

ENABLE

History Matching & Uncertainty Analysis

Reservoir Performance Prediction

Field Appraisal..Brown Field Development...
History Matching...Reservoir Optimisation...
Geological Uncertainty...

ENABLE provides mathematical support to reservoir engineers in their use of reservoir simulation software. This support allows engineers to complete tasks like history matching much more quickly than using the simulator on its own, and also provides a more rigorous approach to predicting future reservoir performance, or optimising field development.

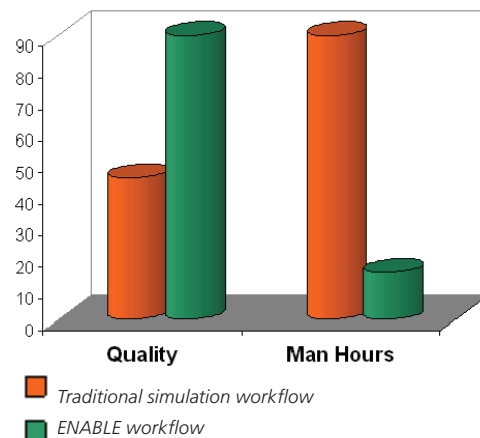
IN SUMMARY

- ENABLE works with Tempest MORE, ECLIPSE* 100 & 300, Nexus/VIP* & many proprietary reservoir simulators. It can also link to Roxar's RMS and Schlumberger's Petrel geomodelling software to investigate geological uncertainty.
- ENABLE can be used at any stage of a field's life, from bid appraisal to abandonment, whether production data is available or not.
- ENABLE speeds up the history matching process, typically by a factor of 4.
- ENABLE uses the Tempest VIEW interface, a powerful easy to use, memory efficient pre & post processor.
- ENABLE was commercialized in 2001 and incorporated into the Tempest portfolio in 2012. It is used by many NOCs, IOCs & independents worldwide.

*Mark of Schlumberger and Landmark

Efficient Simulation and Better Results

The graph below shows a client's analysis of using ENABLE with the simulator. ENABLE was tested on 3 different history matching projects and comparisons made between the client's traditional simulation workflow and the ENABLE workflow. For model quality and time used to complete the projects. It clearly shows a reduction in time taken and improvement in quality of data.



How does ENABLE work?

The reservoir engineer uses ENABLE to drive the reservoir simulation process. In a traditional workflow, the engineer will manually vary a few parameters before a simulation run. Using ENABLE, the engineer sets up the full range of parameters and their distributions at the outset. ENABLE will then intelligently manage the simulator so that it focuses on areas with the greatest uncertainty. With each run, ENABLE adds to its knowledge of the reservoir. At the same time, it builds a mathematical proxy model which mimics reservoir behaviour. The proxy technique is unique to ENABLE and allows the investigation of thousands of scenarios, instead of the few simulations that the manual workflow permits.

Field Appraisal

In this setting, data is relatively limited, but ENABLE can facilitate a full and rigorous analysis of all scenarios, which gives better prediction and lowers the risk of costly retro-fitting in the future.

Brown Field Development - Beyond the History Match

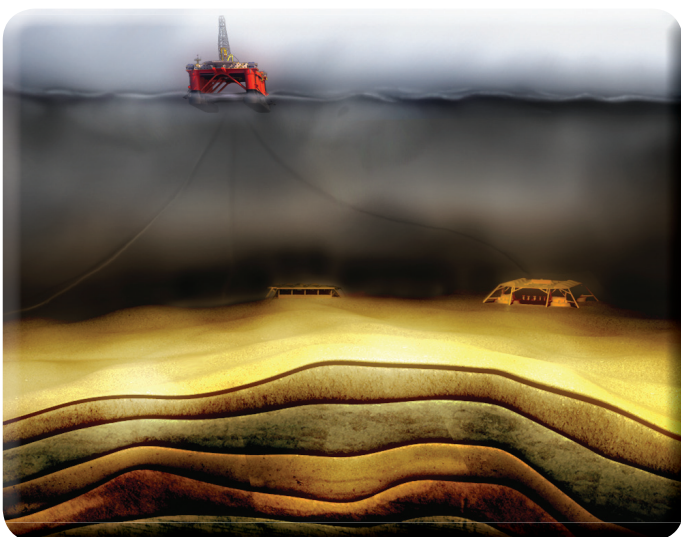
In a mature reservoir setting, the history match tends to dominate the engineer's simulation tasks. Time constraints mean that prediction is often based on a few cases. Like other assisted history matching tools, ENABLE substantially speeds up the history match process, typically by a factor of 4. But ENABLE is unique in that all input data can be taken automatically into the prediction phase and the proxy model technique means that few simulation runs are required to gain a good statistical measure, leading to more confident prediction. The criteria for choosing runs is based less on human influence and more on rigorous statistical analysis, making p10, p50 & p90 cases more robust. Furthermore, as production continues, un-expected results can be investigated to understand why production does not fit the most likely case.

