AMERICAN GLOBAL INSTITUTE FOR PRIVATE TRAINING

External Training Course

Digital Excellence in Equipment Integrity for Oil & Gas Operations

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From 15 Jun. To 19 Jun. 2025
From 20 Jul. To 24 Jul. 2025
From 24 Aug. To 28 Aug. 2025

InterContinental Cairo Semiramis by IHG Hotel, Cairo, Egypt

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External Training Course:

Digital Excellence in Equipment Integrity for Oil & Gas Operations

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Course Overview:

In today's fast-evolving oil and gas landscape, equipment integrity is no longer solely about mechanical reliability—it is increasingly about integrating smart technologies, data-driven decision-making, and sustainability into operations. This course provides a comprehensive and forward-looking approach to mastering equipment integrity through the lens of digital transformation. Participants will explore the full lifecycle of industrial assets—from design and commissioning through operation and decommissioning—with a focus on applying digital tools, advanced analytics, and intelligent monitoring systems to ensure safe, efficient, and profitable performance. The course bridges the gap between traditional integrity practices and modern smart technologies such as Artificial Intelligence (AI), Internet of Things (IoT), machine learning, predictive analytics, digital twins, and cloud platforms. These tools are essential for transforming integrity management from reactive to proactive and predictive systems that reduce downtime, improve safety, and extend asset life. Whether dealing with static equipment (pressure vessels, storage tanks, piping systems) or rotating machinery (pumps, compressors, turbines), participants will gain the tools and frameworks needed to lead the development and implementation of digital integrity management systems across upstream, midstream, and downstream operations.

Key Areas Covered:

Modern Integrity Management: Shifting from conventional to intelligent, real-time integrity assurance.

Digital Transformation in Oil & Gas: Role of technology in equipment safety, efficiency, and sustainability.

Operational Risk Reduction: Using predictive tools and risk-based inspection to prevent failures.

Data-Driven Decision-Making: Turning asset condition data into actionable insights.

Compliance & Best Practices: Applying API, ISO, ASME, and IEC standards in digital workflows.

Strategic Planning: Building a digitally enabled integrity management program aligned with corporate goals.

Key Objectives:

Upon completion of this course, participants will be able to:

- Understand the fundamentals of equipment integrity in oil & gas environments.
- Leverage digital technologies for integrity monitoring and diagnostics.
- Apply risk-based inspection (RBI) and predictive maintenance techniques.
- Utilize AI and IoT in data-driven decision-making for asset health.
- Align integrity programs with industry standards (API, ISO, ASME).
- Develop digital strategies to reduce downtime and extend equipment life.

Training Methodology:

Expert-Led Sessions – Delivered by experienced industry professionals.
Live Demonstrations – Showcasing digital tools and monitoring systems.
Interactive Case Studies – Real-world scenarios for applied learning.
Workshops & Team Exercises – Hands-on planning.
Continuous Evaluation – Participant feedback, Q&A, and daily wrap-ups.

Course Content and Agenda:

Day 1 – Foundations of Equipment Integrity in the Digital Age

Core Principles of Integrity Management:

- Definition and scope of equipment integrity
- Importance of integrity in oil & gas risk management
- Impacts of integrity failure: safety, environmental, financial

Regulatory Frameworks and Industry Standards:

- API 580/581, ISO 55000, ASME Sections V, VIII & IX
- National and international regulatory compliance
- Auditing and reporting requirements

Introduction to Digital Transformation in Oil & Gas:

- Role of digitalization in asset integrity
- Overview of Industry 4.0 applications in petroleum sector
- Barriers and enablers of digital integrity programs

Day 2 – Smart Inspection & Monitoring Technologies

Risk-Based Inspection (RBI) Methodologies:

- Risk assessment and consequence analysis
- RBI planning tools and workflows
- Case example: RBI implementation for offshore pipelines

Advanced Inspection Techniques:

- Smart visual inspection (drones, AI-vision)
- Ultrasonic, magnetic particle, thermographic, acoustic emission
- Remote condition monitoring in inaccessible locations

Digital Monitoring Systems & IIoT (Industrial IoT):

- Sensor technologies for real-time data acquisition
- Wireless monitoring networks and edge computing
- Cloud-based data management and alerting platforms

Day 3 – Predictive Maintenance & Digital Failure Management

Predictive Maintenance Framework:

- Comparison of reactive, preventive, and predictive strategies
- Predictive tools: Vibration analysis, lubricant analysis, thermal imaging
- Condition-based vs. time-based maintenance planning

Root Cause Analysis (RCA) & Failure Modes:

- Common causes of equipment degradation and failure
- RCA tools: 5 Whys, Fault Tree Analysis (FTA), Ishikawa Diagram
- Mitigation strategies and continuous improvement plans

Data Analytics & Digital Decision-Making:

- Using AI/ML to interpret equipment condition data
- Trends, anomalies, and lifecycle forecasting
- Dashboards and analytics visualization tools

Day 4 – AI-Enabled Asset Integrity Platforms

Role of Artificial Intelligence in Integrity:

- AI models for failure prediction
- Machine learning for anomaly detection and trend analysis
- Examples of AI-powered integrity software (e.g., GE APM, IBM Maximo)

