COURSE OVERVIEW LE1013
New XRF Analyzer Machine

Course Title
New XRF Analyzer Machine

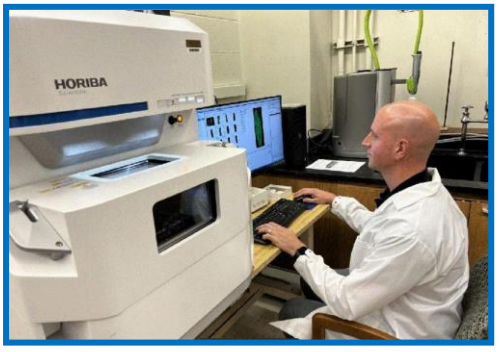
Course Reference
LE1013

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Course Date	Venue
1	June 22-26, 2025	Meeting Plus 9, City Centre Rotana, Doha, Qatar
2	September 07-11, 2025	
3	November 23-27, 2025	

Course Description



This practical and highly-interactive course includes real-life case studies where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and advanced overview on new XRF analyzer machine. It covers the XRF technology, the basic principles of XRF operation and components of the XRF analyzer; the types of XRF instruments, safety principles in XRF operation and the importance of proper sample preparation; the sample preparation for solid samples, liquid and slurry samples, powders and alloys and the sample labeling and traceability; and the instrument calibration fundamentals, setting up calibrations in the new system and running measurements.

During this interactive course, participants will learn the quality control (QC) and validation, measurement interferences and corrections and the calibration and qc testing; interpreting XRF spectra, reporting and data management, and troubleshooting analytical problems; the maintenance of the new XRF analyzer, the error prevention and best practices and advanced measurement modes and custom methods; and the regulatory and quality compliance, health, safety, and radiation protection and integration with other lab techniques.

Course Objectives

Upon the successful completion of this course, each participant will be able to: -

- Apply and gain an in-depth knowledge on new XRF analyzer machine
- Discuss XRF technology, the basic principles of XRF operation and components of the XRF analyzer
- Identify the types of XRF instruments, safety principles in XRF operation and the importance of proper sample preparation
- Employ sample preparation for solid samples, liquid and slurry samples, powders and alloys and carryout sample labeling and traceability
- Explain instrument calibration fundamentals, set up calibrations in the new system and run measurements
- Discuss quality control (QC) and validation, measurement interferences and corrections and the calibration and qc testing
- Interpret XRF spectra and carryout reporting and data management, and troubleshooting analytical problems
- Perform maintenance of the new XRF analyzer as well as identify error prevention and best practices and advanced measurement modes and custom methods
- Carryout regulatory and quality compliance, health, safety, and radiation protection and integration with other lab techniques

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of new XRF analyzer machine for laboratory technicians and analysts, quality control/quality assurance personnel, process engineers, maintenance and instrumentation technicians, lab supervisors/managers and those who will operate, manage, or utilize data from the new XRF analyzer machine.

Course Fee

US$ 6,000 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Dirk Horst is a **Senior Engineer** with over **30 years** of extensive experience in **On and Off-Line Gas Chromatography**, **Natural Gas Determination of Composition and Associated Uncertainty by Gas Chromatography (ISO 6974)**, **QMI** (**Quality Measuring Instruments**), **Process Analyzers**, **Crude Metering System**, **Analytical Instrumentation**, **Process Control & Instrumentation**, **Process Troubleshooting, Measuring Instruments**, **Calibrating Instruments**, **LNG Custody Transfer Analysis**, **ISO Standards**, **Quality Assurance Monitoring System** and **In-Line Gasoline Blending System**. He is **Certified Instrument Trainer**, **Competence Assessor** and **Internal Verifier**.

Mr. Horst has performed significant contributions in various industries for handling challenging positions such as an **Engineering Trainer & Consultant**, **Process Analyzer Engineer**, **Instrument Engineer**, **Maintenance Engineer**, **Design Engineer**, **Start-Up & Commissioning Engineer**, **Senior Advisor Quality Measuring Instruments**, **Senior Analytical Chemist** and **Team Leader**. He has imparted his practical experience and in-depth knowledge in different international companies including **Shell Refinery**, **Shell Global Solutions**, **SIOP-Shell**, **Yokogawa LNG**, **QMI**, **Harburg Refinery**, **Nigeria LNG**, **Sakhalin LNG**, **SRTCA**, **Reliance Petroleum Refinery** and many more.

