XCELERATE TRAINING INSTITUTE
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MECHANICAL ENGINEERING

Root Cause Failure Analysis (RCFA) Training Course

DURATION	LANGUAGE	FORMAT
5 days	**English**	**Classroom / Online**

Upcoming dates

Dates	Venue	Format	Fee
12 – 16 Apr 2027	Live online	Online (live)	**€1,200**
18 – 22 Oct 2027	Live online	Online (live)	**€1,200**
15 – 19 Nov 2027	Amsterdam	Classroom	**€4,800**

Register or ask a question

Online: x8ti.com/course/root-cause-failure-analysis-rcfa-training-course/

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Root Cause Failure Analysis (RCFA) Training Course

Introduction

Introduction

Failures of machines and equipment, both moving and static, have many causes. Some causes of failures appear to be immediate or as seen by face value but they may be superficial causes. The actual root causes may be hidden deep inside the components of machines and equipment in terms of material of construction, corrosion, stress processes, propagation of micro structure inter granular cracks etc., or other associated aspects surrounding machines and equipment, in terms of operation, inspection, maintenance, methods, human machine interface and the overall management around these amongst other factors.

Notwithstanding the causes of failure, incidents having Health, Safety and Environment (HSE) outcomes from failures of these machines and equipment while in service in oil & gas industries are increasingly being seen globally. Such incidents result not only in serious human injuries but also fatalities resulting from major consequential incidents such as fire, explosion, toxic/lethal releases, etc. Depending upon stakes and risks involved, the concerned industry must pay due attention to root causes of such failures of the machines and equipment and do everything possible to prevent, minimize and contain these failures; else quick escalation of incidents beyond control of an organization can wipe out the assets and end the business of a company.

Root Cause Failure Analysis provides an organization with a systematic methodology and actions to minimize/eliminate the failures which ultimately harm the people, damage the equipment or property, cause loss of production or mete out adverse impact to the environment. With our team of experts, you will be able to write an effective root cause failure analysis report by the end of the training program.

Learning Objectives

- Learn fundamental concepts around failures of machines and equipment, both moving and static
- Understand relationship between failures of machines and equipment and the associated HSE incidents
- Comprehend failure mechanisms of various identified major machines and equipment
- Learn and use Root Cause Failure Analyses (RCA) to arrive at root and generic causes of failures of machines and equipment
- Check effectiveness of the implementation of CAP’s and PAP’s
- Understand and practice skills to draft and generate RCFA Report
- Comprehend the importance of RCFA Close-out
- Cascade lessons learnt from the failure Incident and the RCFA Report
- Address accurately the various Insurance, Legal and Statutory Implications

Training Methodology

- Lectures (Tutor-assisted online and classroom as per prevailing situations/requirements)
- Seminars & Presentations

- Group Discussions
- Assignments
- Case Studies & Functional Exercises

Benefits for Your Organization

- Minimize adverse impact on business continuity by preventing the failures of machines and equipment and the associated safety incidents through implementation of recommended actions from the RCFA report
- Reduce greatly the costs associated with failure incidents such as insurance premiums, compensation to employees, legal fees and regulatory/statutory penalties
- The culture of RCFA leaves a positive impact on customers, lenders, insurance underwriters, management system certification agencies, regulatory & statutory authorities, industry and societal spectrum at large

Benefits for You

- Development of confidence by practicing techniques and procedures involving RCFA, and thus proving to be a successful professional irrespective of their trade
- Since RCFA and the associated HSE excellence are seen as important attributes for all professionals of all trades (not only Inspection, Maintenance and HSE department), this course will help develop a very important aspect in their professional journey which will eventually benefit whichever company they would work for
- With knowledge gained in this training course, delegates will develop a safe attitude towards his professional, personal, family and social life

Target Audience

- All line functions at all levels – Trainees, interns and officers
- Managers, senior managers in operation, maintenance, inspection, engineering, other line disciplines
- Exclusively, Inspection, Maintenance and HSE Professionals at all levels
- Middle and senior management (a bite-sized customized part of this course)
- Non-line functions such as office managers and finance professionals dealing with insurance and statutory compliance's

Course Outline

Fundamental Concepts and Some Failure Analysis Tools

- Reliability Engineering and Predictive Maintenance
- Failure Mode Effects Analysis
- Fault-Tree Analysis
- Cause-and-Effect Analysis
- The Fish bone Graph
- Sequence-of-events diagram
- Bow-Tie method
- Introduction to Root Cause Failure Analysis
- Purpose of RCFA

- Effective use of RCFA
- Personnel Requirement
- Conditions for using the method

