

Structural Mechanics of Composite Beams and Shells

- Equations of a laminated anisotropic beam
- Equations of a laminated anisotropic plate
- Orthotropic plates

Analysis of Aircraft Composite Structures

- Design principles for aircraft composite elements
- Analysis of a composite strut element
- Analysis of a composite floor cross beam
- Analysis of a composite wing panel

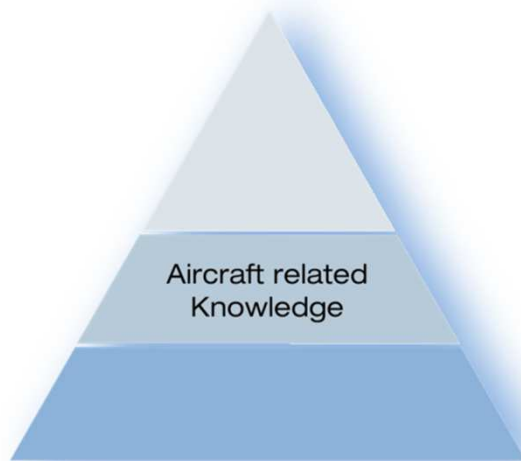
Joining of Aircraft Composite Structures

- Bonding (co-curing, co-bonding, cold bonding)
- Joints (bolts, rivets)

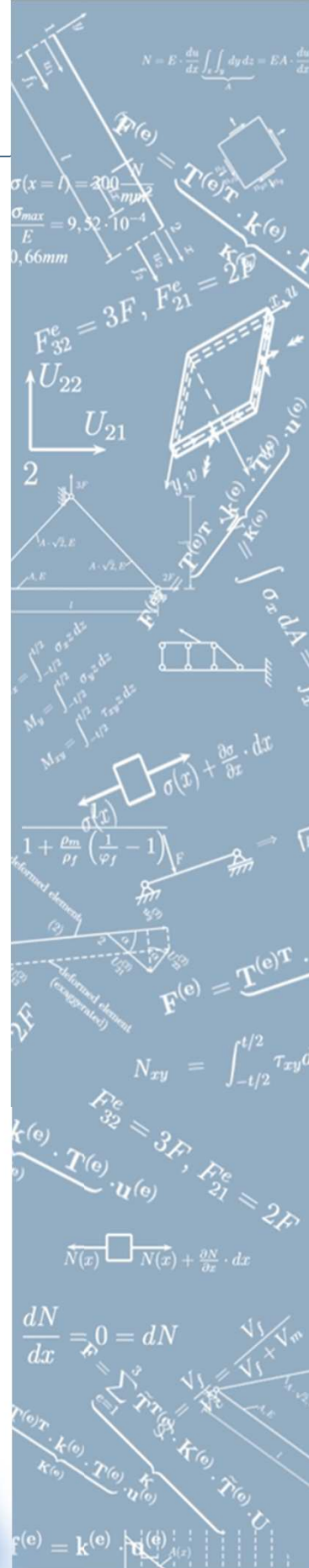
Quality Assurance Aspects

- Non destructive testing
- Destructive testing

Certification of Composites



Duration: 4 days



Fatigue for Designer

Registration Code: FATIGUE

Introduction

- Historical Overview
- History of Certification rules
- Static Strength - Fatigue Strength

Vibrational Loading of Structures

- Terminology
- Vibrational Loading of Airplanes
- Lifetime Prediction
- Influences on the Fatigue Strength of Metallic Structures

Fatigue of Materials and Damage Tolerance

- Fatigue Strength
- Scatter
- Crack Growth and Residual Strength
- Changes of Static Design Values due to Vibrational Loads

