

Materials Selection and Failure Analysis



22nd / 23rd May 2017 at Hotel Towers Rotana, Dubai.



**Meet Your Expert Coach :
Dr. Eng. Mohamed Fathi ElFeki**

Introduction :

Failure analysis is the process of collecting and analyzing data to determine the cause of a failure, often with the goal of determining corrective action or liability. It is an important discipline in many branches of manufacturing industry, such as the electronics industry, where it is a vital tool used in the development of new products and for the improvement of existing products. The failure analysis process relies on collecting failed components for subsequent examination of cause or causes of failure using a wide array of methods, especially microscopy and spectroscopy. Nondestructive (NDT) methods are valuable because the failed products are unaffected by analysis, so inspection sometimes starts using these methods.

International Business Conferences training courses are thoroughly researched and structured to provide intense and intimate practical training to your organisation.

Our format:

- ⇒ Combination of educational presentation with case studies, productive in-session assignments and participant's collaboration to provide an actionable learning.
- ⇒ Register early to avoid any disappointment!
- ⇒ Strictly limited numbers and one-to-one greater interaction with the trainer.
- ⇒ Detailed pre-course questionnaires to allow you to tailor the programme to address your individual concerns as the ROI.

Pre-course questionnaire :

To ensure that you gain maximum benefit from this event, a detailed pre-questionnaire will be sent for establishing your exact training needs via email. The completed forms will be analysed by the course trainer prior to the event. As a result, we ensure the course is delivered at an appropriate level and all the relevant issues are well - addressed. The comprehensive course material will enable you to digest the subject matter in your own time.

Course Overview :

- ◆ Profit from failure analysis techniques.
- ◆ Understand general failure analysis procedures.
- ◆ Learn fundamental sources of failures.

This course is designed to bridge the gap between theory and practice of failure analysis. It presents a very practical approach to failure analysis for the non-metallurgist as well as for those who are new to the field or those who want an update. It is also designed for technicians and those interested in understanding how knowledge of failure analysis can lead to better productivity.



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What Will You Miss :

- ◆ Learn what failure analysis can mean in terms of profitability - and liability.
- ◆ Understand general procedures, techniques and precautions in failure analysis.
- ◆ Learn how to identify design - related failures.
- ◆ Be able to analyze the factors that cause failure.
- ◆ Understand what environmental sources are responsible for failures and ways to prevent them.
- ◆ Learn how stress systems relate to fracture of ductile and brittle materials.

Who should attend?



- ◆ People who are new to failure analysis or for those who want an update.
- ◆ Technicians.
- ◆ Those interested in understanding how knowledge of failure analysis can lead to better productivity.
- ◆ Technical management.
- ◆ Planning.
- ◆ Operation and production.
- ◆ Mechanical engineers.
- ◆ Plant heads.

From the following industries:

- ◆ Generation-Transmission & Distribution.
- ◆ Cement.
- ◆ Fertilizers.
- ◆ Petrochemicals and Refineries.
- ◆ Electronics, Electricals and Semiconductors.
- ◆ Bottling and Packaging.
- ◆ Steel and Aluminum.
- ◆ Medical Equipments.
- ◆ Original Equipment Manufacturers (OEM).
- ◆ Precision Manufacturing.
- ◆ Pharmaceuticals.
- ◆ Heavy Manufacturing.
- ◆ Glass.
- ◆ Paper and Pulp.
- ◆ Oil & Gas.
- ◆ Chemical.
- ◆ Construction.
- ◆ Manufacturing.
- ◆ Sugar.
- ◆ Power Energy.

Course Outline :

- ◆ **General Procedures for Failure Analysis** : Collection of data and samples; preliminary examination; non-destructive inspection; mechanical testing; selection and preservation of fracture surfaces; macroscopic and microscopic examination; selection; preparation and examination of metallographic sections; fracture classification; report writing.
- ◆ **Types of Failure and Stress**: (Fracture, wear, corrosion, and distortion failures; tensile, compressive, torsion and shear stresses; residual stress.
- ◆ **Ductile and Brittle Fractures**: Definitions and comparisons; dimple rupture; tearing and shearing; plastic deformation ductile-brittle transition; cleavage; intergranular fracture; thermally-induced and environmentally-assisted embrittlement; effect of fabrication and heat treatment; residual stress.
- ◆ **Fatigue Failures**: Factors affecting fatigue life; stages of fatigue fracture; fatigue cracking; effects of variables; mean stress; stress concentration; metal characteristics; manufacturing process; elevated temperatures; contact fatigue.
- ◆ **Wear Failures**: Abrasive wear; adhesive wear; role of friction; lubricated wear; lubricant failures; nonlubricated wear; examination of worn parts; effect of microstructure and hardness; surface-fatigue pitting; wear rates.
- ◆ **Corrosion Failures**: Electro-chemical reactions; types of corrosion; velocity-affected corrosion; bacterial and bio-fouling corrosion; underground corrosion; atmospheric corrosion; corrective and preventative measures; stress corrosion cracking; analysis of failure.
- ◆ **Elevated-Temperature Failures**: Creep; stress rupture; thermal fatigue; effect of atmospheric environment; failures in industrial application; testing techniques.
- ◆ **Case studies.**

