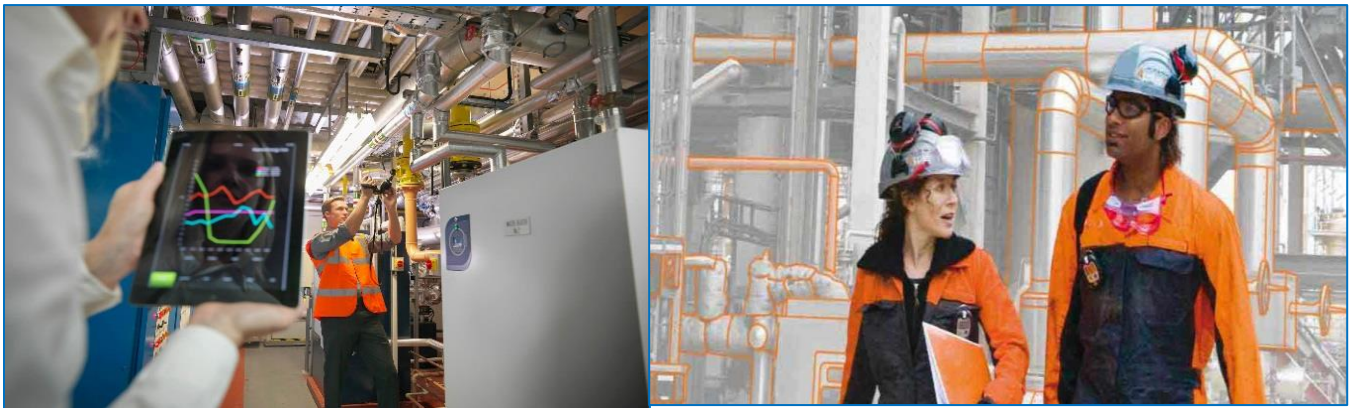




FE122-3D: Facility Integrity & Technical Audit

Training Description:

The aim of this intensive training course is to give the participants a comprehensive understanding of the various aspects of facility integrity and technical audit in process plants. The course combines current industry practices with engineering methods and applicable codes and standards. The course will cover the development and implementation of facility integrity and technical audits; the scope and key elements of mechanical integrity, reliability and engineered safety in process plants; the causes and implications of industrial failures; the consequences of pressure and storage equipment failures in vessels, exchangers, heaters, storage tanks and piping; the codes, standards and specifications used in safety design and the integration of the operability and maintainability in design; the types and various applications used in engineering material and ensure that the guidelines in the selection methodology are being met; and the methodology and design considerations of piping system in pressure and mechanical integrity.

The course will also discuss the principles, guidelines and best practices in safeguarding systems and its safety systems key design considerations; investigating the various failures in piping, rotating equipment, pressure vessels, piping and boilers and its causes, reliability improvement and prevention; and the correct procedures involved in the inspection, testing, repair and monitoring of piping systems and equipment in refineries, petrochemical and process plants.

Participants of the course will be able to identify and assess hazards; carryout risk analysis and HAZOP studies; integrate the safety management plan using the various risk analysis processes; implement the principles of fitness-for-service and engineering critical assessment; employ the best maintenance strategies and programs; rerate piping and pressure vessels; ensure the correct application of the various methods of troubleshooting plant equipment and piping system; and carryout integrity audits.

At the completion of the course, the participants will gain enough knowledge that will help them to improve their efficiency in managing facility integrity in a professional manner. The course will help participants to develop and implement a mechanical integrity program for critical process equipment. The course manual will be valuable for future reference.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Get Certified as a "Certified Facility Integrity Auditor"
- ✓ Develop and implement a facility integrity and technical audits
- ✓ Apply the scope and key elements of mechanical integrity, reliability and engineered safety in process plants and find the causes and implications of industrial failures
- ✓ Estimate the consequences of pressure and storage equipment failures in vessels, exchangers, heaters, storage tanks and piping
- ✓ Implement the codes, standards
- ✓ and specifications used in safety design and integrate the operability and maintain ability in design
- ✓ Determine the types and the various application used in engineering material and ensure that the guidelines in the selection methodology are being met
- ✓ Employ the methodology and design considerations of piping system in pressure and mechanical integrity