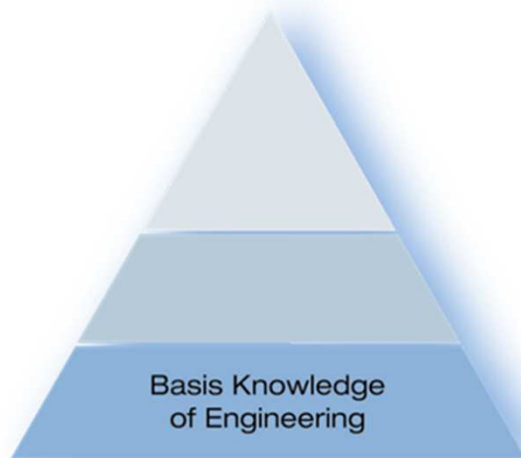
Fasteners and Joints

- Connection Types
- Connection Strength
- Design Principles

Design Guidelines

- Safe Life versus Fail Safe
- Milled Parts
- Sheet Metal parts
- Usage of Shims
- Corrosion Protection
- Material
- Crack Detection
- Checklist and Influences
- Design Recommendations

Workshop - Examples



Duration: 2 days

Introduction to Fatigue Analysis

Registration Code: INTRO_FATIGUE_BASIC

Introduction

- Fatigue Damage: consequences and examples
- Damage Mechanisms

Stress Analysis using Finite Element Analysis

- Nominal Stresses: Assessment using Beam, Shell and Continuum Idealization
- Notch Stresses: Accuracy, Element types
- Stress Assessment for Welds

SN-curves

- Definition of Stress Cycle SN-curve (Wöhler Curve)
- Scatter of Experimental Data
- Test Evaluation
- Gassner Diagram
- Linear Damage Accumulation
- Probability of Failure

Loads and Stresses

- Cycle Counting
- Load Spectra

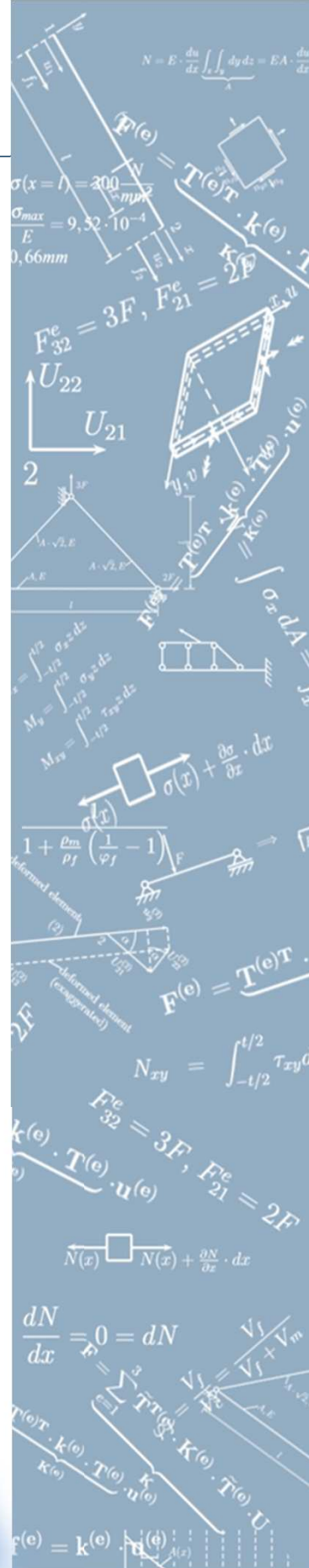
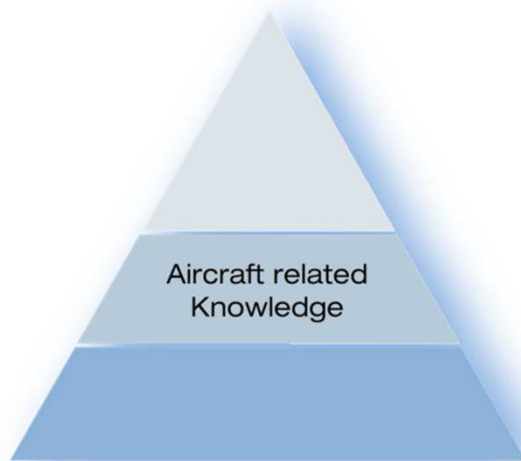
Factors Affecting Fatigue