Field Optimisation

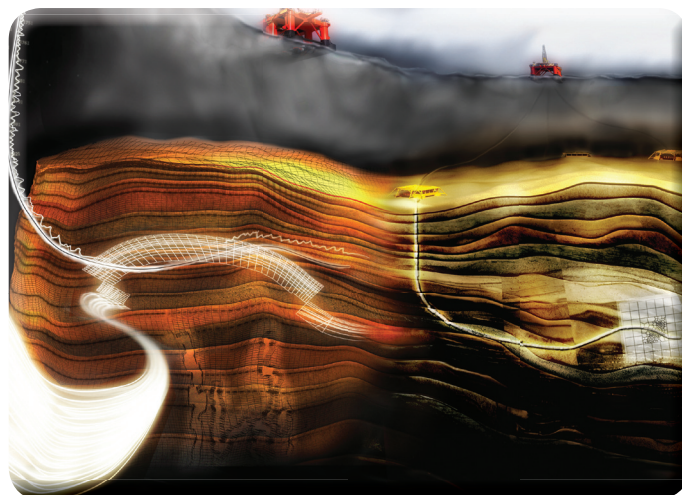
Whether production data is available or not, the same mathematical rigour can be used in reservoir optimisation, to look at a complete range of possible scenarios in future well planning, for example well locations and timings.

Geological Uncertainty

ENABLE works with Roxar's RMS and Schlumberger's Petrel to investigate geological uncertainty. The link to RMS, known as the 'Big Loop' workflow, allows ENABLE to investigate multiple geological models to give further insight into reservoir uncertainty and how it might affect production. The ENABLE link to Petrel is direct, without the need to purchase a specific plugin.



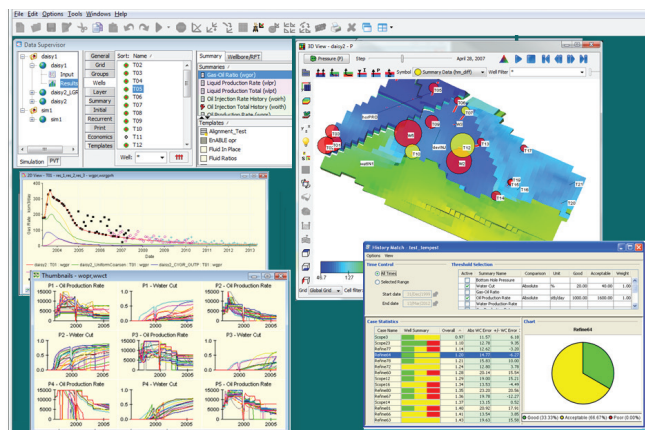
When planning new wells, ENABLE allows a fast and thorough inspection of a multitude of potential locations and timings, to help identify the best well placement.



Whatever stage of a field's life, ENABLE maximizes the information gained during simulation, to give more robust prediction of future performance.

Fast and Powerful Data Analysis

ENABLE uses the Tempest VIEW interface, a fast and memory efficient pre and post processor, capable of quickly processing results from multiple simulations consisting of millions of cells and thousands of wells. The interactive 2D & 3D plotting, use of thumbnail plots and ready access to all engineering data in both 2D and 3D provides the engineer with superior data sorting and analysis. Results Interrogation is further enhanced by the history match analysis and streamlines tools.



The Tempest VIEW interface, showing the data supervisor, 2D and 2D thumbnail plots, the history match analysis panel, with corresponding 3D view of history match quality by well

For further information on Tempest ENABLE please contact us at tempest@roxar.com or go to our website www.roxarsoftware.com.