- ✓ Apply the principles, guidelines and best practices in safeguarding systems and discuss its safety systems key design considerations
- ✓ Investigate the various failures in piping, rotating equipment, pressure vessels, piping and boilers and be able to explain its causes, reliability improvement and prevention
- ✓ Apply the correct procedures involved in the inspection, testing, repair and monitoring of piping systems and equipments in refineries, petrochemical and process plants
- ✓ Identify and assess hazards and carryout risk analysis and HAZOP studies and integrate the safety management plan using the various risk analysis processes
- ✓ Implement the principles of fitness-for-service and engineering critical assessment including fracture mechanics, flaw characterization, stability, etc.
- ✓ Employ the best maintenance strategies and programs and rerate piping and pressure vessel
- ✓ Ensure the correct application of the various methods of troubleshooting plant equipment and piping system and carryout integrity audits

Training Designed for:

This course is intended for facility integrity engineers, inspection engineers, corrosion engineers, facility engineers, reliability engineers, design engineers, maintenance engineers, safety engineers, loss prevention engineers and those engaged in the development and implementation of mechanical integrity programs for critical process equipment.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ **Overview of Technical Integrity**
 - Definition, Scope, and Key Elements-Hardware and Software Issues, Peopleware- Sound People Management
 - Potential Threats to Technical Integrity in a Hazardous Environment
 - Regulatory Requirements–SH&E, OSHA, SEVESO II
 - Life Cycle Implications–Design/ Operation/Maintenance, Regulatory/Industrial Interface, Training/Staff Development, Networking
- ❖ **Introduction to Asset Integrity**
 - Industry Practice of AIM
 - Asset Life Cycle Management
 - Integrity Assurance in Projects
- ❖ **Industrial Failures–Catastrophic Failures Do Happen**
 - Statistics
 - Typical Examples

- Causes and Implications
- Learning
- ❖ **Estimation of Consequences of Pressure and Storage Equipment Failures –Vessels, Exchangers, Heaters, Storage Tanks, and Piping**
 - Types of Hazards – Release of Hazardous Substances, Bleves, Fractures, Explosions, Vapor Cloud Explosions
 - Guidelines and Procedures for Quantifying Consequences
- ❖ **Safety in Design I**
 - Project Development and Design Bases
 - Appropriate Codes, Standards, Specifications, Industrial Practices
 - Safeguarding Premises
 - Calculation Methods, Heuristics
- ❖ **Safety in Design II**
 - Quality Control in Design
 - Inherent Safety
 - Reliability & Availability Premises
- ❖ **Integration of Operability and Maintain ability in Design**
 - Health, Safety and Environmental Considerations
 - Roles and Responsibilities of Engineering/Operation/Maintenance
 - Operating Strategies – Run Length, Shifts
 - Startup, Shutdown, Emergency Operating Procedures
 - Steam-Out and Flushing Procedure
 - Isolation, Blanking, Vents and Drains
 - Human Factor: Training Modules, Operator Training
- ❖ **Workshop I–Failure Consequences**
 - Case Studies and Worked Examples
- ❖ **Design Codes, Standards, Specifications and Best Practices**
 - Fit-For-Purpose Facilities
 - Business-Focused Facilities
 - Liability & Due Diligence
- ❖ **Engineering Materials I**
 - Types and Application
 - Imperfections and Defects
 - Specifications and Standards
- ❖ **Engineering Materials II**
 - Behaviour of Metals Under Stress
 - Degradation Processes
 - Selection Methodology and Guidelines
- ❖ **Design of Major Plant Equipment – Methodology & Key Considerations**
 - Pressure Vessels
 - Heat Exchangers
 - Fired Heaters and Boilers

DAY TWO:

