FAILURE ANALYSIS AND FORENSIC INVESTIGATION

Failure of components or sometimes the entire structure often pose significant impact and threats to safety, economic and even to environmental issues. A detailed understanding and analysis of the causes is usually deemed as basic requirement in order to prevent similar failures from recurring in the future.

Training Information

Objectives:

→ Forensic knowledge and skills used in failure investigation

→ An abridgement of techniques used as aids in forensic investigation

→ Collated experience from past failure cases from various industries and components

Who Should Attend?

The course is designed for various disciplines that includes Engineers, Consultants, Inspectors, Safety, Maintenance, Process and Operators; covering major industries not limited to Oil and Gas, Marine, Building and Construction, Manufacturing and Aerospace. It is especially beneficial for participants who are new to these concepts, non-metallurgist or non-engineering related professionals who wants to better understand the application of forensic engineering for cases such as litigation and insurance purposes.

Course Outline:

Day 1:

→ Introduction to Failure Analysis and Forensic Investigation

→ Material Properties and basic concepts in metallurgy

→ Practice and analytical techniques used for Site

→ Practice and analytical techniques used for Laboratory

Day 2:

→ Failure and Damage Mechanisms: Overload (Ductile and Brittle), Fatigue , Corrosion, Surface degradations (Wear)

→ Types of Mechanical Loads

→ Failure Analysis of Polymers and Composites

→ Case Studies (focus on different industries and mechanical related, such as metals, components, structural damage, power transmission etc.)

→ Individual work and Quiz (including comprehensive library of photos)

→ Questions / answers

Pre-requisites:

Basic knowledge in metallic materials

Pedagogical means:

Teaching method alternating theory and practice through case studies or works directed

Ref: MTS01
Type: Physical Training
Trainer: Robert Shandro, Ashley Ng

Date:
25-26 February 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 11 February 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS01 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

CORROSION FUNDAMENTALS FOR ENGINEERS AND INSPECTORS

Although corrosion is regarded as nature's way of converting a refined metal to a more stable form, its impact on the economy has been significantly devastating in many industries. Corrosion has been the cause of many infrastructure and industrial incidents leading to injuries and loss of lives. As such, it is important to understand the fundamentals, mechanisms and potential consequences of corrosion.

Ref: MTS02
Type: Physical Training
Trainer: Liam Kok Chye

Date:
11-12 March 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 25 February 2025)

Training Information

Objectives:

- → Introduction to corrosion terminology and basic concepts
- → Knowledge of the classification of different types of corrosion mechanisms
- → Knowledge on methods to detect and monitor corrosion degradation so as to mitigate or prevent any significant consequences or failures from occurring
- → Theoretical and practical knowledge through case studies

Who Should Attend?

The course is designed for Engineers, Consultants, Inspectors, Maintenance, Process and Production Operators, covering major industries such as Oil and Gas, Offshore/Marine, Building and Construction, Manufacturing and Aerospace. It is especially beneficial for participants who are non-material related professionals wanting to better understand the basic concepts of corrosion engineering and some of the practical applications of corrosion technology to solve industrial corrosion problems.

Course Outline:

Day 1:

- → Introduction and Course Objectives
- → Basic Concepts of Metallurgy
- → Principles and Mechanisms of Corrosions
- → Types of Corrosion

Day 2:

- → Types of Corrosion (continued)
- → Methods to Detect and Control Corrosion
- → Diagnosis of Corrosion Problems

Pre-requisites:

None

Pedagogical means:

None

REGISTER TODAY!

Scan the QR Code to register for the MTS02 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

FAILURE & DAMAGE MECHANISM AFFECTING FIXED EQUIPMENT

ASME and API codes are commonly referred to for the design, fabrication, inspection, and testing of pressurized equipment. Failure and damage mechanisms are however generally not addressed in these codes. Understanding and determining the causes of failure or degradation is essential when conducting a general inspection, fitness for service (FFS) assessment or risk-based-inspection (RBI) of an equipment or plant.

