

WM13

Delivery mode :
Online

Analysis of failures in polymer and composite elements - Methodology and assessment tools

Understanding the basic principles of applied assessment processes and the tools necessary to anticipate a failure and draw conclusions to improve the end quality of your items - Theoretical course.

5
days

21-24 November 2022
2pm - 6pm

25 November 2022
2pm - 5pm

The use of polymer and composite materials to create mechanical objects is very widespread today. Despite efforts undertaken to produce quality pieces, premature flaws can occur due to certain errors introduced during transformation; factors that are badly or not at all considered during design; or even inappropriate use of objects.

A strong understanding of the process that led to the accidental damage provides the basis necessary to go back over the design and manufacture phases in order to improve the quality of the product.

This remote learning course provides an introduction to failure analysis. We discuss the process applied for failure analysis and the main tools used on plastic, elastomer and composite objects, which enable us to verify failure hypotheses (non destructive checks, fractography, Physico-chemical analyses, calculations, etc.).

WHO SHOULD ATTEND

Engineers & technicians in:

1

Quality Control

2

Manufacture

3

Maintenance

PRE-REQUISITES

None

SKILL AIMS

1

Application of the failure analysis process to situations they find in their company.

2

Identification of analysis methods that can be used to pinpoint causes of failure and their purpose.



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COURSE OBJECTIVES

1

Apply objectives

2

Identify the analysis methods that can be used

3

Start an analysis of how an object broke

COURSE OUTLINE

Materials and processes

- Recap on materials, their make-up and their transformation processes
- Recap on structure / property relations
- Main flaws found

Process used in failure analysis

- Preliminary investigation
- Investigation phase following the starting assumptions

Principles and application of non-destructive checks for assessment

- Types of checks and flaws detectable (radiography, ultrasound, acoustic emission, thermography, etc.)

Physico-chemical characterisation methods

- Review of main physico-chemical characterisation methods used in failure analysis
- Important characteristics to measure and associated techniques

Calculations and mechanical characterisation

- Main mechanical characterisation methods used in failure analysis
- Possibilities offered by assessment calculations

Fractography analysis

- Notions of polymer and composite breakage
- Process applied to analyse breakage in an object
- Main events characteristic of breakages in polymers and composites

Application in a real-life situation

- Application example on a case study (application of the process, consideration of the methods to use to find the cause of failure)

TRAINER



Sophie TOILLON

Sophie TOILLON, expert on Materials provides expertise on polymer and composite components and structures. The areas in which she works concern:

- Classification of materials
- Failure analysis, audit, advising
- Searching for repair or redesign solutions
- Management of projects across multiple skill areas
- Training (teaching manager) and presentations on technology days

Moreover, she is head of R&D studies and of supervision of theses on:

- Ageing and life expectancy prediction
- Development of classification techniques (remaining constraints, etc.)

AREAS OF EXPERTISE

- Mechanical and physical-chemical classification, NDTs of polymer and composite materials (high diffusion and high performance)
- Failure analysis of plastic, elastomer and composite parts, methodology, FMEA process
- Damage analysis and identification of failure mechanisms (fractography)
- Understanding of ageing phenomena
- Assistance with redesign or repair of faulty parts or structures
- Surface, adhesion treatments

PROFILE

- A CETIM (20 years): failure analysis project manager, head of R&D studies then Area Expert
- CRITT Materials - LNE East (5 years): manager of classification services, failure analysis, specific formulations, bonding, training

Education and Training

- Diploma from l'Institut de l'Expertise (Paris)
- Qualified in Engineering at the Ecole d'Application des Hauts Polymères (EAHP) in Strasbourg (1994), Post-graduate diploma in Physics Chemistry Polymer Materials (1993)
- Master's degree in Physical Chemistry (1992)



FEE

RM4,890

(inclusive of course materials & certificate)

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