QUADCO
ENGINEERING

COURSE

INTRODUCTION TO FATIGUE ANALYSIS WITH THE FINITE ELEMENT METHOD

May 27–28 2024
Izegem (BE)

INTRODUCTION TO FATIGUE ANALYSIS WITH THE FINITE ELEMENT METHOD

Fatigue in materials and structures presents a challenging problem in the engineering world. Despite its recognition since the 19th century, this form of material failure is often overlooked. Correctly predicting and analysing fatigue remains a complex task that requires thorough knowledge. This is where our course, **Introduction to fatigue analysis with the finite element method**, can help you get started quickly.

WHY THIS COURSE?

This course is designed to equip engineers and designers with the necessary skills and knowledge to efficiently and accurately perform fatigue analyses. We unravel the complex process of fatigue analysis into clearly defined steps, provide insight into the underlying physical phenomena, and demonstrate how you can successfully implement practical solutions using calculation tools such as Excel, Python or the Finite Element Method (FEM).

WHO IS THIS COURSE FOR?

- Engineers and designers involved in evaluating structural durability.
- Professionals who wish to refresh or deepen their knowledge about material fatigue and determining the lifespan of components.
- Anyone interested in efficiently performing fatigue analyses, with the help of advanced FEA software or more accessible tools like Excel or Python.

WHAT WILL YOU LEARN IN THIS COURSE?

- Design philosophies for structural durability.
- Different techniques for determining fatigue life: S-N and E-N methods, and evaluation methods for crack growth.
- Background and insight into the fundamental principles of fracture mechanics, such as LEFM, and how this knowledge can be applied to assess the life of structures after the initiation of cracks.
- You will learn how and when to apply different fatigue and fracture mechanics techniques, depending on the specific requirements of your project.
- Discover how essential accurate stress results are for predicting the fatigue life and how you can ensure this accuracy in your analyses.
- You will be guided through a step-by-step process to successfully perform a fatigue analysis from start to finish, from the initial setup to the final evaluation and interpretation of the results.

BENEFITS OF THE COURSE

SOFTWARE INDEPENDENT

Our course is designed to be universally applicable, regardless of the specific (FEA) software you use. This means that the knowledge gained is broadly applicable, keeping you flexible in your choice of tools and technologies.

ACCELERATE YOUR LEARNING PROCESS AND ACHIEVE ACCURATE RESULTS

The investment in this course pays off quickly. You will learn how to maximize the potential of your software and hardware investments in a short time, minimizing the costs associated with the learning process and maximizing productivity. You will learn how to perform complex analyses faster and with greater precision, resulting in better design decisions and a more efficient design process.

PREVENT COSTLY ERRORS

Prevent costly errors by learning a thorough foundation in fatigue problem analysis. This allows you to identify potential problems early and make informed design decisions that can save significant costs in the long run.

CREATE CONFIDENCE IN YOUR RESULTS

With the knowledge and skills you acquire, you can confidently interpret and defend the results of your analyses. This confidence is crucial, not only for your personal satisfaction and peace of mind, but also for convincing colleagues and clients of the reliability of your analyses.

IMMEDIATELY APPLICABLE KNOWLEDGE

The focus is on practical skills and insights that you can immediately apply in your work. This ensures that you can start analysing and solving fatigue problems right after completing the course. Learning a step-by-step plan also makes your calculations significantly more efficient and accurate.

TAKE THE NEXT STEP TOWARDS EXCELLENCE IN YOUR FIELD

Don't miss this opportunity to develop your skills and elevate your career to a higher level. Join our course, **Introduction to fatigue analysis with the finite element method**, and take the first step towards mastering this challenging field.

Contact us today for more information or to enroll.

