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|  <b>BATEN RABEH</b><br><small>TRAINING SERVICE</small> | <b>Adresse : Cité 11 Décembre 1960 N° 120</b><br><b>2ème Etage Baba Hassen- ALGER</b><br><b>N RC : 16-01 - 20A1551304</b><br><b>NIF : 19517310150012900000</b><br><b>Telephone : 0782 83 79 88</b><br><b>Email: <a href="mailto:kitalgeria@kit-egy.com">kitalgeria@kit-egy.com</a></b><br><b>Site web : <a href="http://www.kit-egy.com">www.kit-egy.com</a></b> | <b>BATEN RABAH</b><br><b>Consultation, Training,</b><br><b>Contracting &amp; Evaluation</b><br><b>Training Programme</b> |
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**Course Title: Electromagnetic Inspection (EMI) for Drill Stem Components**

**Course Description:**

This course offers an in-depth understanding of Electromagnetic Inspection (EMI) techniques, specifically tailored for professionals involved in the maintenance and inspection of drill stem components in the oil and gas industry. Participants will learn how to effectively utilize EMI technology to detect flaws such as cracks, corrosion, and other structural anomalies in drill pipes, collars, and other critical components.

Through a blend of theoretical instruction and practical exercises, this course equips participants with the skills needed to perform accurate inspections, interpret complex EMI signals, and make informed decisions about the integrity and usability of drilling equipment. The course emphasizes real-world applications and includes hands-on training with state-of-the-art EMI equipment, ensuring that participants gain both the knowledge and confidence to conduct EMI inspections in the field.

**Course Objectives:**

Understand the Fundamentals of EMI:

Grasp the basic principles of electromagnetism and how they apply to EMI inspections.

Learn about eddy currents and their role in detecting defects in metallic materials.

Master EMI Equipment and Techniques:

Gain hands-on experience with EMI inspection tools and learn how to calibrate and operate them effectively.

Develop the ability to select appropriate probes and settings for different inspection scenarios.

Perform Accurate EMI Inspections:

Acquire the skills to conduct thorough EMI inspections of drill stem components, including drill pipes, collars, and tubing.

Learn to identify and categorize common defects such as cracks, pits, and wall thickness variations.

Analyze and Interpret EMI Data:

Develop the expertise to interpret EMI signals and differentiate between defect indications and noise.

Learn how to document inspection findings and create detailed, actionable reports.

Enhance Decision-Making Based on EMI Results:

Understand how to use EMI inspection data to assess the condition of drill stem components.

Make informed recommendations for repair, maintenance, or replacement of components based on inspection results.

Ensure Safety and Equipment Integrity:

Learn best practices for maintaining EMI equipment and ensuring safe operation during inspections.

Understand the safety precautions necessary to protect operators from electromagnetic hazards.

Course Target Audience:

Inspection Engineers and Technicians:

Professionals responsible for the inspection, maintenance, and integrity assessment of drilling equipment.

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### **Drilling Engineers:**

Engineers involved in the design and operational oversight of drilling activities, seeking to enhance their understanding of EMI inspection techniques.

Quality Control and Assurance Personnel:

Individuals responsible for ensuring the quality and safety of drilling operations through effective inspection practices.

Maintenance Supervisors and Technicians:

Personnel tasked with the upkeep and repair of drilling equipment, who need to understand how EMI can aid in identifying components that require maintenance.

Nondestructive Testing (NDT) Specialists:

Professionals specializing in NDT methods, looking to expand their skill set with EMI-specific knowledge and applications.

### **Course Content:**

#### **Module 1: Introduction to Electromagnetic Inspection (EMI)**

Overview of EMI:

Introduction to the principles of Electromagnetic Inspection (EMI).

Importance of EMI in detecting flaws in drill stem components.

Comparison of EMI with other nondestructive testing (NDT) methods.

Applications of EMI in the Oil and Gas Industry:

Common uses of EMI for drill pipes, casing, and tubing.

Understanding the role of EMI in maintaining the integrity of drilling operations.

#### **Module 2: Fundamentals of Electromagnetic Theory**

Basic Principles of Electromagnetism:

Understanding magnetic fields and electromagnetic waves.

The relationship between electricity and magnetism.

Magnetic Hysteresis and Permeability:

Explanation of magnetic hysteresis and its impact on EMI.

The role of material permeability in EMI inspections.

Eddy Currents and Their Role in EMI:

Introduction to eddy currents and their application in flaw detection.

How eddy current signals are affected by defects in the material.

#### **Module 3: EMI Equipment and Calibration**

Overview of EMI Equipment:

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Description of the key components of EMI inspection systems (e.g., coils, sensors, signal processors).  
Portable vs. stationary EMI systems.

Calibration of EMI Equipment:

Importance of calibration for accurate results.  
Procedures for calibrating EMI equipment according to industry standards.  
Selection of Probe and Settings:

Choosing the correct probe type for different materials and inspection requirements.  
Adjusting settings for optimal inspection performance.

#### **Module 4:** EMI Inspection Procedures

Pre-Inspection Preparations:

Ensuring cleanliness and proper surface preparation.  
Setting up the EMI equipment and verifying operational status.  
Conducting EMI Inspections:

Step-by-step procedure for inspecting drill pipes, collars, and other drill stem components.  
Interpreting EMI signals to identify defects such as cracks, pits, and wall thickness variations.  
Common Defects Detected by EMI:

Types of flaws detected by EMI, including transverse and longitudinal defects, fatigue cracks, and corrosion.  
Understanding signal responses associated with different defect types.

#### **Module 5:** Data Interpretation and Analysis

Signal Analysis Techniques:

Reading and interpreting EMI signals and graphs.  
Differentiating between signal noise and valid defect indications.  
Data Recording and Reporting:

Methods for documenting inspection findings.  
Producing clear and concise inspection reports that meet industry standards.  
Decision Making Based on EMI Results:

Assessing whether components meet acceptance criteria or require further action.  
Recommendations for repair or replacement based on inspection outcomes.

#### **Module 6:** Practical Applications and Case Studies

Hands-on EMI Inspection Practice:

Practical exercises using EMI equipment on sample drill stem components.  
Real-world scenarios for participants to apply their EMI inspection skills.  
Case Studies:

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Review of past inspection cases where EMI was successfully applied.  
Group discussions on challenges and solutions in EMI inspections.

#### **Module 7:** Maintenance, Troubleshooting, and Safety

Maintaining EMI Equipment:

Best practices for maintaining and storing EMI equipment.  
Regular checks and maintenance schedules.  
Troubleshooting Common Issues:

Identifying and resolving common problems encountered during EMI inspections.  
Techniques for minimizing signal interference and enhancing inspection accuracy.  
Safety Considerations:

Ensuring operator safety during EMI inspections.  
Understanding and mitigating the risks associated with electromagnetic fields.

#### **Module 8:** Final Assessment

Written Examination:

Testing participants' theoretical knowledge of EMI principles and procedures.  
Practical Examination:

Evaluating participants' ability to perform EMI inspections and interpret results accurately.  
Conclusion and Certification  
Course Review and Q&A:

Recap of key course content and addressing participants' questions.  
Certification:

Issuance of certificates to participants who pass both the written and practical exams, recognizing their proficiency in EMI inspection.