Mr. Horst has a **Bachelor** degree in **Instrumentation & Electrical Engineering** from the **Royal Institute of the Netherlands**. Further, he is "**Qualified Internal Verifier**" and a "**Certified Competence Assessor**" and has certifications in "**Coaching**" from the **City & Guilds** as well as "**Flow Metering**" and "**Gas Chromatography Troubleshooting**" from the **Technical University Delft**, **The Netherlands**.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to XRF Technology*** *What Is X-Ray Fluorescence (XRF)? • Differences Between XRF and Other Analytical Techniques (e.g., AAS, ICP) • Applications in Mining, Metallurgy, Cement, Polymers, and Forensics • Benefits of the New Generation XRF Analyzer*
0930 – 0945	*Break*
0945 – 1040	***Basic Principles of XRF Operation*** *Physics of X-Ray Emission and Fluorescence • Primary and Secondary X-Rays • Characteristic versus Scattered X-Rays • Interaction of X-Rays with Different Elements*
1040 – 1135	***Components of the XRF Analyzer*** *X-Ray Tube and Detector Types (Si Drift Detector, Proportional Counter) • Sample Chamber and Autosampler (if Applicable) • Electronics and Cooling Systems • User Interface (Touchscreen, PC, or Remote Control)*
1135 - 1230	***Types of XRF Instruments*** *Benchtop versus Handheld XRF • Energy Dispersive XRF (EDXRF) versus Wavelength Dispersive XRF (WDXRF) • Qualitative vs. Quantitative Modes • Portability and Field versus Lab Use*
1230 – 1245	*Break*
1245 – 1335	***Safety Principles in XRF Operation*** *X-Ray Generation and Shielding Requirements • Radiation Exposure Risks and Safe Practices • Local Legal and Regulatory Standards • Interlocks, Dosimeters and Emergency Procedures*
1335 - 1420	***Hands-On Introduction to the New XRF Unit*** *System Start-Up and User Login • Navigating Software Menus • Overview of Hardware Layout • Basic Functionality Test and Readiness Check*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Importance of Proper Sample Preparation*** *How Preparation Affects Accuracy and Repeatability • Matrix Effects and Homogeneity • Surface Condition Considerations • Sample Size and Geometry*
0830 – 0900	***Sample Preparation for Solid Samples*** *Grinding and Pelletizing Methods • Use of Binders and Additives • Hydraulic versus Manual Pressing • Troubleshooting Poor Pellet Formation*
0900 – 0915	*Break*
0915 – 1100	***Sample Preparation for Liquid & Slurry Samples***

	Filtration and Drying Techniques • Cell Selection and Sealing Methods • Liquid Sample Carriers and Containment • Preventing Contamination and Leakage
1100 – 1230	***Sample Preparation for Powders & Alloys*** *Homogenization Techniques for Fine Powders • Fusion Techniques Using Flux ($Li_2B_4O_7$, $LiBO_2$) • Preparing Pressed versus Fused Samples • Dealing with Conductive and Magnetic Materials*
1230 – 1245	*Break*
1245 – 1335	***Sample Labeling & Traceability*** *Best Practices for Barcode/ID Labeling • Preventing Sample Mix-Ups • Chain of Custody and Documentation • Sample Storage and Recordkeeping*
1335 - 1420	***Practical Session – Sample Preparation & Loading*** *Real-Time Demonstration of Sample Preparation • Loading Samples into the Machine • Positioning and Cleaning for Optimal Results • Safety During Manual Handling*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Instrument Calibration Fundamentals*** *What Is Calibration in XRF? • Importance of Matrix-Matched Standards • Primary versus Secondary Calibration Standards • Drift Correction Principles*
0830 – 0900	***Setting Up Calibrations in the New System*** *Step-by-Step Calibration Procedures • Selecting and Inputting Standards • Curve Fitting and Regression Options • Managing Calibration Databases*
0900 – 0915	*Break*
0915 – 1100	***Running Measurements*** *Selecting Methods and Analytical Programs • Setting Dwell Time and Number of Repeats • Background Subtraction and Peak Deconvolution • Saving, Exporting, and Printing Results*
1100 – 1230	***Quality Control (QC) & Validation*** *Running Certified Reference Materials (CRMs) • Setting Up Control Charts • Repeatability, Reproducibility, and Accuracy Testing • Statistical Tools for Performance Monitoring*
1230 – 1245	*Break*
1245 – 1335	***Measurement Interferences & Corrections*** *Spectral Overlaps and Peak Shifts • Matrix Corrections (Alpha Factors, Compton Normalization) • Line Selection for Multielement Analysis • Correcting for Air, Filter, or Surface Effects*
1335 - 1420	***Practical Session – Calibration & QC Testing*** *Run Calibration and Verification Procedures • Analyze Multiple Samples • Record and Interpret Results • Documenting Errors and Corrective Actions*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Interpreting XRF Spectra*** *Understanding Energy versus Count Plots • Peak Identification by Element • Background Noise and Artifacts • Confidence Level in Results*
0830 – 0930	***Reporting & Data Management*** *Data Storage Formats (PDF, CSV, LIMS) • Generating Reports for Quality, Compliance, and Audits • Exporting Data to Lab Systems • Documenting Metadata and Result Comments*
0930 – 0945	*Break*
0945 – 1100	***Troubleshooting Analytical Problems*** *Inconsistent Results and Drift • High Background or Low Counts • Equipment Messages and Diagnostic Codes • Invalid Samples or Out-of-Range Data*
1100 – 1215	***Maintenance of the New XRF Analyzer*** *Daily, Weekly, and Monthly Care Tasks • Cleaning and Replacing Sample Windows • Checking Detector and X-Ray Tube Health • Running Internal Diagnostics*
1215 – 1230	*Break*
1245 – 1335	***Error Prevention & Best Practices*** *Avoiding Cross-Contamination • Avoiding Damage to Sample Holders and Detectors • Environmental Control (Humidity, Dust, Temperature) • Establishing SOPs and Checklist Use*
1335 - 1420	***Practical Session – Data Review & Troubleshooting*** *Review of Test Batch Data • Identifying and Resolving Real Sample Anomalies • Running Preventive Diagnostics • Operator Q&A Session*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