- ❖ **Design of Piping Systems I— Pressure Integrity**
 - Methodology and Key Considerations
- ❖ **Design of Piping Systems II – Mechanical Integrity**
 - Special Design Considerations—Dynamic and Transients Loadings
 - Piping Flexibility and Supports
- ❖ **Workshop II – Failures Due to Design Deficiencies**
 - Case Studies
- ❖ **Safeguarding Systems, I-Guidelines and Best Practices**
 - Principles
 - Guidelines and Best Practices
 - Documentation
 - Safeguarding Systems Integrity—Design
- ❖ **Safeguarding Systems II—Safety Systems Key Design Considerations**
 - Safeguarding Safety Systems—SIL
 - Relief and Depressuring Systems
 - Safeguarding Systems Integrity and Effectiveness
- ❖ **Failures in Piping and Equipment Pressure Vessels, Piping and Boilers**
 - Degradation Processes
 - Failures in Pressure Equipment
 - Piping System Vibration and Failure
- ❖ **Failures in Rotating Equipment**
 - Causes
 - Monitoring and Analysis
 - Reliability Improvement
- ❖ **Failure Prevention**
 - FMEA
 - Causal Analysis
- ❖ **Testing and Monitoring**
 - NDT Methods
 - Inspection, Testing and Repair Regulations, Codes, and Practices
 - Evaluation of Inspection Data
- ❖ **Workshop III—Failures Due to Improper Operation and Maintenance**
 - Case Studies
- ❖ **Hazard Identification and Assessment**
- ❖ **Risk Analysis, Assessment and Management**
 - Risk Management Context— Process Safety and Integrity
 - Probability Basics
 - Probabilistic Risk Assessment Concepts and Methodology
 - Fault Tree and Event Tree Analysis
 - Quantitative Risk Assessment Concepts and Methodology
- ❖ **Integrity Data Base Management System**
 - Introduction to Defects Assessment Tools
 - Develop & Monitor Integrity Assurance

- ADMA Strategy – Reactive to Calculate and Proactive
- Asset Equipment in ADMA OPCO
- Asset Integrity Management Standards & Systems in ADMA OPCO
- Implementation of Integrity Management in ADMA

❖ **Practical Sessions**

DAY THREE:

- ❖ **Integrated Safety Management Plan**
 - Hazard and Effect Management Plan
 - Bow-Tie Process
 - Risk Matrix
 - Determining Acceptability of Risk
- ❖ **Hazard and Operability (HAZOP) Reviews**
 - Process and Guidelines
- ❖ **Management of Change**
 - Change Control Policy and Procedures
 - Process Changes
 - Plant Changes
 - Assessment and Authorization
 - Documentation
 - Illustrative Change Control Procedure
- ❖ **Workshop IV**
 - Case Studies - Failures Due to Improper Management of Change System
 - Examples of HAZOP Reviews
- ❖ **Fitness-For-Service / Engineering Critical Assessments**
 - API RP 579 Fitness-For-Service
 - Fracture Mechanics and Mode of Failure of Material
 - Flaw Characterization, Growth, Stability
 - Factors of Safety
 - Disposition versus Repair
- ❖ **Maintenance Strategies and Programs**
 - Risk-Based Inspection
 - Reliability-Centered Maintenance
- ❖ **Rating Piping and Pressure Vessels**
- ❖ **Engineering Information and Systems Management**
- ❖ **Troubleshooting Plant Equipment and Piping Systems**
 - Guidelines and Best Practices
 - Resonance and Vibration
 - Excessive Thrusts and Moments on Connected Equipment
 - Leakage at Joints
 - Excessive Piping Sag, Disengagement of Piping from Supports
 - Interference with Expansion and Contraction
- ❖ **Technical Integrity Audits**
 - Guidelines and Procedures
 - Checklists

- Implementation Plans
- ❖ **Implementation Activities – Hands on**
 - Hands on Risk Assessment
 - Risk Mitigation Plans
- ❖ **Workshop IV – Examples of HAZOP Reviews**
- ❖ **Course Conclusion**
- ❖ **POST-ASSESSMENT and EVALUATION**

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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