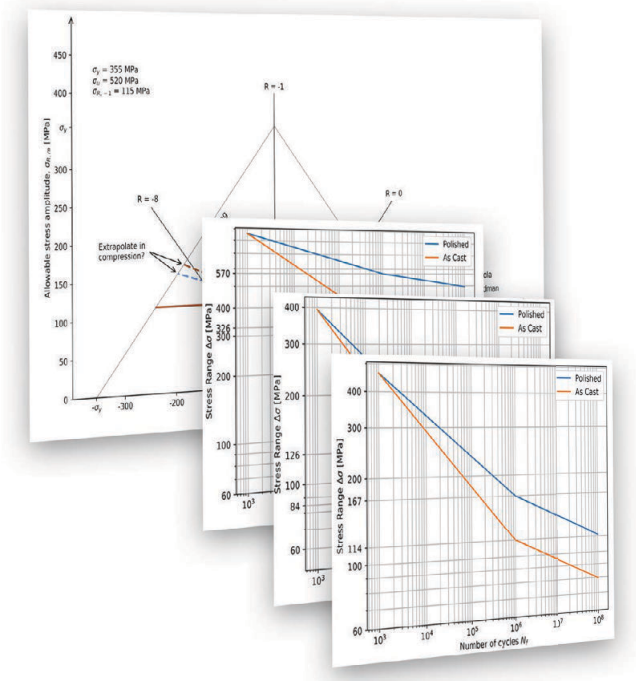
FLEXIBLE TRAINING OPTIONS

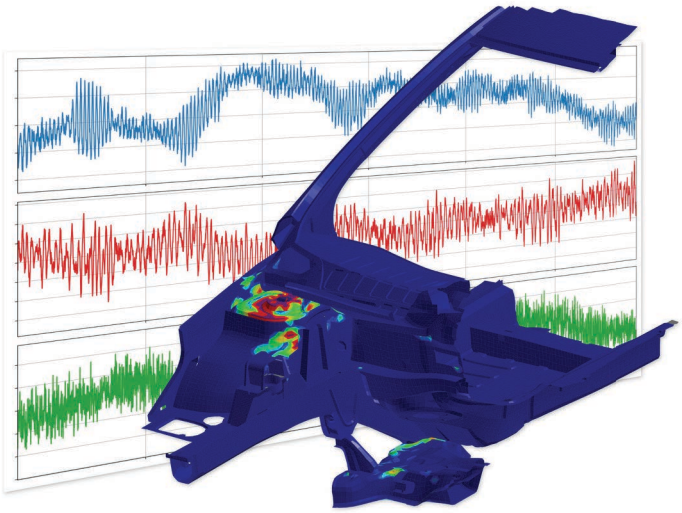
If desired, this course can also be organized **on-site at your company** and **customized for your team**, so the knowledge can be applied directly in your familiar working environment.

Interested? Call or email us

COURSE CONTENT

- Introduction to fatigue as a failure mechanism
  - Definition of material fatigue
  - Microscopic and macroscopic material behaviour subject to cyclic loading
  - Historical and contemporary fatigue assessment practices
- Factors influencing the fatigue life of components
- Overview of fatigue analysis methods
  - General methods for the assessment of structural durability
  - Effect of mean stress
  - Fatigue correction factors
- High-cycle fatigue (S–N or Stress–Life)
  - Concepts of high-cycle fatigue and fatigue strength
  - Fatigue properties of materials and how to measure them
  - Palmgren-Miner's rule for damage accumulation
- Low-cycle fatigue (E–N or Strain–Life)
  - Concepts of low-cycle fatigue
  - Fatigue properties of materials and how to measure them
  - Stress concentrations near notches
  - Local plasticity and notch corrections according to Neuber
- Residual stresses
- Fatigue under variable amplitude loading
- Multiaxial loading
- Fatigue of welded joints
- Fatigue of bolted joints
- Introduction to fracture mechanics
  - LEFM
  - Assessment of structures with (pre-) existing cracks
  - Analysis of fast crack growth and fracture
- Special fatigue conditions
  - Surface treatments
  - Corrosion
  - High and low temperature fatigue
- Designing against fatigue of structures





