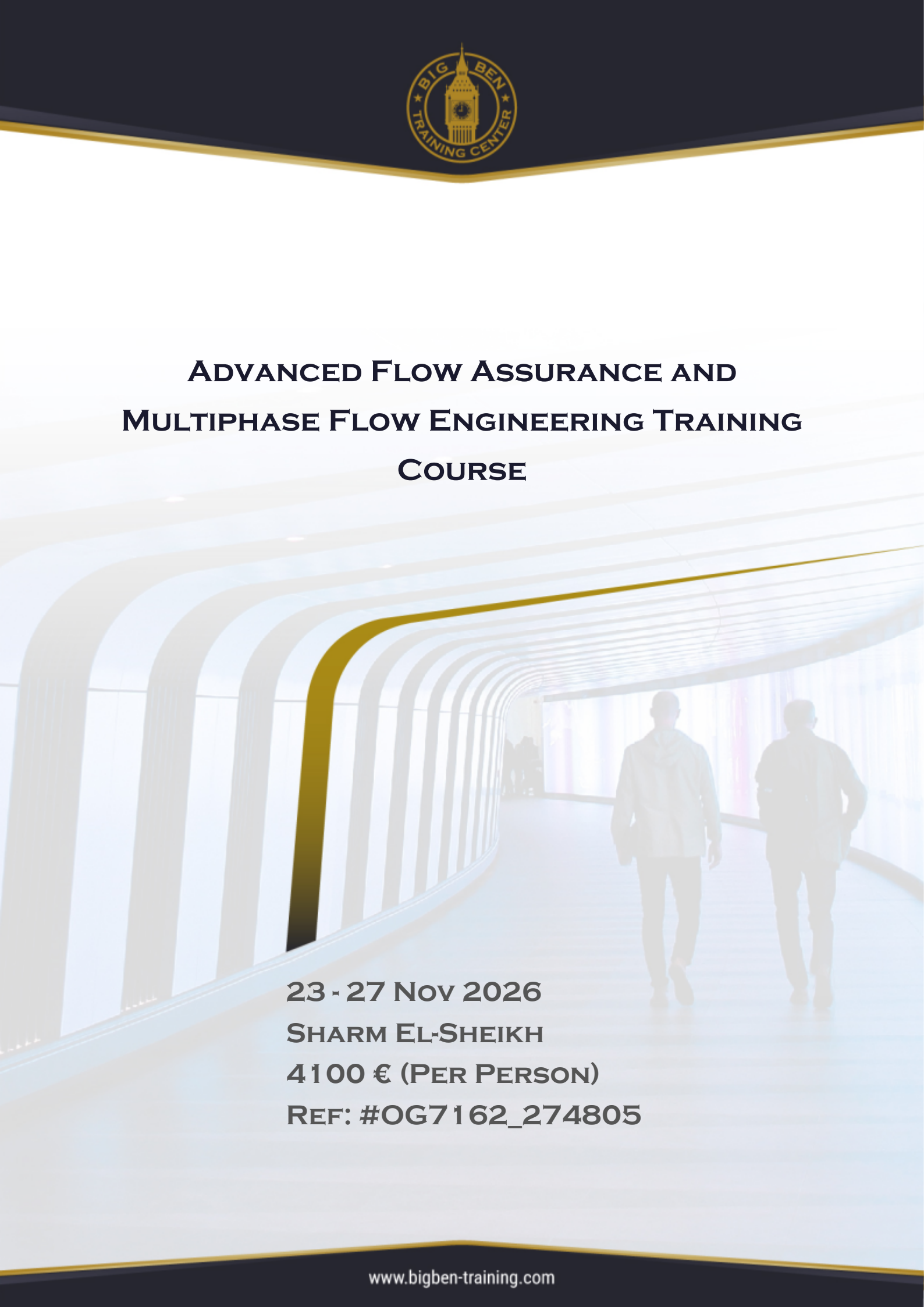
Advanced Flow Assurance and Multiphase Flow Engineering Training Course



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Sharm El-Sheikh

4100 € (Per Person)

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Course Introduction / Overview:

This course provides a comprehensive and in-depth exploration of flow assurance and multiphase flow engineering, critical disciplines for ensuring the safe, efficient, and economical transport of hydrocarbon fluids from the reservoir to the processing facility. In the modern energy landscape, challenges such as hydrate formation, wax deposition, slugging, and corrosion can severely impact production and asset integrity, leading to significant financial losses and safety risks. This program, offered by BIG BEN Training Center, is meticulously designed to equip participants with the fundamental principles and practical tools needed to diagnose, predict, and mitigate these complex flow assurance issues. Drawing upon foundational concepts established by pioneers like James P. Brill and his seminal work, "Multiphase Flow in Pipes," the curriculum integrates fluid dynamics, thermodynamics, and production chemistry. Participants will move from understanding basic multiphase flow regimes and fluid properties to mastering advanced simulation techniques and developing robust operational strategies. The course emphasizes a holistic approach, linking design considerations with real-world operational challenges to ensure uninterrupted hydrocarbon production throughout the asset lifecycle. It is an essential training for any professional aiming to master the complexities of multiphase transport systems.

Target Audience / This training course is suitable for:

- Production and Operations Engineers.
- Process and Facilities Engineers.
- Pipeline and Subsea Engineers.
- Reservoir Engineers.
- Chemical and Process Technologists.
- Asset Integrity Engineers.
- Project Managers and Team Leaders in the energy sector.
- Research and Development Professionals.

