
Fracture Network Characterisation and Shale Reservoir Simulation Training Course

1 – 5 March 2027
Tokyo





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Programme Summary

Fracture network characterisation and shale reservoir simulation is the subject of this one-week training course for senior subsurface, reservoir engineering and asset leaders, ending in a fracture and shale model review pack for one asset. Forecasts from fractured and shale models shape well plans and reserves, yet their assumptions are seldom challenged. The programme builds a method for reading fracture data, testing dual-porosity and well models, and judging forecast uncertainty. Mars Training Centre UK delivers this programme on fracture network characterisation and shale reservoir simulation to mixed-organisation cohorts.

The Business Case

A reservoir model is a set of assumptions about rock that nobody can see. Where fracture network characterisation rests on a few image logs and a default shale well model, well plans, spacing and reserve bookings can inherit the same hidden error. Leaders who question fracture density, matrix connection and match quality can stop weak studies early and direct data acquisition to where it narrows the range most.

- Forecast Reliability: Improves when model inputs are tied to stated data and a tested range.
- Drilling and Completion Spend: Falls as weak fracture assumptions are caught before wells are committed.
- Reserves Confidence: Improves as uncertainty ranges are mapped to resource classes.

Principles and Evidence Base

- Petroleum Resources Management System: Classifying resources by uncertainty shapes the forecast review in Session 4.
- Dual-porosity model of Warren and Root: Separating matrix storage from fracture flow gives the dual-continuum logic of Session 2.
- Discrete fracture network modelling: Building fracture sets from image and core data structures Sessions 1 and 2.
- Rate transient analysis: Reading flow regimes from production data guides the shale well review in Session 3.



Intended Participants

- Subsurface managers who sign off reservoir studies.
- Reservoir engineering leaders who review simulation models.
- Asset managers who commit wells on model forecasts.
- Geoscience leaders who own fracture and core interpretation.
- Reserves leaders who book resources from model results.

Typical functions include subsurface, reservoir engineering, asset management and reserves teams in operators, national companies and service firms.

Learning Outcomes

1. Participants will be able to evaluate the reliability of fracture data from logs, core and production.
2. Participants will be able to construct a fracture network and dual-porosity description for a fractured reservoir.
3. Participants will be able to diagnose flow regimes and stimulated volume in a shale well.
4. Participants will be able to prioritise the parameters that drive forecast uncertainty.
5. Participants will be able to design a history match review that exposes weak models.
6. Participants will be able to justify a forecast range to an investment committee.

Programme Structure

Day 1: Fracture Network Characterisation and Fracture Data

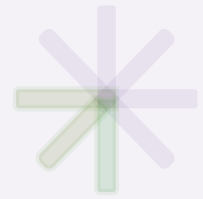
Which data show how fractures are distributed, and how reliable is each source?

- Fracture Data Reliability Matrix
- Image Log Interpretation Review
- Core and Outcrop Comparison Sheet
- Fracture Set Orientation Plot
- Matrix and Fracture Property Register

Day 2: Fracture Network Building and Dual-Porosity Models

How is a fracture system represented so that flow through it can be simulated?

- Discrete Fracture Network Template
- Dual-Porosity Parameter Worksheet
- Shape Factor Check
- Upscaling Comparison Table
- Dual-Permeability Selection Guide



Day 3: Shale Wells, Hydraulic Fractures and Flow Regimes

What do completions and production data say about the stimulated rock?

- Hydraulic Fracture Geometry Sketch
- Stimulated Volume Estimate Sheet
- Flow Regime Diagnostic Plot
- Well Interference Check
- Completion Sensitivity Table

Day 4: History Match, Uncertainty and Forecast Range

How wide should the forecast range be, and which assumption drives it?

- History Match Quality Checklist
- Parameter Screening Chart
- Uncertainty Range Table
- Forecast Ensemble Summary
- Resource Class Mapping Sheet

Day 5: Applying the Tools to One Asset

Do the fracture, model and forecast tools support one defensible decision?

- Applying the Session 1 Fracture Data Reliability Matrix
- Using the Session 2 Dual-Porosity Parameter Worksheet
- Testing the Session 3 Flow Regime Diagnostic Plot
- Checking the Session 4 Uncertainty Range Table
- Completing the Model Review Pack

Methodology

The programme uses a data workshop method built on anonymised image log summaries, core descriptions, production histories and model inputs from fractured carbonate and shale assets. Participants work in peer groups on a shared asset dataset, challenge each other's models and receive written facilitator feedback. Each exercise set uses a common template so results can be compared across the group.

- Suggested activity: Ranking three fracture data sources by reliability and defending the order.
- Suggested activity: Reading a shale well production plot to name its flow regime.
- Suggested activity: Challenging a history match that fits the data for the wrong reason.



Capstone Output

Each participant completes a fracture and shale model review pack for one asset. It holds a fracture data reliability matrix, a dual-porosity parameter worksheet, a flow regime diagnostic plot, an uncertainty range table and a recommendation. The pack is used at work to question model assumptions and brief the investment committee.

Frequently Asked Questions

Is fracture network characterisation and shale reservoir simulation suitable for leaders who are not modellers?

Yes. Fracture network characterisation and shale reservoir simulation assumes some subsurface or asset experience and builds review skills step by step.

Which models does fracture network characterisation and shale reservoir simulation rest on?

Fracture network characterisation and shale reservoir simulation rests on the Petroleum Resources Management System, the dual-porosity model of Warren and Root, discrete fracture network modelling and rate transient analysis.

How is the pack from fracture network characterisation and shale reservoir simulation used at work?

You use the model review pack to question model assumptions, direct data acquisition and brief your investment committee on forecast range.

How does fracture network characterisation and shale reservoir simulation differ from general reservoir engineering training?

Fracture network characterisation and shale reservoir simulation centres on fractured and shale systems and their uncertainty, while general reservoir engineering training centres on conventional flow and recovery methods.