

# Advanced Nodal Analysis and Well Performance Training Course

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Johannesburg

AGILE LEADERS
Training Center

# Advanced Nodal Analysis and Well Performance Training Course

**Ref:** 2032_249438 **Date:** 5 – 16 September 2027 **Location:** Johannesburg **Fees:** 10000 Euro

## Overview

Advanced Nodal Analysis and Well Performance Training Course is a two-week course for production engineers, petroleum engineers, well performance specialists, artificial lift engineers, and asset teams who leave with an Integrated Well Performance Diagnosis and Optimization Pack. Participants connect inflow performance, vertical lift performance, fluid behavior, wellbore pressure losses, and surface constraints in a calibrated production-system model. The course converts surveillance data into defensible intervention and operating decisions. Agile Leaders Training Center presents this course on advanced nodal analysis and well performance.

## Who Should Attend

- Teams responsible for production-system modeling and well deliverability
- Functions responsible for production surveillance and performance diagnostics
- Personnel responsible for artificial lift design and operating changes
- Groups responsible for well interventions and production enhancement
- Asset teams responsible for integrated reservoir-to-surface decisions

The course assumes participants can interpret well, pressure, rate, completion, and fluid data at work; it leaves out introductory petroleum engineering and basic fluid mechanics.

## Departments and Industries

The course supports departments and industries that manage fluid production through wells and connected surface systems.

- Oil and gas production engineering departments
- Reservoir and well performance teams
- Artificial lift and well intervention groups
- Geothermal production and operations teams
- Subsurface consulting and energy service companies
- Asset optimization and operations functions

## Learning Objectives

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

- Build an integrated nodal analysis model
- Analyze IPR and VLP curve intersections
- Diagnose reservoir, wellbore, and surface constraints
- Evaluate fluid, completion, choke, and lift sensitivities
- Prioritize production optimization and intervention options
- Use surveillance evidence to calibrate recommendations

## Course Agenda

### Day 1: Frame the Production System

- Reservoir-to-Separator Pressure Balance Map
- Nodal Analysis Node Selection Method
- Production-System Boundary Condition Register
- Energy-Loss Component Classification
- Well Deliverability Problem Definition Sheet

### Day 2: Prepare Fluid and Field Data

- PVT Input Quality Review Checklist
- Black-Oil Fluid Property Model
- Well Geometry and Completion Data Sheet
- Pressure, Rate, and Temperature Validation Method
- Production Test Reconciliation Table

### Day 3: Model Reservoir Inflow

- Productivity Index Deliverability Model
- Vogel Inflow Performance Relationship
- Gas-Well Backpressure Deliverability Method
- Composite IPR Construction for Multiphase Wells
- Reservoir Pressure and Skin Sensitivity Matrix

### Day 4: Calculate Vertical Lift Performance

- Multiphase Pressure-Gradient Calculation
- Hydrostatic, Friction, and Acceleration Loss Profile
- Flow-Regime and Holdup Correlation Review
- Vertical Lift Performance Curve Construction
- Wellhead Pressure Boundary Sensitivity

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## Day 5: Diagnose the Operating Point

- IPR-VLP Operating Point Intersection
- Stable and Unstable Flow Diagnostic
- Tubing Diameter Sensitivity Plot
- Choke Performance and Backpressure Model
- Reservoir-Well-Surface Bottleneck Map

## Day 6: Build and Calibrate the Model

- Steady-State Well Model Architecture
- Measured Pressure Traverse Match
- Flow Correlation Selection Protocol
- Model Calibration Error Register
- Uncertainty and Assumption Control Log

## Day 7: Evaluate Natural-Flow Options

- Completion Restriction Sensitivity Analysis
- Water Cut and Gas-Liquid Ratio Scenario Grid
- Separator Pressure Debottlenecking Case
- Tubing and Choke Change Comparison
- Natural-Flow Intervention Ranking Matrix

## Day 8: Integrate Artificial Lift

- Gas-Lift Injection Sensitivity Curve
- Electric Submersible Pump Operating Envelope
- Lift-System Interaction with IPR and VLP
- Artificial Lift Constraint Register
- Lift Option Screening Decision Matrix

## Day 9: Link Surveillance to Decisions

- Well Performance Surveillance Dashboard
- Model-to-Test Variance Diagnostic
- Production Opportunity Register
- Intervention Value and Feasibility Matrix
- Operating Recommendation Evidence Pack

## Day 10: Practice Integrated Well Optimization

- Suggested Exercise: Validate a Well Data Set
- Suggested Exercise: Match an IPR-VLP Model
- Suggested Exercise: Diagnose a Production Constraint
- Suggested Exercise: Rank Lift and Debottlenecking Options
- Capstone Exercise: Present an Integrated Well Performance Diagnosis and Optimization Pack

## Practical Exercises

The course uses suggested activities to turn production data and model results into traceable field decisions.

- Suggested activity: assemble PVT, completion, pressure, rate, and temperature inputs and document data-quality limitations.
- Suggested activity: construct and calibrate inflow and outflow curves against a production test.
- Suggested activity: compare tubing, choke, separator-pressure, water-cut, and artificial-lift sensitivities.
- Suggested activity: prioritize operating changes and interventions using technical evidence, uncertainty, and feasibility.

## FAQs

### Who suits advanced nodal analysis and well performance training, and what does it assume?

Production and petroleum engineers, well performance specialists, artificial lift engineers, and integrated asset teams suit the training. It assumes working ability with well, pressure, rate, completion, and fluid data.

### How does advanced nodal analysis differ from introductory well performance training?

Advanced nodal analysis emphasizes calibrated reservoir-to-surface models, sensitivity analysis, artificial lift interactions, uncertainty, bottleneck diagnosis, and decision evidence. Introductory training generally emphasizes basic pressure-flow concepts and simple curve construction.

### How do IPR and VLP determine a well operating point?

The IPR and VLP curves intersect where reservoir inflow equals the production system outflow capacity. Changes in reservoir pressure, fluids, tubing, choke, lift, or backpressure move the curves and alter the predicted rate.

## How is a nodal analysis model calibrated with field data?

A nodal analysis model is calibrated by reconciling geometry, PVT, production tests, pressures, temperatures, and flow correlations, then documenting residual error and uncertainty before sensitivity cases are accepted.

## How does nodal analysis support production optimization?

Nodal analysis separates reservoir, wellbore, completion, lift, and surface effects so teams can locate constraints, compare feasible changes, and rank interventions using a consistent pressure-flow model.

## Conclusion

Participants take an Integrated Well Performance Diagnosis and Optimization Pack back to their organization. It links validated data, calibrated IPR and VLP models, sensitivity cases, constraints, uncertainties, and ranked actions. Teams can use the pack to challenge production assumptions, select interventions, and document reservoir-to-surface operating decisions.