Root Cause Failure Analysis Methodology

- Reporting a Failure Incident or Problem
- Symptoms and Boundaries/Conditions
- Perceived Causes of Problem
- Event-Reporting Format
- Failure Incident Classification
- Typical Failure Incident-Reporting Form
- Equipment Damage or Failure
- Operating Performance
- Economic Performance
- Safety
- Regulatory Compliance
- Data Gathering: Interviews, Questions to Ask
- Collecting Physical Evidence
- Analyze Sequence of Events
- Design Review: Minimum Design Data
- Objectives of the Design Review
- Application/Maintenance Review: Installation, Operating Envelope, SOP's
- Maintenance History and the associated Procedures and Practices
- Observations & Measurements: Vibration Analysis, Process Parameters, Visual Inspection, Measurement Devices, Failed Machine Components, Wear Particles
- Other testing techniques: NDT (Non-Destructive Testing), metallography, fractography etc

Determining The Failure Root Cause(s)

- Misapplication
- Poor Design Practices
- Aging: Depreciation, Remainder Life, Replacement Planning not predictive.
- Procurement Practices: Inadequate Specifications, Substitutions, Low Bid versus Lifecycle Cost, Vendor Evaluations,
- Poor Operating, Inspection & Maintenance Practices and Procedures
- Poor Training
- Inadequate Supervision
- Ineffective Communication
- Faulty Human Engineering
- Work Environment: Physical and Physiological
- Management Systems
- Substandard Qualify Control

Evaluating Potential Corrective Actions

- Involvement of SMEs (Subject Matter Experts)
- HSE Risk Assessment Matrix.
- Regulatory Requirements
- Costs Involved: Process, Materials, Labor, Training, other considerations.
- Cost-Benefit Analysis
- Management Decision

Report and Recommendations

- Failure Incident Summary
- Initial Plant Condition
- Initiating Event
- Failure Incident Description
- Immediate Corrective Actions
- Causes and Long-Term Corrective Actions
- Internal and External Reports Filed
- Lessons Learned
- References and Attachments
- Failure Investigator or Investigating Team Description
- Review and Approval Team Description
- Distribution List
- Verification of Implementation of Corrective Action and Its Effectiveness

HES-Related Issues

- Fatigue
- Physical Impairment
- Personal Problems
- Repetition/Boredom
- Machine-Human interface not friendly
- Operations Problems/Short-cuts/capacity stretching
- Economic Considerations to avoid HSE best practices
- Inspection and maintenance priorities side-lined

Regulatory and Internal Compliance Issues

- Spill Hazards: Recommended Spill Responses
- Worker Education and Communication
- Prevention
- Worker Responsibilities
- Legislation and Reporting Requirements including Pollution Control Board if failures entail it.
- Occupational Health & Safety Management | ISO 45001:2018
- Process Safety Management (PSM)
- Emergency Planning and Community Right-to-Know Act

- Resource Conservation and Recovery Act
- Hazardous Materials Transportation Act

Design Evaluation Aspects: Selected Machines & Equipment

- Pumps
- Compressors
- Turbines
- Fans, Blowers, and Fluidizers
- Driving Conveyors and Conveyor Belts
- Mixers and Agitators
- Dust Collectors
- Rollers
- Fasteners
- Ropes and cables
- Gearboxes/ Speed Reducers
- Steam Traps
- Electric Inverters
- Control Valves
- Seals and Packing
- Preventive Trouble Shooting for The Above Machines & Equipment to Avoid Failures

Live Failure Incidents, Case Studies and Exercises to do RCFA

- Failure Videos and discussions
- Tutor runs the above RCFA methodology with respect to one incident case study to refresh the attendees.
- Tutor presents a few other case studies and asks course participants to work them out with RCA and Investigation Reports
- Tutor observes progress and provides support
- Question and answers

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Registration Form

Root Cause Failure Analysis (RCFA) Training Course

Preferred dates: ..... Venue or online: .....

Duration: 5 days Language: .....

Please complete and email this form to us, or register online. We confirm your place and send the invoice within one working day.

Delegate information

Full name (Mr / Ms / Dr / Eng): .....

Position: ..... Telephone / mobile: .....

Official email: ..... Personal email: .....

Company information

Company name: .....

Address: .....

City / country: ..... VAT / tax number: .....

Person responsible for training & development

Full name (Mr / Ms / Dr / Eng): .....

Position: ..... Telephone / mobile: .....

Email: .....

Payment

☐ Please invoice me ☐ Please invoice my company

Signature: ..... Date: .....

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