Digital Twin & Technologies:

- Building a virtual model of physical equipment
- Integration with control systems (SCADA, DCS)

Digital KPIs & Asset Health Indexing:

- Key performance indicators for integrity and reliability
- Health indexing and prioritization of critical assets
- Integrating KPIs into corporate performance systems

Day 5 – Practical Applications, Strategy Development & Case Studies

Case Studies in Oil & Gas Environments:

- Integrity challenges in upstream, midstream, and downstream operations
- Lessons learned from equipment failures in major projects
- Benchmarking digital transformation in global oil firms

Workshop – Designing a Digital Integrity Strategy:

- Building a comprehensive integrity plan for a sample facility
- Assigning risk levels, inspection plans, and monitoring tools
- Group presentations and feedback

Course Summary & Final Evaluation:

- Key takeaways and best practices
- Individual assessments and feedback
- Awarding of certificates and closing remarks

Program Agenda:

(1st Day) Agenda

8.30	9.00	Opening Remarks (30 Min.).
9.00	11.30	Discuss Course Points: • Foundations of Equipment Integrity in the Digital Age. • Smart Inspection & Monitoring Technologies. • Predictive Maintenance & Digital Failure Management. • AI-Enabled Asset Integrity Platforms. • Practical Applications, Strategy Development & Case Studies.
11.30	12.00	Coffee Break
12.00	14.00	Foundations of Equipment Integrity in the Digital Age Core Principles of Integrity Management: • Definition and scope of equipment integrity • Importance of integrity in oil & gas risk management • Impacts of integrity failure: safety, environmental, financial Regulatory Frameworks and Industry Standards: • API 580/581, ISO 55000, ASME Sections V, VIII & IX • National and international regulatory compliance • Auditing and reporting requirements Introduction to Digital Transformation in Oil & Gas: • Role of digitalization in asset integrity • Overview of Industry 4.0 applications in petroleum sector • Barriers and enablers of digital integrity programs
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(2nd Day) Agenda

9.00	11.30	Smart Inspection & Monitoring Technologies Risk-Based Inspection (RBI) Methodologies: • Risk assessment and consequence analysis. • RBI planning tools and workflows. • Case example: RBI implementation for offshore pipelines. Advanced Inspection Techniques: • Smart visual inspection (drones, AI-vision). • Ultrasonic, magnetic particle, thermographic, acoustic emission. • Remote condition monitoring in inaccessible locations.
11.30	12.00	Coffee Break
12.00	14.00	Smart Inspection & Monitoring Technologies Digital Monitoring Systems & IIoT (Industrial IoT): • Sensor technologies for real-time data acquisition. • Wireless monitoring networks and edge computing. • Cloud-based data management and alerting platforms.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(3rd Day) Agenda

9.00	11.30	Predictive Maintenance & Digital Failure Management Predictive Maintenance Framework: • Comparison of reactive, preventive, and predictive strategies. • Predictive tools: Vibration analysis, lubricant analysis, thermal imaging. • Condition-based vs. time-based maintenance planning. Root Cause Analysis (RCA) & Failure Modes: • Common causes of equipment degradation and failure. • RCA tools: 5 Whys, Fault Tree Analysis (FTA), Ishikawa Diagram. • Mitigation strategies and continuous improvement plans.
11.30	12.00	Coffee Break
12.00	14.00	Predictive Maintenance & Digital Failure Management Data Analytics & Digital Decision-Making: • Using AI/ML to interpret equipment condition data. • Trends, anomalies, and lifecycle forecasting. • Dashboards and analytics visualization tools.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(4th Day) Agenda

9.00	11.30	AI-Enabled Asset Integrity Platforms Role of Artificial Intelligence in Integrity: • AI models for failure prediction. • Machine learning for anomaly detection and trend analysis. • Examples of AI-powered integrity software (e.g., GE APM, IBM Maximo). Digital Twin & Technologies: • Building a virtual model of physical equipment. • Integration with control systems (SCADA, DCS).
11.30	12.00	Coffee Break
12.00	14.00	AI-Enabled Asset Integrity Platforms Digital KPIs & Asset Health Indexing: • Key performance indicators for integrity and reliability. • Health indexing and prioritization of critical assets. • Integrating KPIs into corporate performance systems.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(5th Day) Agenda

9.00	11.30	Practical Applications, Strategy Development & Case Studies Case Studies in Oil & Gas Environments: • Integrity challenges in upstream, midstream, and downstream operations. • Lessons learned from equipment failures in major projects. • Benchmarking digital transformation in global oil firms.
11.30	12.00	Coffee Break
12.00	14.00	Practical Applications, Strategy Development & Case Studies Workshop – Designing a Digital Integrity Strategy: • Building a comprehensive integrity plan for a sample facility. • Assigning risk levels, inspection plans, and monitoring tools. • Group presentations and feedback. Course Summary & Final Evaluation: • Key takeaways and best practices. • Individual assessments and feedback. Awarding of certificates and closing remarks.
14.00	14.30	Questions, Discussion & Conclusion Training Course.
14.30		Buffet Lunch