Operation, Diagnostics and Maintenance of Equipment for Oil & Gas Production

Introduction:

Pressure vessels, storage tanks, and piping systems together with rotating machinery for fluid transport represent major capital investment in any Oil/Gas Production operation. Good fabrication of these components, based on rigorous material selection is likely to provide long service life of equipment. Material degradation and aging requires application of adequate diagnostic techniques and continuous monitoring. Regular monitoring and inspection techniques can help in providing basis for estimating the health of the existing components of the equipment as well as the overall risk assessment.

The delegates will be introduced to the main points of inspection and testing of storage tanks and piping systems according to the relevant API standards in order to perform the fitness for service (FFS) analysis. The most up-to-date methods of equipment protection methodologies will be presented together with maintenance activities, including necessary repairs as prevention of failures. The PetroKnowledge training course will also cover methodology of the risk assessment and management regarding the overall equipment integrity

This training course will include several workshops with real problems from industrial practice which will enable discussions and exchange of experiences.

The training course will feature:

- Safety in operation and maintenance of pressure stationary equipment and pipelines
- Efficient operation, diagnostics and maintenance of rotating equipment
- Material degradation, ageing, and modes of failure
- Diagnostics methods including inspection procedures
- Equipment maintenance best practices
- Repair and revitalization technologies

Methodology:

The training course will be conducted along workshop principles with formal lectures and interactive worked examples included in several workshops. Presented also will be several illustrative and instructive videos. The emphasis in the course will be on the explanation of all technical points and providing answers to problems that are encountered in everyday industrial practice related to operation and maintenance, as well as repair and alterations of pressure equipment.

Each learning point will be reinforced with practical examples. There will be ample opportunities for active discussion and sharing professional experiences and exchange that will help solidify the gained knowledge. All course materials will be provided.

Who Should Attend?

The training course is suitable to a whole range of professionals but will greatly benefit:

- Operation, technical service and maintenance professionals
- Technical professionals responsible for maintenance and repair of equipment
- Professionals involved in inspection and maintenance and repair
- Technical professionals dealing with risk assessment and integrity analysis
- Technicians dealing with regulating and metering and other measurements

Training Objectives:

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

- Follow the requirements of industry inspection standards and practices
- Identify elements of safety of pressure vessels, storage tanks and pipelines
- Apply diagnostics and inspection procedures to pressure equipment
- Analyze results of condition monitoring and vibration control of rotating equipment
- Plan and manage activities related to maintenance and repair

Course Outline:

Day One: Stationary Equipment - Technical Characteristics & Operational Safety

Competency Description: Familiarization with technical & safety characteristics of stationary pressure equipment

Key points

- Main elements of storage tanks and pressure vessels
- Details of safety of pipelines and piping systems
- Importance of pressure relief valves

Topics to be covered

- Above Ground Storage Tanks: Operation & Safety
- Pressure Vessels, Heat Exchangers and Steam Boilers:
- Pipelines & Piping Systems: Operation & Safety
- Pressure Relief Valves: Selection & Sizing
- ASME BPV VIII & ASME B31.3 Standards and API Inspection Codes

Day Two: Rotating Equipment - Operation, Efficiency & Safety

Competency Description: Understanding of operation & safety of rotating equipment

Key points

- Efficient operation of centrifugal pumps
- Safety in operation of centrifugal compressors

- Control system of rotating machinery

Topics to be covered

- Centrifugal pumps: Maintaining NPSH and Prevention of Cavitation
- Reciprocating & rotary pumps
- Centrifugal compressors: Anti-surge control and Choke conditions
- Reciprocating & rotary compressors
- Safety issues, troubleshooting and problem solving of rotating equipment

Day Three: Diagnostics of Equipment Failure & Root Cause Analysis

Competency Description: Ability to diagnose symptoms of equipment failures

Key points

- Material degradation and failures
- Diagnostics methodology and techniques
- Risk management

Topics to be covered

- Material degradation & failures of stationary & rotating Equipment
- Failure modes, effects and diagnostics analysis (FMEDA)
- Diagnostics of fatigue, cracks, &ruptures: Fitness For Service (FFS) Analysis
- Root cause analysis (RCA) of failures
- Risk Management & Mitigation Technologies: ALARP criteria

Day Four: Inspection, Monitoring & Mechanical Integrity Evaluation

Competency Description: Understanding of steps in monitoring and inspection procedures

Key points

- Risk based inspection

- Inspection of interior of storage tanks and pipelines
- Rotating machinery vibration

Topics to be covered

- Risk Based Inspection (RBI API 580) for stationary pressure equipment (NDT)
- Pipeline internal and external corrosion direct assessment (ICDA & ECFA) methods
- Pigging of complex onshore and offshore pipelines
- Rotating machinery condition monitoring
- Vibration analysis including rotor balancing, shaft alignment techniques

Day Five: Maintenance & Repairs Organization & Management

Competency Description: Familiarization with organization of maintenance & repairs

Key points

- Internal maintenance methods
- Cathodic protection
- Repair techniques

Topics to be covered

- Storage Tanks: External & Internal Maintenance Techniques
- Cathodic Protection of Pipelines and Storage Tanks
- Coating & Thermal Protection
- Repair Technologies
- Summary and Conclusions