- Loading
- Mean Stress
- Notches
- Material
- Size
- Technology
- Surface
- Temperature
- Corrosion
- Load Sequence

Stress Based Concept

- Analysis Scheme
- Synthetic Wöhler Diagrams (SWL99)
- Nominal-, Structural-, Notch Stress Concept

Duration: 2 days

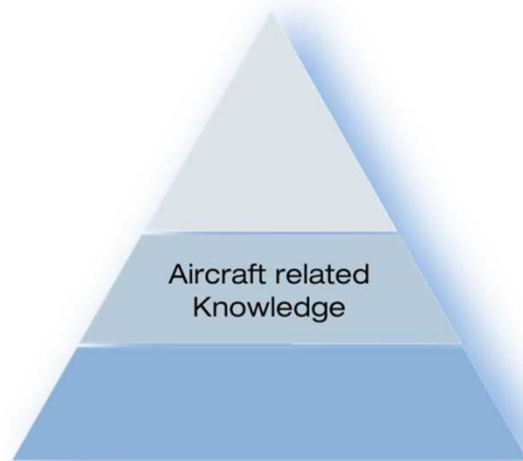


Introduction to Strain Based Fatigue Analysis

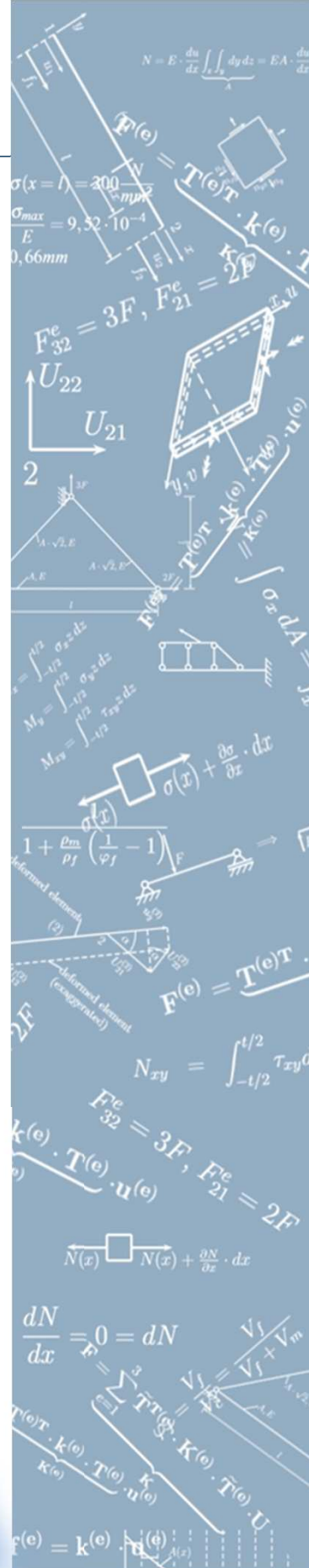
Registration Code: INTRO_STRAIN_FATIGUE

Strain Based Concept

- Cyclic Elastic-Plastic Material Data
- Load-Notch Relation
- Factors Affecting Fatigue
- Damage Parameters
- Analysis Scheme