DETAILS

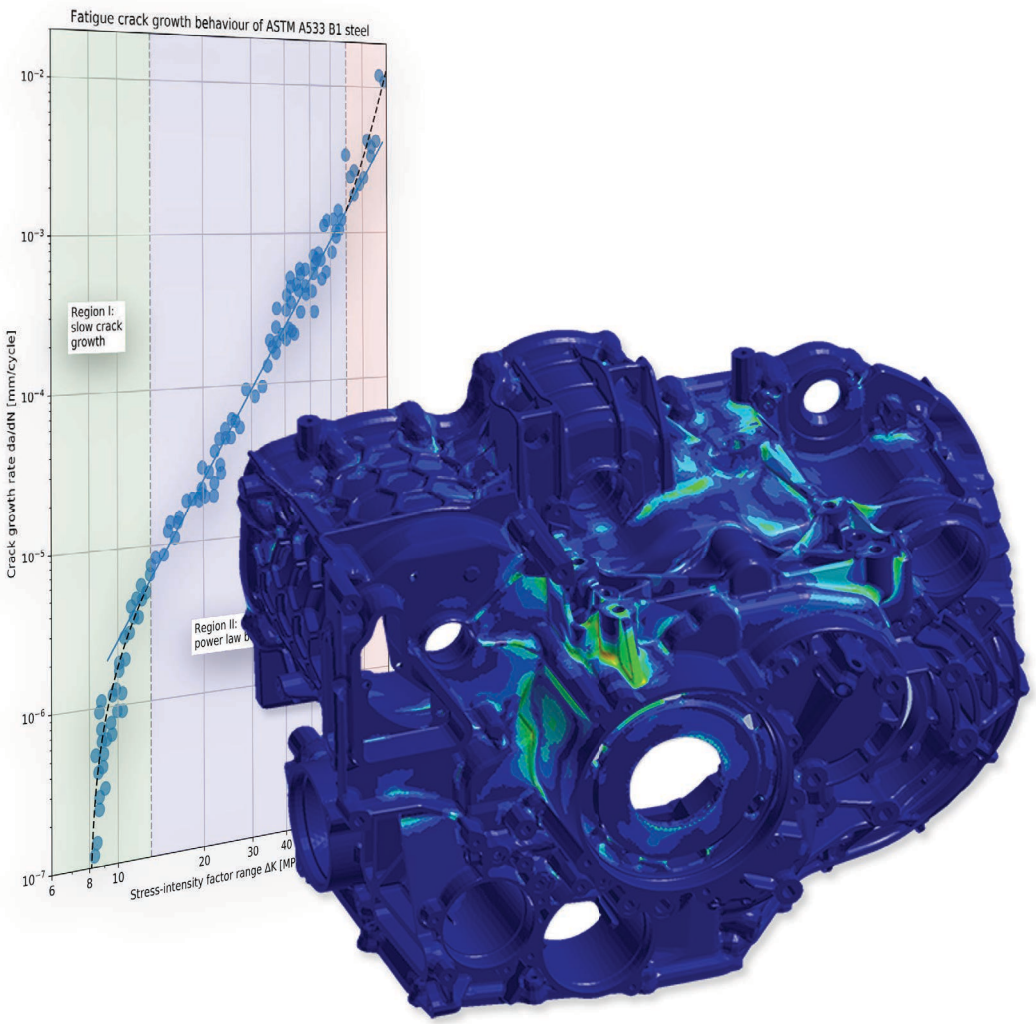
DURATION AND DATES
2 days
May 27–28 2024

ENROLLMENT
The number of participants is limited and enrollment is closed one week before start of the course.

LOCATION
Izegem (BE)

PRICE
Enrollment before 27/04/2024:
1.525 euro ex VAT
Enrollment after 27/04/2024:
1.695 euro ex VAT

LANGUAGE
Dutch (English on request)



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tel.: +32 478 61 81 18 **email:** training@quadco.engineering **web:** www.quadco.engineering