Training Information

Objectives:

→ Basic concepts in metallurgy
→ Overview of failure analysis and techniques of diagnosing failure modes and damage mechanisms
→ Understanding of general damage mechanisms for all industries
→ Understanding of damage mechanisms in refining/petrochemical industries
→ Ability to evaluate different failure/damage mechanisms and their implications on service life

Who Should Attend?

The course is designed for Engineers (AEs, CPs, etc), Inspectors, Consultants, Adjusters, Maintenance and Plant Operators, and Safety and Quality Assurance Personnel. It is essential for those whose work involves safety, inspection, maintenance, trouble-shooting, plant operations and prevention of failures.

Course Outline:

Day 1:

→ Introduction and Course Objectives
→ Basic Concepts of Metallurgy
→ Overview of Failure Analysis and Diagnostic Techniques
→ Mechanical and Metallurgical Failure Mechanisms

Day 2:

→ Uniform or Localized Loss of Thickness
→ High-Temperature Corrosion
→ Environmental-Assisted Cracking

Pre-requisites:

None

Pedagogical means:

None

Ref: MTS03
Type: Physical Training
Trainer: Liam Kok Chye

Date:
22-23 April 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 8 April 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS03 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

FAILURE ANALYSIS OF POLYMER AND COMPOSITES

Despite efforts to improve the reliability of polymers and polymer composites, failures may occur due to manufacturing defects, inappropriate use of the materials and/or ageing due to environmental degradation. Good failure investigation skills gather pieces of information based on different characterization techniques that complement one other and use them to the benefits of hypothesizing possible failures, segregating irrelevant causes, and concluding the root cause of failure.

Training Information

Objectives:

→ Forensic knowledge and skills used in failure investigation

→ An abridgement of techniques used as aids in forensic investigation

→ Collated experience from past failure cases from various industries and components

Who Should Attend?

The course is designed for various disciplines that includes Materials engineers, Consultants, Inspectors, Safety, Maintenance, Process and Operators; covering major industries not limited to Oil and Gas, Energy, Marine, Building and Construction, Manufacturing, Automotive and Aerospace. It is especially beneficial for participants who wants to better understand the application of forensic engineering for cases such as litigation and insurance purposes.

Course Outline:

Day 1:

→ Introduction to Failure Investigation

→ Laboratory analysis techniques

→ Non-destructive testing (Ultrasonic, Tomography, Shearography, Thermography)

→ Physico-chemical analyses (FTIR, Raman, NMR, GPC or Viscosimeter)

→ Thermal analyses (DSC, TGA, DMA)

Day 2:

→ Laboratory analysis techniques

→ Mechanical analyses (Tensile, Hardness, Impact testers)

→ Fractography of polymers and polymer composites

→ Case studies (focus on industrial components made from polymers and polymer composites)

→ Data reporting

Pre-requisites:

None

Pedagogical means:

None

Ref: MTS04
Type: Physical Training
Trainer: Carla Canturri, Yoga Salim

Date:
18-19 June 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 4 June 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS04 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

FAILURE ANALYSIS OF MECHANICAL POWER TRANSMISSION COMPONENTS

Mechanical Power Transmission is a very dynamic field of activity with various applications ranging from the chain on a bicycle, the gearbox on a wind turbine, or the drive train of an automobile. Understand the causes of failures of components like shaft, gears and bearings, help to better avoid them. For this reason, the implement of an appropriate corrective actions using a structured failure analysis approach is very important.

Training Information

Objectives:

→ Introduction to failure analysis methodology and laboratory analysis techniques
→ Knowledge of the different types of fractures and their morphology
→ Knowledge of the mechanical power transmission components
→ Implementation of appropriate corrective actions after failure
→ Theoretical and practical knowledge through case studies

Who Should Attend?