Duration: 1 days

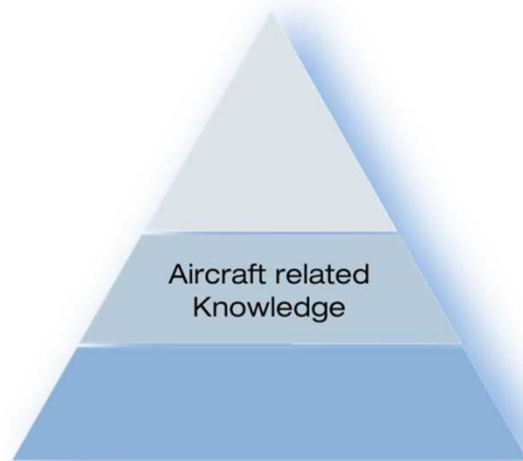


Introduction to Multiaxial Fatigue Analysis

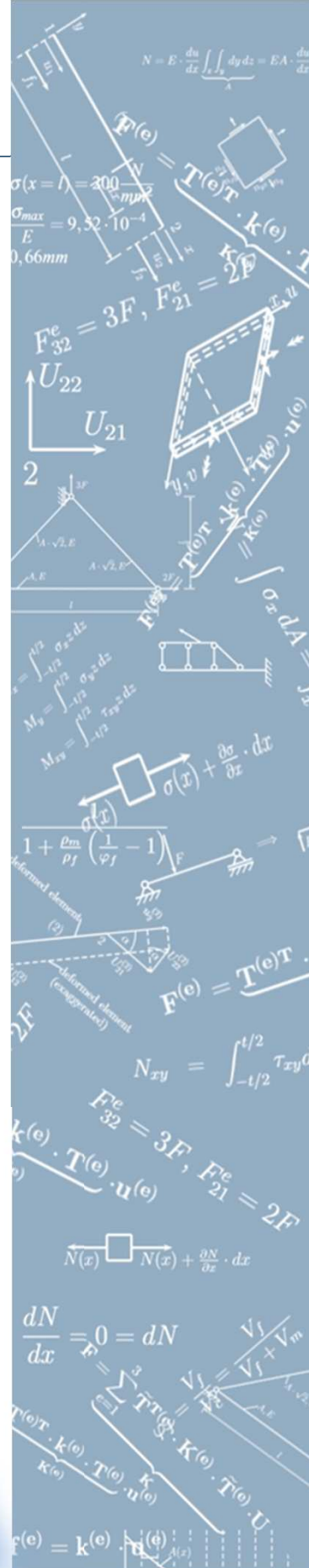
Registration Code: INTRO_MULTI_FATIGUE

Introduction to Multiaxial Fatigue

- Effects and Consequences
- Multiaxial Stress and Strain
- Plasticity Models
- Cycle Counting
- Selected Damage Parameters (Stress, Strain and Energy Based Concepts)



Duration: 1 days



Aircraft Engineering

Registration Code: AIRCRAFT

Overview of The Design Process

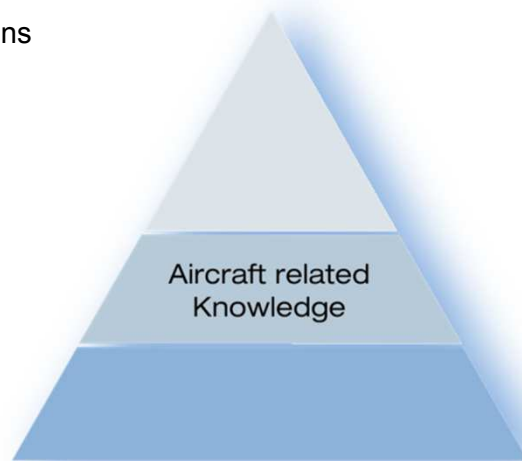
- Phases of Aircraft Design
- Concurrent Design Process
- Primary Structure – Secondary Structure (ATA Chapter)

Design Principles

- Introduction
- Materials
- Design Principles for Metallic Structures
- Tolerances
- Environmental Constraints
- Integration of Systems
- Design in Damage Prone Areas
- Repair of Aircraft Structures

Certification

- Airworthiness
- Design Principles
- Environment Conditions
- Failure Modes
- Certification Tests (Test Pyramid)
- Overview of Different Certification Regulations



Duration: 5 days

Parts can be booked separately as an individual course

Organisation

1/2

General Terms and Conditions for Seminars, Training and Coaching by Acentiss GmbH Course Fees:

Course fees are listed in the Acentiss Academy catalogue. The course fees include course materials and beverages during breaks. Where further fees for seminars, training and coaching on-site at the customer may apply.