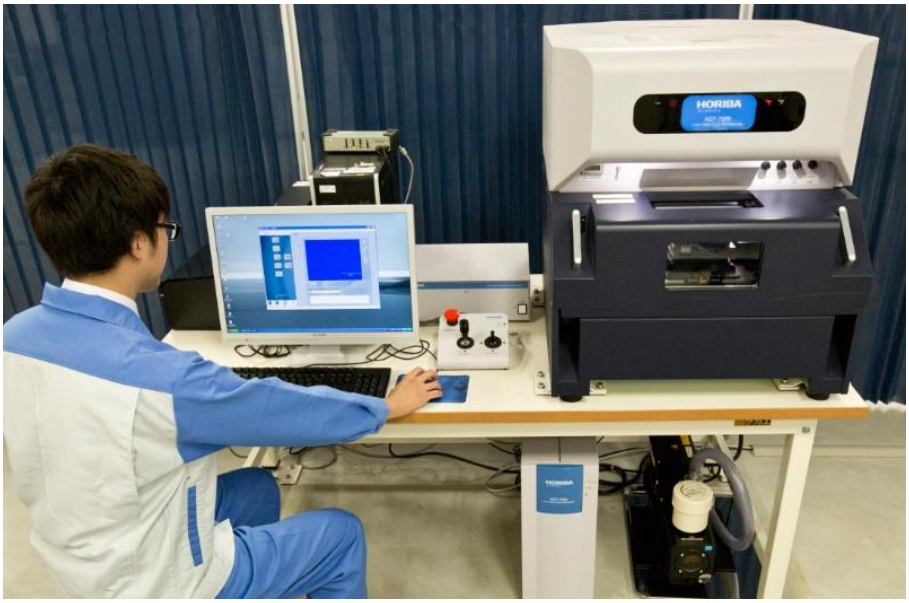
Day 5

0730 – 0830	***Advanced Measurement Modes & Custom Methods*** *Fundamental Parameters versus Empirical Calibration • Thin Film, Coating Thickness Analysis • Multi-Layer Analysis and 3D Mapping (if Supported) • ROI (Region of Interest) Mapping Tools*
0830 – 0930	***Regulatory & Quality Compliance*** *Role of XRF in ISO, ASTM, and EPA Methods • Compliance with REACH, RoHS, and WEEE Directives • Documenting for Audits and Traceability • Role in Internal QA/QC Systems*
0930 – 0945	*Break*
0945 – 1045	***Health, Safety & Radiation Protection*** *Local and International Radiation Safety Regulations • Machine-Specific Safety Interlocks • Emergency Response and Spill Handling • Refresher on PPE and Restricted Access Zones*
1045 – 1215	***Integration with Other Lab Techniques*** *When to Use XRF versus ICP, AAS, or XRD • Complementary Roles in Quality Labs • Multi-Instrument Workflow Optimization • Hybrid Data Analysis for Critical Decision-Making*
1215 – 1230	*Break*

1230 – 1345	***Final Project – End-to-End Operation Simulation*** *Receive and Log a Sample • Prepare, Calibrate, and Run the Measurement • Validate and Interpret Results • Generate and Present a Full Report*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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