Maintenance, Machine Repair, Plant/Facility Engineering staff, Rotating Equipment Engineers and largely, anyone facing damage problems in mechanical power transmissions components

Course Outline:

Day 1:

→ Practice of failure analysis
  - Failure analysis methodology
  - Laboratory analysis techniques.
→ Morphological analysis of fractures
→ Failure Analysis on Mechanical Power Transmission:
  - Generalities on transmissions
  - Lubricant analysis

Day 2:

→ Shafts failure analysis (main loads, typical shaft's rupture)
→ Practice of gear damage analysis:
  - General considerations
  - Main aspects of the gear teeth in service (ISO 10825)

Day 3:

→ Practice of bearing damage analysis:
  - General considerations
  - Typical deteriorations of gears (ISO 15243)
→ Real case studies of damages

Pre-requisites:

General notions of materials, mechanics and kinematics of mechanical power transmission

Pedagogical means:

Teaching method alternating theory and practice through case studies or works directed

Ref: MTS06
Type: Physical Training
Trainer: Robert Shandro, Ashley Ng

Date:
6-8 May 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 2,600.00 (exclude GST)
(Closing Date: 22 April 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS06 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

GEAR WEAR, BEARING WEAR AND FAILURE RECOGNITION (ISO 10825, ISO 15243)

A vision into the appearance and fundamental causes of gear and bearing failure modes. This training provides gear and bearings users with the necessary skills to examine, assess and recognize common gear and bearing failure modes.

Training Information

Objectives:

→ Examine the different aspects of gears and bearings
→ Assess and interpret common gears and bearings
→ Appreciate what is considered normal wear and what could potentially be a problem and know the appropriate action to take

Who Should Attend?

Maintenance, Machine Repair, Plant/Facility Engineering staff, Rotating Equipment Engineers and largely, anyone facing damage problems in mechanical power transmissions components.

Course Outline:

Day 1 (ISO 10825):

→ Key principles in ISO Standards
→ Members (how to get involved), Technical Committees and Working Groups
→ The different type of ISO publications
→ Basic concepts on the geometry of gears to "Teeth in involute"
→ Spur and helical gears
→ Meshing (contact ratio, interference, sliding)
→ Tooth modifications (profile and helix)
→ Contact pressure and tooth rupture calculations
→ Gear failure analysis method and failure recognition strategy
→ Introduction to the common investigation methods and equipment used
→ Introduction to the new ISO 10825
→ Classification of failure modes in gears
→ Tribological damages (non-fatigue)
→ Fatigue damages, Non-fatigue fracture, Plastic deformation

Day 2:

→ Bearings – General considerations
→ Overview and Vocabulary
→ Main types of bearings and Types of bearing cages
→ Protection and Sealing
→ Bearings assembly and Lubrication
→ Bearings – Typical deteriorations
→ Terms and definitions of the ISO 15243
→ Classification of failure modes in rolling bearings
→ Types of Failure modes

Pre-requisites:

Basic notions of materials, mechanics and kinematics of mechanical power transmission

Pedagogical means:

Teaching method alternating theory and practice through case studies or works directed

Ref: MTS07
Type: Physical Training
Trainer: Robert Shandro, Ashley Ng

Date:
11-12 June 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 28 May 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS07 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

CETIM MATCOR

KISSSOFT GEAR PAIR, SHAFT AND BEARING CALCULATION - BASICS

The main objective of this introductory training is to provide the basic handling and understanding of the KISSsoft software and its user interface teaching participants on the data entry and the calculation possibilities of shafts and bearings in order to operate and apply the software correctly and efficiently in the design process. The training focuses on rolling bearings as this group is the one that is most commonly used.

Training Information

Objectives:

With the help of prepared exercises, participants will learn how to find correct fields to enter the data for the calculation, how to handle different tabs and settings, and how to get the results from the calculations.

Who Should Attend?

This basic training is targeting engineers who are new users of KISSsoft or do not work with KISSsoft that often.