Services:

The services rendered under this contract shall be the arrangement and the implementation of a seminar. Course content, location and instructor shall be defined in the specific contractual arrangements.

Applications:

Please use the form available from the Acentiss website at www.acentiss.de or the form at the end of this catalogue. You may apply for seminars by:

Letter: Einsteinstr. 28a, 85521 Ottobrunn, Germany

Fax: 089 4111 934 95

Email: academy@acentiss.de

Cancellation or changes of the course by Acentiss GmbH:

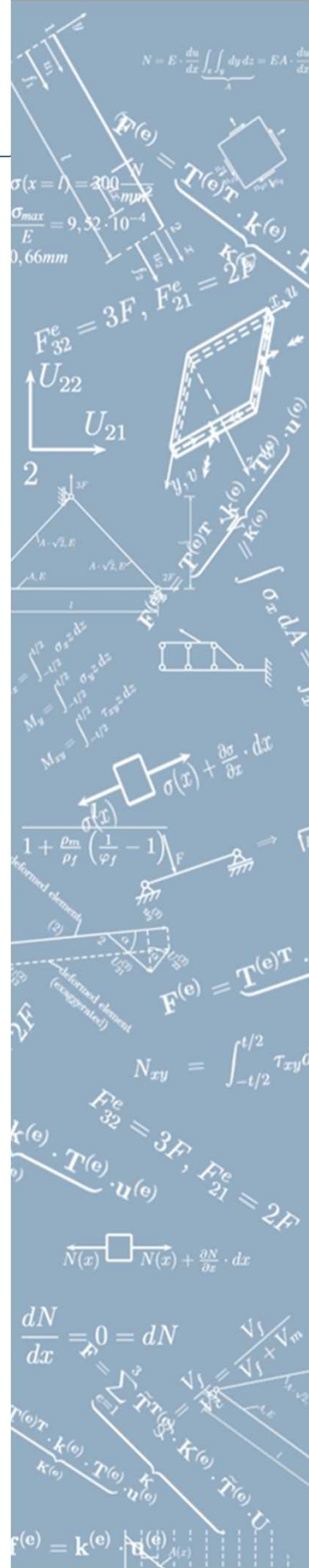
Acentiss GmbH reserves the right to cancel the event due to an important reason, e. g. if there are too few participants (less than three), if the instructor is unable to deliver the course resp. is sick, if the hotel is closed or in case of force. Acentiss GmbH further reserves the right to change the instructor, the location and the program of the event. In case there are too few participants the cancellation shall occur no less than five working days prior to the beginning of the event. In all other cases of cancellation due to an important reason and in case of necessary program changes, especially change of the instructor, the participants shall be informed by Acentiss GmbH as soon as possible. In case of a cancellation of the event by Acentiss GmbH the paid course fees shall be reimbursed. Further claims against Acentiss GmbH, especially, but not limited to useless expenses, shall be excluded except in cases of gross negligence or deliberate acts on part of the legal representatives, employees or other assistants of Acentiss GmbH.

Number of Participants:

The number of participants per event is limited. Applications are processed in the order that in which they are received.

Confirmation of registration and due date of payment:

Applications are confirmed by Acentiss in writing. Along with the confirmation letter, you will receive travel details for the location and a of convenient hotels. The course fees shall be due for payment immediately upon receiving the confirmation, but no later than 14 days prior to the beginning of the event. For this the receipt of the payment by Acentiss GmbH is decisive. Participants who did not pay the course fees in due time can be barred from attending the event. The course fees shall be due nonetheless.



Organisation

2/2

Room reservation and arrival:

Please make your own arrangements for your hotel room reservations and plans for your arrival.

