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# Advanced Refinery Modeling and Optimization Training Course Using Petro-SIM

10 – 14 January 2027
Muscat

# Advanced Refinery Modeling and Optimization Training Course Using Petro-SIM

**Ref:** 701_26254 **Date:** 10 – 14 January 2027 **Location:** Muscat **Fees:** 6500 GBP

Advanced Refinery Modeling and Optimization Training Course Using Petro-SIM is a 1-week training course for process simulation engineers, refinery yield accountants and production planners who calibrate digital twins and update LP vectors, and it produces a rigorous refinery simulation and LP update dossier. Crudes now fluctuate constantly in sulphur and heavy ends while decarbonisation limits site energy, so engineers who align non-linear reactor kinetics with commercial planning tools decide plant profitability. Jupiter Prime Training delivers this advanced refinery modeling and optimization training course using Petro-SIM.

## Why Refinery Modeling and Optimization Using Petro-SIM Matters Now

Refinery economics depend on the fidelity between commercial planning predictions and physical unit performance. As crude slates shift towards heavily discounted opportunity crudes, commercial planners and operations teams face rapid swings in furnace duty, hydrogen consumption and catalyst deactivation. Without kinetic simulation to translate unit limits into production plans, facilities suffer yield give-away, off-spec bunker blending and unexpected emissions spikes. The course grounds digital flowsheet modelling in ASTM International crude assay distillation methods ASTM, the American Petroleum Institute Technical Data Book API TDB physical properties methods, and the International Organization for Standardization energy management system standard ISO 50001:2018 ISO 50001.

## Who Gains Most from Refinery Modeling and Optimization Using Petro-SIM

- Engineers who build and tune non-linear unit models against plant historian data
- Yield specialists who reconcile operating mass balances and track unmeasured losses
- Planning analysts who translate process unit limits into linear programming vectors
- Operations technologists who troubleshoot catalyst cycle life and fractionator hydraulic constraints

Technical services, planning and operations groups in downstream refining and integrated petrochemicals gain most when process engineers and linear programming planners attend together, because they eliminate yield discrepancies between planning models and physical assets.

## Refinery Modeling and Optimization Using Petro-SIM Capabilities

Participants master the simulation workflows required to model complex unit operations, reconcile plant balances and generate predictive planning updates.

- Calibrate crude distillation column hydraulics and assay cut points — operations superintendents
- Reconcile unit heat and material balances against distributed control system historians — yield accounting leads
- Model kinetic reactions across catalytic cracking and hydroprocessing units — catalyst management specialists
- Generate non-linear delta-base vectors for linear programming blend models — commercial planning teams
- Optimise steam, hydrogen and fuel gas balance networks — energy management committees
- Quantify margins for processing unconventional opportunity crude slates — crude procurement managers

## Key Refinery Modeling and Optimization Using Petro-SIM Terms

- Assay characterisation — the mathematical breakdown of crude oil distillation and analytical data into pseudo-components for thermodynamic simulation.
- Kinetic reactor model — a mathematical representation of chemical transformation rates used to predict product yields across changing catalyst conditions and operating temperatures.
- Delta-base vector — a set of linear tuning coefficients supplied to planning software to adjust baseline yields for changes in unit feed quality.
- Data reconciliation — a statistical technique that adjusts redundant plant measurements to enforce rigorous conservation of mass and energy across a flowsheet.
- Hydraulic rating — the calculation of tray or packing vapour-liquid traffic to identify downcomer choke, weeping and flooding limits.
- Submodel tuning — the calibration of individual unit simulation models against recent test run data before exporting updated yield curves.

## Refinery Modeling and Optimization Using Petro-SIM Day by Day

## Day 1: Crude Characterisation and Baseline Flowsheet Architecture

- Crude Assay Management — Reconciling Laboratory Distillation Curves with Pseudo-Component Property Cuts
- Equation of State Selection — Choosing Thermodynamic Packages for High-Pressure Hydrocarbon Systems
- Feed Blending Simulation — Evaluating Opportunity Crude Incompatibility and Sludge Formation Risks
- Baseline Unit Mass Balancing — Filtering Plant Historian Noise to Establish Steady-State Flowsheets
- Assay Library Generation — Supplying Characterised Crude Streams for Downstream Conversion Units