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Meet Your Expert Coach : Dr. Eng. Mohamed Fathi Elfeki

EDUCATION:

- ✓ PhD degree, Metallurgical field.
- ✓ Diploma in NDT Quality Management and ISO 9000 standards.
- ✓ Sr. Consultant of tests and Corrosion Protection.
- ✓ International Arbitration.
- ✓ Member of the International Arbitration Organization, (19605/Egypt).

PROFESSIONAL EXPERIENCE:

Dr. Elfeki is a Director of the Mechanical lab and X-ray industry, a laboratories assessor and Consultant of Tests and Corrosion Protection at Sakr Factory, Arab Organization for industrialization. Heat treatment of ferrous & non-ferrous, testing of metals (Destructive and Non-Destructive testing), Electroplating, Corrosion protection, Welding and welders' evaluation, manage on- site control including non-destructive testing, thermal & thermo-mechanical treatment of all alloys and failure analysis.

Complete analysis of failed material, weld examination, technical assessor. He is also a ISO/IEC/ Guide25.Trainer, OJT and instructor of courses in Syria, AIFURAT PETROLEUM COMPANY (AFPT), consultant for Equa Egypt, Bonatti Company, (Italy), Libya branch and Lokma group (pipes division), Cairo, Egypt, Ministry of Electricity, Inter Cairo for all industry, Corrosion (causes & prevention) Emirates, Kuwait, Oman (ORPIC) and managing the courses of Materials Departments in Sudan University.

Consultant for Engico office for engineering consultancy and Pioneer Company for maintenance and technical services, INTEC and egyptrol. Member of the Egyptian engineering syndicates as a consultant engineer in the field of "TESTS AND CORROSION PROTECTION OF MATERIALS".

CURRENT ACTIVITIES:

Dr.Elfekei is working as a professor in Ain Shams University and Helwan University and teaching the following courses: Testing of materials (Destructive and Non-Destructive), engineering drawing and heat treatment of ferrous and non-ferrous & corrosion protection, production engineering and welding technology. He has published over 20 papers in the field of materials.

Program Schedule for Two days

09:30 am	Registration & Introduction
10:00 am	Course Commences
11:30 am - 11:45 am	Tea Break
01:00 pm - 02:00 pm	Lunch
03:30 pm - 03:45 pm	Tea Break
05:30 pm	Course Ends

Would You Like to Run This Course In-House?



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General Procedures for Failure Analysis:

- ✓ Collection of data and samples.
- ✓ Preliminary examination.
- ✓ Non-destructive inspection.
- ✓ Mechanical testing.
- ✓ Selection and preservation of fracture surfaces.
- ✓ Macroscopic and microscopic examination.
- ✓ Selection.
- ✓ Preparation and examination of metallographic Sections.
- ✓ Fracture classification.
- ✓ Report writing.

Types of Failure and Stress:

- ✓ Fracture, wear, corrosion and distortion failures.
- ✓ Tensile, compressive, Torsion and shear stresses.
- ✓ Residual stress.

BENEFITS :

Understanding the steps required to start failure analysis process and different types of stresses.

ACTIVITY :

Discussing the different mechanical stresses that lead to failure.

AFTERNOON

Ductile and Brittle Fractures:

- ✓ Definitions and comparisons.
- ✓ Dimple rupture.
- ✓ Tearing and shearing.
- ✓ Plastic deformation ductile-brittle transition. a Cleavage
- ✓ Inter-granular fracture.
- ✓ Thermally-induced and environmentally-assisted embrittlement.
- ✓ Effect of fabrication and heat treatment.
- ✓ Residual stress.

Fatigue Failures:

- ✓ Factors affecting fatigue life.
- ✓ Stages of fatigue fracture.
- ✓ Fatigue cracking.
- ✓ Effects of variables.
- ✓ Mean stress.
- ✓ Stress concentration.
- ✓ Metal characteristics.
- ✓ Manufacturing process.
- ✓ Elevated temperatures.
- ✓ Contact fatigue.

