ME078:
Maintenance & Inspection of Static Equipment
Training Description:
This intensive course is designed to acquire a comprehensive and practical knowledge of static equipment inspection, Maintenance and Operation in order to efficiently contribute to the entire scope of duties performed by an Inspection Department of an Oil & Gas company.

The course is contributing to customers with high mobility and techniques/skill level at unexpected construction work, periodic maintenance work, etc. The course also provides high level technology through improvement proposal considering failure recurrence prevention, equipment diagnosis and inspection.

Training Objectives:
By the end of the training, participants will be able to:
✓ Use and explain pressure vessels international rules and regulations
✓ Gain an in-depth knowledge of the best practices for operation of static equipment
✓ Identify materials comprising equipment, their composition, their mechanical characteristics and select the most appropriated material for a given Oil & Gas application
✓ Familiarize the best operation for Heat Exchangers and increase heat transfer
✓ Describe the various welding processes and their limits
✓ Identify most appropriate non-destructive or destructive testing for the different modes of degradation and perform several simple non-destructive testing
✓ List the main characteristics and types of corrosion of metallic materials used in the Oil & Gas industries, describe protection means against each type of corrosion and implement associated monitoring

Training Designed for:
This course is intended for Inspectors of the Oil & Gas industry, maintenance, inspection and Operation Technicians, Engineers and Managers looking to acquire comprehensive inspection knowledge.

Training Program:
DAY ONE:
❖ PRE-TEST
❖ Inspector Occupation & Statutory Regulations Relating to Pressure Vessels
  • Introduction to production facilities inspection
  • Introduction to operation facilities
  • Introduction to maintenance facilities
  • Impact on safety, pressure vessel integrity, accident analysis
  • Inspector occupation
  • Operator occupation and his competency for expellant operation
  • Duties & organization of inspection services: inspector role and responsibilities
  • Inspection plan: definition, set-up, implementation
  • Excellent operation and good start up for static equipment
  • Inspection report
  • Interaction with the other departments
  • Statutory regulations applicable to pressure vessels
Main regulatory texts – area of application and regulatory context of pressure vessels
Roles and responsibilities of various parties – managing feedback and lessons learnt

**DAY TWO:**

- **Metallurgy & Materials, Welding**
  - Metallurgy introduction
  - Ferrous and non-ferrous metals
  - Structures and behavior of metals and alloys at service conditions for static equipment
  - Evaluation of the mechanical characteristics required for predictable behavior at service conditions
  - Most widely used metals and metal alloys in production facilities: steels, their composition, structure and behavior at service conditions
  - Steels: HIC-resistant, CRA resistant, cupro-nickel, aluminum bronze
  - Effect of heating and cooling on steels: current heat treatments resulting from welding or deliberately applied
  - Common defects in steels
  - Boiler making Welding
  - Current cutting, forming and welding processes; impact on metals structure
  - Post-welding heat treatment
  - Identification of welding defects in welded assemblies using non-destructive checks and destructive tests on weld test pieces
  - Qualification of welding procedures and welders
  - Technique for the permanent assembly of heat exchanger bundle tubes and tube plates, roll, and mechanical expansion
  - Case study

**DAY THREE:**

- **Constructive Technology, Non-Destructive & Destructive Testing**
  - Equipment construction technology
  - General information on static equipment
  - Type of pressure vessels and pressurized accessories
  - Drawings: reminder on PFD, P&ID, Isometrics reading
  - Introduction to construction codes and standards:
    - Rules & regulations application areas, standards, harmonized standards, professional guides
    - Notions of materials strength and pressure vessel shells calculations – safety and welding margins
    - Construction monitoring, destructive and non-destructive testing.
    - Notions of strength test
    - Introduction to relevant codes and standards (ASME)
  - Techniques for non-destructive and destructive testing
  - Standard faults in external and internal walls
  - Principles, possibilities and areas of application of main NDTs: visual, sweating, magnetic crack detection, ultrasound, X-ray, sealing, acoustic emission
  - Review of innovative NDTs: digital radio, phased array, TOFD, IRIS, MFL, intelligent pigging, ROVs, drones, reinforced visual inspection
• Implementation in equipment inspection: on base materials and components, during production, on acceptance, in operation
• Principles, possibilities and areas of application of destructive test methods

DAY FOUR:
❖ Corrosion Prevention in Production Facilities
• Definition and mechanisms of corrosion
• Wet corrosion, dry corrosion and its related to operation
• Best practice for excellent operation of Heat Exchangers to avoid corrosion
• Elements of electrochemistry
• Cost of corrosion: both financial and human, impact on safety
• Common types of corrosion: origin and development process, possible methods of prevention
• Types of corrosion encountered in the oil & gas industry
• Case studies of corrosion observed in oil & gas installations – identification of the types of corrosion and suggested remedial treatments
• Corrosion prevention
• Design of equipment; choice of materials; corrosion inhibitors; anti-corrosion coatings and systems

DAY FIVE:
❖ Corrosion Prevention in Production Facilities (cont’d)
• Cathodic protection with sacrificial anodes or imposed current
• Methodology and control of processes – control of process and environmental parameters
• Corrosion monitoring
• Corrosion coupons and probes; non-destructive testing of wall condition
• Corrosion monitoring plan

❖ Course Conclusion
❖ POST-TEST and EVALUATION

Training Requirements:

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

Please note that the above topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

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, Software & General Discussions
• Pre and Post Test
**Training Certificate(s):**
Internationally recognized certificate(s) will be issued to each participant who completed the course.

**Training Fees:**
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:**

<table>
<thead>
<tr>
<th>Daily Timings:</th>
<th>07:45 - 08:00</th>
<th>Morning Coffee / Tea</th>
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<tbody>
<tr>
<td></td>
<td>08:00 - 10:00</td>
<td>First Session</td>
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<tr>
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<td>10:00 - 10:20</td>
<td>Recess (Coffee/Tea/Snacks)</td>
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<tr>
<td></td>
<td>10:20 - 12:20</td>
<td>Second Session</td>
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<tr>
<td></td>
<td>12:20 - 13:30</td>
<td>Recess (Prayer Break &amp; Lunch)</td>
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<tr>
<td></td>
<td>13:30 - 15:00</td>
<td>Last Session</td>
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For training registrations or in-house enquiries, please contact:
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Training & Career Development Department