Target Sectors and Industries:

- Oil and Gas (Upstream and Midstream).
- Petrochemical and Refining Industries.
- Engineering, Procurement, and Construction (EPC) Companies.
- Consulting Firms specializing in energy projects.
- Governmental bodies and regulatory agencies overseeing the energy sector.
- Power Generation Sector.

Target Organizations Departments:

- Production Operations.
- Engineering and Design.
- Asset Management and Integrity.
- Research and Development (R&D).
- Health, Safety, and Environment (HSE).
- Project Management.
- Field Development Planning.

Course Offerings:

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

- Analyze fundamental principles of multiphase fluid flow and thermodynamics.
- Identify and characterize different multiphase flow patterns in pipelines.
- Predict the conditions for hydrate, wax, and asphaltene formation.
- Develop effective chemical and thermal strategies for solids management.
- Evaluate and design mitigation techniques for various types of slugging.
- Assess corrosion and erosion risks in multiphase pipelines.
- Interpret results from steady-state and transient multiphase flow simulators.
- Formulate integrated flow assurance strategies for field development and operation.
- Optimize production systems by effectively managing flow assurance challenges.
- Implement best practices for monitoring and controlling production chemistry.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a dynamic and engaging learning environment that bridges theory with practical application. This course utilizes a blended approach, combining expert-led lectures with interactive workshops, group discussions, and detailed case study analyses. Participants will not just listen to theory; they will actively apply it by working through real-world flow assurance problems drawn from diverse operational environments, such as deepwater subsea systems and onshore gathering networks. The sessions will feature practical exercises focused on risk assessment, mitigation strategy selection, and the interpretation of simulation data. Collaborative team-based activities will encourage participants to share experiences and develop comprehensive solutions to complex scenarios. Emphasis is placed on creating a participatory atmosphere where questions are encouraged and knowledge is co-created. Our instructors provide continuous feedback and facilitate discussions to ensure that the complex concepts of multiphase flow and production chemistry are thoroughly understood and can be confidently applied in the workplace.

Course Agenda (Course Units):

Unit One: Fundamentals of Multiphase Flow and Fluid Properties

- Introduction to Flow Assurance and its Impact on Production.
- Fundamentals of Fluid Dynamics and Thermodynamics.
- Phase Behavior of Hydrocarbon Fluids (PVT Analysis).
- Properties of Oil, Gas, and Water.
- Multiphase Flow Regimes and Flow Pattern Maps.
- Pressure Drop and Holdup Calculations in Multiphase Flow.
- Introduction to Empirical Correlations and Mechanistic Models.

Unit Two: Solids Deposition and Management

- Gas Hydrate Formation Theory and Phase Envelopes.
- Hydrate Prediction, Prevention, and Remediation Strategies.
- Wax Deposition Mechanisms and Wax Appearance Temperature (WAT).
- Wax Management using Thermal and Chemical Methods.
- Asphaltene Precipitation, Deposition, and Control.
- Inorganic Scale Formation and Inhibition Techniques.
- Sand Management and Erosion Prediction.

Unit Three: Liquid Management and Dynamic Phenomena

- Understanding Hydrodynamic and Terrain-Induced Slugging.
- Slug Prediction, Characterization, and Control Strategies.
- Use of Slug Catchers and Riser-Based Mitigation.
- Liquid Loading in Gas Wells and Pipelines.
- Emulsion Formation and Separation Challenges.
- Foaming Issues in Production Systems.
- Pigging Operations and Strategies in Multiphase Pipelines.

Unit Four: Corrosion, Erosion, and Simulation Tools

- Mechanisms of Corrosion in Multiphase Environments (CO2, H2S).
- Corrosion Modeling and the Role of Flow Dynamics.
- Erosion Prediction and Sand Production Management.
- Principles of Material Selection for Multiphase Systems.
- Introduction to Steady-State Multiphase Flow Simulation.
- Fundamentals of Transient Multiphase Flow Simulation (e.g., OLGA, LedaFlow concepts).
- Application of Simulators for Flow Assurance Studies.

Unit Five: Integrated Flow Assurance and Advanced Topics

- Developing an Integrated Flow Assurance Strategy.
- Flow Assurance in System Design and Architecture.
- Operational Flow Assurance and Production Chemistry Management.
- Monitoring and Surveillance Techniques.
- Challenges in Deepwater and Subsea Production Systems.
- Flow Assurance for Heavy Oil and Unconventional Resources.
- Future Trends and Innovations in Flow Assurance Technology.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Considering the increasing complexity of deepwater and unconventional fields, how might machine learning and AI transform predictive flow assurance modeling beyond current simulation capabilities?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by adopting a holistic, lifecycle-based approach to flow assurance, moving beyond isolated theoretical topics to present an integrated view of design, operation, and asset integrity. While many courses focus narrowly on either simulation or chemistry, this program synthesizes these critical areas, demonstrating how fluid behavior, material science, and operational strategy are interconnected. We emphasize the practical application of knowledge through extensive use of real-world case studies, covering a wide spectrum of challenges from deepwater Gulf of Mexico to onshore unconventional plays. This allows participants to analyze past failures and successes, fostering critical thinking and robust problem-solving skills. The curriculum is uniquely structured to build a strong foundational understanding before tackling advanced mitigation and management strategies. Rather than merely teaching how to use software, we focus on interpreting the results and making sound engineering judgments. The interactive methodology ensures that participants learn not only from the expert instructor but also from the diverse experiences of their peers, creating a rich and collaborative learning environment that prepares them for immediate application of their new skills.