BENEFITS :

Recognize the different shapes of fractures.

ACTIVITY :

Discussing the effect of each stress on fracture surfaces.

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Wear Failures:

- ✓ Abrasive wear.
- ✓ Adhesive wear.
- ✓ Role of friction.
- ✓ Lubricated wear.
- ✓ Lubricant failures.
- ✓ Non-lubricated wear.
- ✓ Examination of worn parts.
- ✓ Effect of micro-structure and hardness.
- ✓ Surface-fatigue pitting; wear rates.

Corrosion Failures:

- ✓ Electro-chemical reactions.
- ✓ Types of corrosion.
- ✓ Velocity-affected corrosion.
- ✓ Bacterial and bio-fouling corrosion.
- ✓ Underground corrosion.
- ✓ Atmospheric corrosion.
- ✓ Corrective and preventative measures.
- ✓ Stress corrosion cracking.
- ✓ Analysis of failure.

BENEFITS:

Understanding fracture due to wear and the fracture due to the different forms of corrosion.

ACTIVITY:

Discussing the effect of the lubricants and the environment on the failure of components and mechanical parts.

AFTERNOON

Elevated-Temperature Failures:

- ✓ Creep.
- ✓ Stress rupture.
- ✓ Thermal fatigue.
- ✓ Effect of atmospheric environment.
- ✓ Failures in industrial application.
- ✓ Testing techniques.

Case studies.

BENEFITS:

Showing the effect of high temperature on failure in industrial application due to creep.

ACTIVITY:

General discussion about the steps of failure analysis and how reporting any case of failure relating to case studies in the program.



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WHEN?

WHERE ?

22nd / 23rd May 2017

Hotel : Towers Rotana
Dubai. P. O. Box 30430,
Dubai, U.A.E.
T:00 971 (0) 4 343 8000

HOW MUCH ?

Per Delegate
AED 3,500/-

Payment Terms:

A confirmation letter and invoice will be sent on receipt of your registration. Payment is required within 5 working days of receipt of invoice. Please note that full payment must be received prior to the event. All payment should be in favour of **“World Vision Management Consultancy”** and couriered to **Office No.707, 7th Floor Bank Street Bur Dubai UAE 043529341**

Payment Policy:

Payment in full is required in advance or at the time of the registration. This Registration Fee includes luncheon, refreshment and conference /workshop materials.

IBC Cancellation, Postponement and Substitution Policy:

- ☞ Once confirmed nos then - Minimum 10 working days prior or before written notice is required for cancellation or you have to buy copyrightten sets of documentation as per number of attendees at AED 1500/-
- ☞ You may substitute delegates at any time. IBC does not provide refunds for cancellations.
- ☞ For cancellations received in writing more than seven (7) days prior to the Workshop you will receive a 100% credit to be used at another IBC conference for up to one year from the date of issuance.
- ☞ For cancellations received seven (7) days or less prior to an event (including day 7), no credit will be issued. In the event that IBC cancels an event, delegate payments at the date of cancellation will be credited to a future IBC event. This credit will be available for up to one year from the date of issuance.
- ☞ In the event that IBC postpones an event, delegate payments at the postponement date will be credited towards the rescheduled date. If the delegate is unable to attend the rescheduled event, the delegate will receive a 100% credit representing payments made towards a future IBC event. This credit will be available for up to one year from the date of issuance. No refunds will be available for cancellations or postponements.
- ☞ IBC is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. IBC shall assume no liability whatsoever in the event this Workshop is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, unforeseen occurrence or any other event that renders performance of this Workshop impracticable or impossible. For purposes of this clause, a fortuitous event shall include, but not be limited to: war, fire, labor strike, extreme weather or other emergency.
- ☞ Please note that speakers and topics were confirmed at the time of publishing, however, circumstances beyond the control of the organizers may necessitate substitutions, alterations or cancellations of the speakers and/or topics. As such, IBC reserves the right to alter or modify the advertised speakers and/or topics if necessary.

NON - RESIDENTIAL PROGRAM

REGISTRATION FORM
Yes! Please register the following delegates
for

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(For Additional delegates please photocopy this form)

PERSONAL DETAILS

	Name	Job Title	Department
1 Delegate
2 Delegates
3 Delegates
4 Delegates
5 Delegates

Company Name

Address

Pin:..... Tel:..... Fax:.....

FOUR EASY WAYS TO REGISTER

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