Cancellation of a course by a participant:

You may cancel the booked course free of charge no less than two weeks before the beginning of the event. In case of a cancellation less than two weeks prior to the beginning of the course, a charge of 25% of the contract value fee shall apply. In case of non-attendance the full course fee shall be owed.

Cancellation must be delivered in writing to:

Acentiss Academy
Einsteinstr. 28 a
85521 Ottobrunn

The receipt of the cancellation by Acentiss GmbH is decisive for the aforementioned periods of time. The full course-fee is also due in case of part-time attendance of an event. Instead of the originally registered participant a backup-participant could enroll.

Warranty:

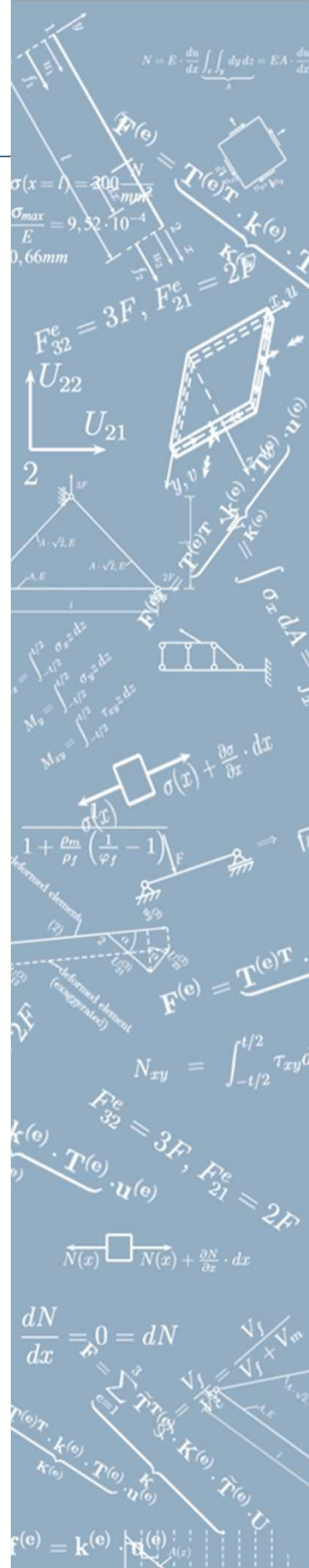
Acentiss GmbH and their instructors will prepare the courses and the corresponding course materials to the best of their knowledge and will make an effort of keeping them up to date at the time of the course. However, Acentiss GmbH does not guarantee a specific result of the course. Neither the course content nor the course materials can be claimed to be correct or complete. For this Acentiss GmbH can not be held liable. The aforementioned exclusion of liability shall not apply to personal injury or if the damage was caused through gross negligence or deliberate acts or if the liability arises from the Product Liability Law (ProdHaftG), from a guarantee or any other mandatory statutory provisions.

Copyright:

The course materials are protected by copyright laws and may not - even in part – be reproduced or distributed without consent by Acentiss GmbH. Acentiss GmbH shall retain all rights. The course materials are provided exclusively for the participants of the course.

