BLACKBIRD FOR TRAINING

Refinery Process Simulation and Optimization with Petro-SIM Training Course



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Introduction:

This Refinery Process Simulation and Optimization with Petro-SIM Training course equips you to construct rigorous refinery flowsheets, reconcile operating data, and maximise unit margins across one week. You will build an operational Refinery Unit Process Simulation and Optimization Model incorporating calibrated thermodynamics, distillation column hydraulic ratings, and real-time plant twin interfaces. You need a foundational background in chemical engineering principles and basic refinery operations, as this practitioner course moves straight into simulation configuration. You will practise through a modelling build, solving steady-state mass balances and tuning unit parameters directly within Petro-SIM.

Course Objectives:

- Build thermodynamic property packages and crude assay characterisations using Petro-SIM and Multiflash for crude distillation units.
- Draft rigorous column fractionation flowsheets using SAEP-364 simulation standards and SAES-C-001 tray rating criteria.
- Score heat exchanger network performance and fouling margins using CAPE-OPEN rating interfaces across preheat trains.
- Run reactor kinetic yield calculations and catalyst decay profiles using Petro-SIM hybrid modeling routines.
- Test plant debottlenecking scenarios and process simulation twin links using OSIsoft PI Asset Framework data streams.

Target Audience:

- You model refinery unit operations and evaluate plant debottlenecking opportunities within technical service teams.
- You monitor daily process unit performance and troubleshoot distillation cut points within refinery operations.
- You design chemical process equipment modifications and verify piping hydraulic limits within engineering consultancies.
- You configure digital plant twins and reconcile plant historian telemetry within site digitalisation groups.



Course Outline:

Day 1: Characterising Crude Assays and Configuring Thermodynamic Packages

- Defining hydrocarbon fluid packages using Petro-SIM equation of state models
- Characterising crude assay cut points using Multiflash PVT distillation curves
- Reconciling laboratory distillation test data using Petro-SIM assay management tools
- Validating physical property generation using CAPE-OPEN thermodynamic interface protocols
- Build: Calibrated Crude Assay and Thermodynamic Characterisation Package

Day 2: Developing Fractionation Flowsheets and Standard Column Hydraulics

- Structuring atmospheric distillation column flowsheets using SAEP-364 simulation guidelines
- Sizing internal fractionation packing configurations using SAES-C-001 tray rating criteria
- Evaluating liquid-vapour separator capacities using SAES-D-001 pressure vessel standards
- Balancing pumparound heat duties using Petro-SIM rigorous column solver specifications
- Build: Atmospheric Distillation Column and Fractionation Simulation Model

Day 3: Modelling Heat Exchanger Networks and Hydraulic Bottlenecks

- Tracking crude preheat exchanger fouling using CAPE-OPEN rating software tools
- Sizing process pipeline hydraulic constraints using SAES-L-100 piping design criteria
- Evaluating pump and compressor curves using Petro-SIM rotating equipment utilities
- Analysing relief load parameters using SAEP-302 engineering waiver documentation workflows
- Build: Heat Exchanger Network Fouling and Debottlenecking Analysis Model

Day 4: Optimising Reactor Kinetics and Integrating Hybrid Models

- Simulating hydrotreater catalyst deactivation rates using Petro-SIM conversion reactor modules
- Tuning kinetic yield estimations using hybrid machine learning simulation algorithms
- Investigating process upset scenarios using Petro-SIM case study generator tools
- Integrating site historian tag telemetry using OSIsoft PI Asset Framework
- Build: Reactor Kinetic Decay and Hybrid Process Simulation Model

Day 5: Executing Modelling Builds and Finalising Simulation Deliverables

- Reconciling plant baseline mass balances using Petro-SIM data regression utilities
- Simulating real-time operating parameters using online process simulation twin architectures
- Sizing field debottlenecking equipment modifications using SAEP-364 compliance reporting templates
- Optimising plant operating margins using Petro-SIM multi-variable flowsheet optimiser tools
- Build: Refinery Unit Process Simulation and Optimization Model



Skills You Will Gain:

- Petro-SIM Flowsheet Configuration
- Multiflash Fluid Characterisation
- CAPE-OPEN Interface Integration
- Distillation Column Hydraulic Rating
- Heat Exchanger Fouling Assessment
- Hybrid Machine Learning Modelling
- Process Simulation Twin Interfacing

Why Attend This Course:

- Build a robust Refinery Unit Process Simulation and Optimization Model that predicts product yields and unit operating margins under fluctuating feedstock conditions.
- Characterise complex hydrocarbon assays accurately by coupling Multiflash equation of state routines with Petro-SIM thermodynamic property packages.
- Evaluate unit debottlenecking constraints directly against established equipment design standards including SAES-C-001 and SAES-D-001.
- Bridge offline simulation models with real-time operations by streaming plant historian telemetry through the OSIsoft PI Asset Framework.

Conclusion:

On your first week back, you will deploy the Refinery Unit Process Simulation and Optimization Model to benchmark your unit's current operating envelope against live plant parameters. You will present the validated flowsheet balances and debottlenecking calculations to your process engineering superintendent, technical services manager, and operations team for formal technical review. Following its initial operational use, you will check the model's predicted product yields and column hydraulic loadings against laboratory sample data to verify convergence accuracy.

Frequently Asked Questions FAQ:

What will you be able to do after the Refinery Process Simulation and Optimization with Petro-SIM Training?

You will be able to construct rigorous refinery flowsheets, characterise crude assays, evaluate column hydraulics, and execute unit optimisation studies in Petro-SIM. You will also connect steady-state models to historian data streams to diagnose operational bottlenecks and predict product yields accurately.



What do you need to know before starting the Refinery Process Simulation and Optimization with Petro-SIM Training?

You need a foundational understanding of chemical engineering unit operations, fluid mechanics, and basic hydrocarbon refining processes. Prior exposure to general process engineering calculations is recommended, though previous experience with Petro-SIM software is not required, as simulation workflows are guided from foundational setup.

What do you build during the Refinery Process Simulation and Optimization with Petro-SIM Training?

You build a fully converged Refinery Unit Process Simulation and Optimization Model. This deliverable includes customised crude assay characterisations, rigorous distillation column hydraulics, heat exchanger network rating sheets, reactor yield decay models, and debottlenecking evaluation cases that align with industrial engineering standards.

How does the Refinery Process Simulation and Optimization with Petro-SIM Training differ from a course on a neighbouring subject or at another level?

This course focuses specifically on hands-on refinery flowsheet design, equipment rating, and online twin interfacing using Petro-SIM. Rather than covering generic chemical engineering theory or broad plant operations, this training provides practitioner-level skills for rigorous unit modeling, debottlenecking, and multi-variable optimization.