Course Outline:

2 Days:

→ Overview of KISSsoft Software
→ Calculation of gears on KISSsoft
→ Cylindrical and other gears
→ Gear pair meshing and calculations
→ Case studies on cylindrical gears
→ Overview of shafts on KISSsoft
→ Shaft editor
→ Geometry, forces, bearings
→ Modelling, Sizing for shaft calculation (according to DIN 743)
→ Calculation of deformation, strength
→ Calculation with load spectrum
→ Graphs and report
→ Examples of shaft calculations
→ Natural frequencies (critical speed) and buckling
→ Rolling bearings:
→ Calculations ISO 281, ISO 76
→ Calculations ISO/TS 13281
→ Influence of bearing stiffness on deformation
→ Influence of inner geometry on bearing life
→ Examples of bearing calculations

Pre-requisites:

You will need a notebook to actively participate in the training. Before the start of the training, participants will receive an actual test version Release 2022

Pedagogical means:

Teaching method alternating theory and practice through case studies or works directed

Ref: MTS08
Type: Physical Training
Trainer: Robert Shandro, Ashley Ng

Date:
8-9 July 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 24 June 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS08 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

STEEL MATERIALS - THE FUNDAMENTALS

Steel, has been the most preeminent of all materials since it can provide wide range of properties that can meet ever changing requirements. This training provides both fundamental and technical information related to steels, including steelmaking, microstructure and phase transformation, their properties and applications.

Training Information

Objectives:

→ Understand the interest of using steels and the related treatments

→ Identify and decode the standardised designation

→ Identify the main types of treatments and their characteristics

→ Acquire basic knowledge to access more thorough or more specialised training courses

Who Should Attend?

The training is designed for various disciplines that includes Engineers, Consultants, Inspectors, Safety, Maintenance, Process and Operators.

Course Outline:

→ Reception
- Presentation, general organization, introduction round

→ Manufacturing and implementation of steels manufacturing:
- Rolling,
- Cutting,
- Drawing,
- Casting, forging,
- Machining,
- Additive manufacturing

→ Properties of steels
- Mechanical strength,
- Fatigue resistance,
- Impact strength

→ Standardized designation of steel (decoding the standards)

→ The different families of steels
- Structural steels,
- Stainless steels,
- Tool steels

→ Treatment of steels
- Heat treatments
- Surface treatments

Pre-requisites:

No specific knowledge is required

Pedagogical means:

Teaching method alternating theory and practice

Ref: MTS10
Type: Physical Training
Trainer: Robert Shandro, Ashley Ng

Date:
29 October 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 900.00 (exclude GST)
(Closing Date: 15 October 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS10 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

CATHODIC PROTECTION AND PROCOR® SOLUTIONS

Corrosion, like mechanical vibration, affects infrastructure, machinery, and pipelines across industries. It is a destructive phenomenon that compromises material integrity, leading to fatigue, failures, and substantial maintenance costs. Cathodic protection (CP) is a critical method to mitigate this degradation, safeguarding assets in sectors such as oil and gas, maritime, and infrastructure. In this course, participants will gain insights into CP design, monitoring, and maintenance, equipping them with the skills to combat corrosion effectively and enhance the longevity and reliability of assets in diverse environments.

Ref: MTS11
Type: Physical Training
Trainer: Johnathan Tan, Eng Peng Seng

Date:
22-23 September 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 8 September 2025)

Training Information

Objectives:

- → Electrochemistry focusing on its principles and how they are directly applied to CP systems
- → Insights into CP methodologies, covering both theoretical and practical aspects to understanding of corrosion prevention strategies
- → Practical field skills, such as conducting CP field measurements and interpreting data to implement reliable corrosion management solutions
- → Hands-on experience with modern tools like Procor, enabling participants to model, simulate, and analyse corrosion systems effectively

Who Should Attend?

This course is ideal for engineers and managers responsible for the design, operation, or maintenance of metallic structures in corrosive environments (i.e., soil or sea). It is tailored for professionals seeking a deeper understanding of electrochemistry and cathodic protection principles. Participants with relevant working experience, though not mandatory, will have advantage in appreciating the course.