## Day 2: Fractionation Columns and Hydraulic Rating

- Atmospheric Distillation Tower Modelling — Calibrating Pumparound Duties and Side-Stripper Vapour Traffic
- Vacuum Tower Elevation Analysis — Preventing Deep-Cut Thermal Cracking and Metallurgical Stress
- Column Internal Hydraulic Rating — Predicting Sieve Tray Flooding and Pressure Drop Bottlenecks
- Distillate Cut-Point Sensitivity Studies — Shifting Diesel and Jet Fuel Yields for Seasonal Demand
- Heat Integration Pinch Analysis — Minimising Primary Furnace Firing to Reduce Carbon Intensity

## Day 3: Kinetic Conversion Units and Reactor Calibration

- Fluid Catalytic Cracker Modelling — Tuning Catalyst Stripper and Regenerator Balances Against Flue Gas
- Hydrocracker Kinetic Reactor Calibration — Predicting Hydrogen Consumption and Distillate Selectivity Shifts
- Catalytic Reforming Severity Analysis — Balancing High-Octane Reformate Yields Against Hydrogen Production Rates
- Diesel Hydrotreater Kinetic Tracking — Projecting Catalyst Deactivation and Sulphur Slip Over Operating Cycles
- Delayed Coker Yield Estimation — Optimising Quench Cycles and Overhead Liquid Product Recovery

## Day 4: Utility Networks and Planning Submodel Integration

- Refinery Steam Network Balancing — Managing Boiler Feedwater Demands and Co-Generation Turbine Dispatch
- Hydrogen Distribution Network Simulation — Resolving Header Pressure Constraints and Purge Gas Losses
- Fuel Gas System Enthalpy Tracking — Controlling Low-NOx Burner Operating Envelopes Across Variable Compositions
- Non-Linear Delta-Base Vector Extraction — Calibrating Linear Programming Submodels for Planning Accuracy
- Utility Cost Attribution Modelling — Allocating Energy Consumption to Individual Process Processing Units

## Day 5: Practising Site-Wide Simulation and LP Vector Updates

- Day Two Fractionation Column Adjustments — Aligning Crude Unit Pumparounds to Feed Quality Changes
- Day Three Reactor Kinetic Alignments — Updating Conversion Yield Vectors Across Multiple Operating Severities
- Day Four Utility Network Feedback Loops — Reconciling Fuel Gas and Steam Demands with Plant Constraints
- Multi-Unit Distillation and Conversion Simulation — Running Integrated Site Scenarios Under Opportunity Feed Disruption
- Rigorous Refinery Simulation and LP Update Dossier — Finalising Validated Yield Vectors and Process Constraint Tables

## Applying Refinery Modeling and Optimization Using Petro-SIM After the Course

- Reconcile current plant historian data across a crude distillation unit to recalibrate column pumparound duties and tray rating profiles in Petro-SIM.
- Generate updated delta-base yield vectors from a calibrated hydroprocessing reactor model and export them to commercial linear programming planning decks.

## Refinery Modeling and Optimization Using Petro-SIM Questions FAQ

### What is refinery modeling and optimization using Petro-SIM and why does it matter now?

It is the process of creating high-fidelity, thermodynamics-based digital representations of refining assets to simulate yields, hydraulics and utility demands. It matters now because crude quality volatility and energy transition targets require operations to push unit constraints safely without sacrificing high-value product yields.

### Which roles gain most from refinery modeling and optimization using Petro-SIM?

Process simulation engineers, yield accounting specialists, operations technologists and production planning analysts gain most. Technical services leaders and linear programming coordinators also benefit by acquiring validated kinetic models that reflect genuine operating limits rather than static historical averages.

### How does refinery modeling and optimization using Petro-SIM differ from a linear programming course?

This course builds rigorous non-linear thermodynamic and kinetic flowsheet models reflecting physical equipment limits. A linear programming course focuses on linear economic optimisation algorithms for commercial planning, relying on the vectors and constraint limits that kinetic simulation models generate.

## What do you bring back from refinery modeling and optimization using Petro-SIM?

You bring back a rigorous refinery simulation and LP update dossier containing calibrated unit models, verified constraint envelopes and non-linear yield vectors, ready to update planning matrices and guide operations in your facility.

## Refinery Modeling and Optimization Using Petro-SIM: The Way Forward

The rigorous refinery simulation and LP update dossier first informs the crude purchase evaluation and unit run plan for the upcoming operating cycle. Process engineering leads, commercial planners and operations superintendents use it to agree realistic unit throughput limits and hydrogen balances. After its first planning cycle, revisit whether actual yields matched simulated predictions, adjusting kinetic severity vectors where feed quality varied.