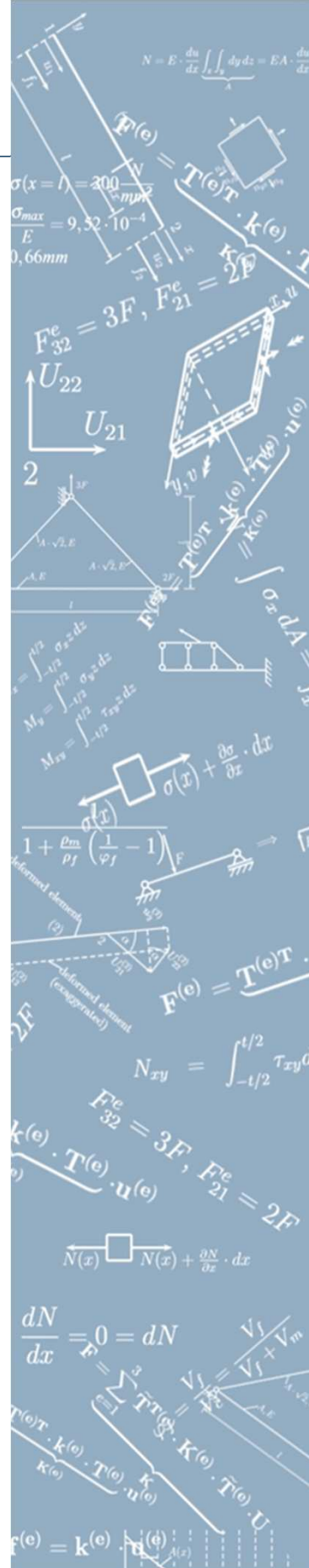
Privacy:

Data transmitted to us will be processed mechanically for processing your course application and for information on other courses. Names and addresses will – if applicable - be made accessible to other course participants by means of a list of course participants and will be transmitted to the company assigned with mail delivery. Should you wish to receive no information on other courses by the Acentiss GmbH, please notify us briefly. Furthermore the General Terms and Conditions of the Acentiss GmbH shall apply.



Summary of Training Courses

Training Courses 2012	Training Topic	Reference	Basic Training	Advanced Training	Duration (days)
Engineering Knowledge	Stress Analysis for Designer	STRESS_DESIGN	●		2
	Stress Engineer for Primary Structures - Basic	STRESS_BASIC	●		4
	Stress Engineer for Primary Structures - Advanced	STRESS_ADVANCED		●	4
	Finite Element Analyses for Stress Engineers - Basic	FEM_BASIC	●		4
	Finite Element Analyses for Stress Engineers - Advanced	FEM_ADVANCED		●	3
	Basic Knowledge of Composite Analysis and Design	COMPOSITE_BASIC	●		4
	Composite Design and Calculation - Advanced	COMPOSITE_ADVANCED		●	4
	Fatigue for Designer	FATIGUE	●		2
	Introduction to Fatigue Analyses	INT_FATIGUE_BASIC		●	2
	Introduction to Strain Based Fatigue Analysis	INT_STRAIN_FATIGUE		●	1
	Introduction to Multiaxial Fatigue Analysis	INT_MULTIFATIGUE		●	1
	Aircraft Engineering	AIRCRAFT		●	5



Fax Registration Form

Please complete and fax to +49 89 4111 934-95

Training Courses 2012	Training Topic	Reference	Basic Training	Advanced Training
	Stress Analysis for Designer	STRESS_DESIGN		
Engineering Knowledge	Stress Engineer for Primary Structures - Basic	STRESS_BASIC		
	Stress Engineer for Primary Structures - Advanced	STRESS_ADVANCED		
	Finite Element Analyses for Stress Engineers - Basic	FEM_BASIC		
	Finite Element Analyses for Stress Engineers - Advanced	FEM_ADVANCED		
	Basic Knowledge of Composite Analysis and Design	COMPOSITE_BASIC		
	Composite Design and Calculation - Advanced	COMPOSITE_ADVANCED		
	Fatigue for Designer	FATIGUE		
	Introduction to Fatigue Analyses	INT_FATIGUE_BASIC		
	Introduction to Strain Based Fatigue Analysis	INT_STRAIN_FATIGUE		
	Introduction to Multiaxial Fatigue Analysis	INT_MULTI_FATIGUE		
	Aircraft Engineering	AIRCRAFT		

Title: _____ Town: _____
 First Name: _____ Country: _____
 Surname: _____ Postcode: _____
 Position (Jobtitle): _____ Phonenummer: _____
 Organisation: _____ Faxnumber: _____
 Address: _____ Email: _____

Date _____ Company _____ Signature _____

The general terms and conditions of ACENTISS Academy are valid.