Course Outline:

Day 1:

- → Introduction to Corrosion
  - Electrochemical Cells and Corrosion Mechanisms
  - Forms of Corrosion (general, pitting, crevice, etc.)
  - Reference Electrodes and Polarisation Concepts
  - Corrosion Rate and Its Importance in Cathodic Protection
- → Cathodic Protection Principles (CP)
  - CP Concept, CP Requirement
  - Sacrificial Anode CP (SCAP), Impressed Current CP (ICCP)
  - Field Measurements, Hands-On Activates

Day 2:

- → Introduction to Procor
  - Features and Capabilities for CP Modelling
  - Demonstration of Key Functions
  - Integrated 3D modelling and visualisation
  - Boundary condition definition and customisation
  - Corrosion rate computation and analysis
- → Hands-On Procor Modelling:
  - Interface walkthrough
  - Basic Modelling Exercise
  - Case Study 1: Calculation of Number of Anode and Simulation in Procor
  - Case Study 2: Modelling of ICCP

Pre-requisites:

None

Pedagogical means:

Teaching method alternating theory and practice through case studies or works directed

REGISTER TODAY!

Scan the QR Code to register for the MTS11 Training Course!

For more information, you may email us at:
training@cetim-matcor.com

VIBRATION STUDIES AND ITS MEASUREMENT AND CONTROL

Mechanical vibration refers to the oscillating motion of an object about a reference position. It is a result of dynamic forces in machines which have moving parts. It is often a destructive and annoying side effect of a useful process or intended operation. Vibration disturbances occur in machines and intricate electronic equipment, if left unattended, will increase product downtime, system maintenance and warranty costs and reduce user satisfaction. It is therefore essential for product designers, equipment manufacturers or system operators to understand the vibration phenomenon, the sources of vibration and to be able to reduce or isolate the unwanted vibration occurs in these machines.

Training Information

Objectives:

→ Mechanical vibration and its underlying theory
→ Various sources of vibration, their effects and general control techniques
→ Vibration isolation methodology and its practical considerations
→ Vibration measurement system set up, and
→ Digital signal processing and spectral analysis.

Who Should Attend?

Practicing engineers, product designers, test engineers and managers involved in the design and/or maintenance of mechanical structures, automotive products, and rotating machinery who want to have a better understanding on various vibration sources and their control measures; vibration measurement set up and spectral analysis. Participants having a technical or bachelor's degree in engineering or its equivalent, or with relevant working experience will have advantage in fully comprehending this course.

Course Outline:

Day 1:

→ Basic of Vibration Study
- Vibration phenomenon
- Simple Harmonic Motion
- Measures of Vibration Signals
- Types of Vibration Signals
- Frequency of Vibration Signals
- About Structure Resonance

→ Sources of Vibration
→ The Effects of Vibration
→ Vibration Isolation and Practical Considerations

Day 2:

→ Other Vibration Control Measures
- Damp Structural Resonances
- Reduce Dynamic Excitation
- Increase Structural Rigidity
- Detune Resonant Frequencies
- Decouple Vibration
- Absorb Vibration

→ Vibration Measurement I – Sensors & Preamplifier
→ Vibration Measurement II – Spectral Analysis
→ Vibration Measurement III – Industrial Applications

Pre-requisites:

None

Pedagogical means:

Teaching method alternating theory and practice through case studies or works directed

Ref: MTS12
Type: Physical Training
Trainer: DR Koh Yong Khiang

Date:
17-18 July 2025

Time:
09:00 – 17:00 (GMT+8) Singapore

Location:
3 Seletar Aerospace Link, S797550

Course Fee:
SGD 1,790.00 (exclude GST)
(Closing Date: 3 July 2025)

REGISTER TODAY!

Scan the QR Code to register for the MTS12 Training Course!

For more information, you may email us at:
training@cetim-matcor.com