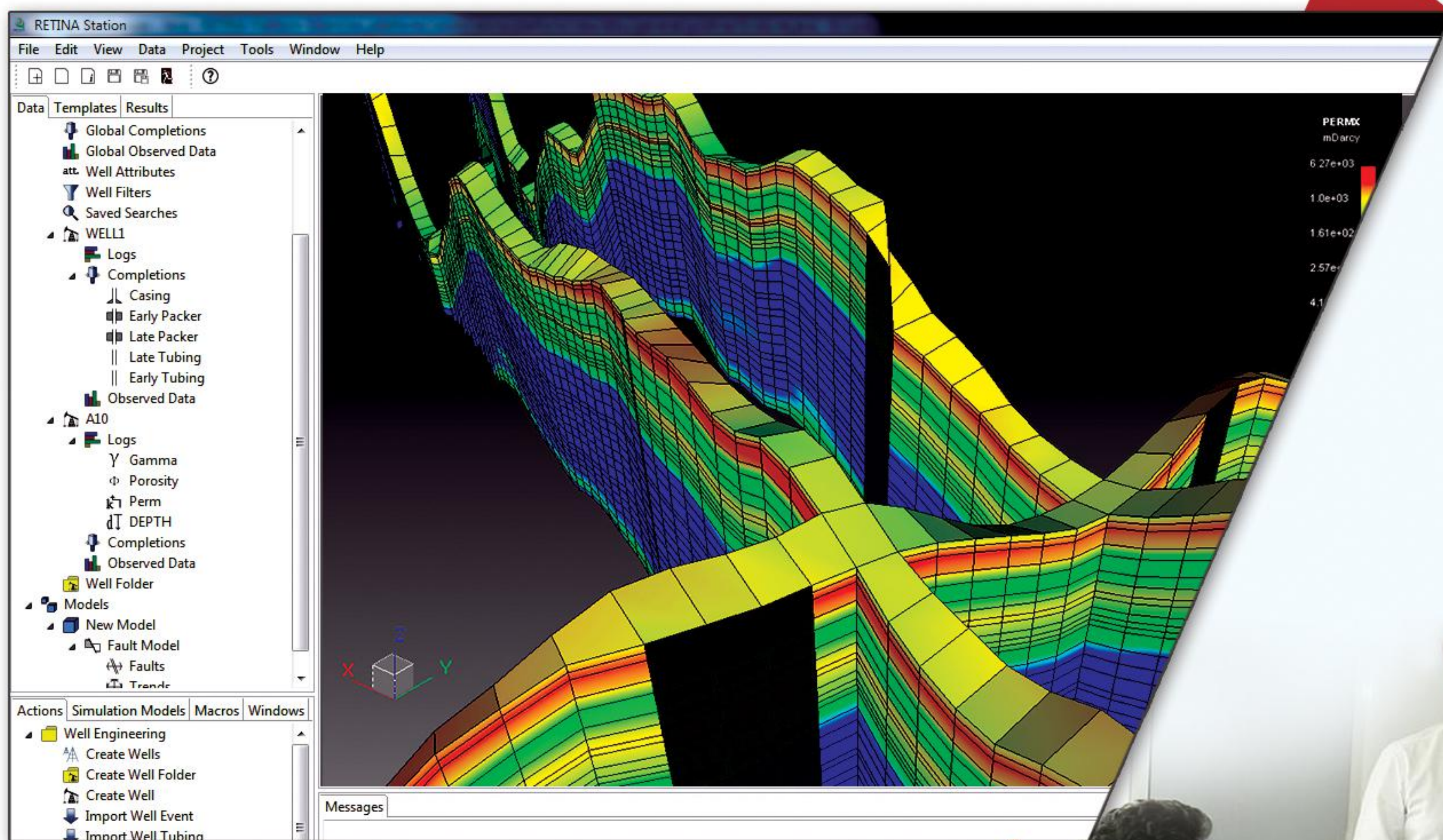


An Integrated Platform for



**RETINA
STATION**



Seismic to Simulation





Engineering Support & Technology Development

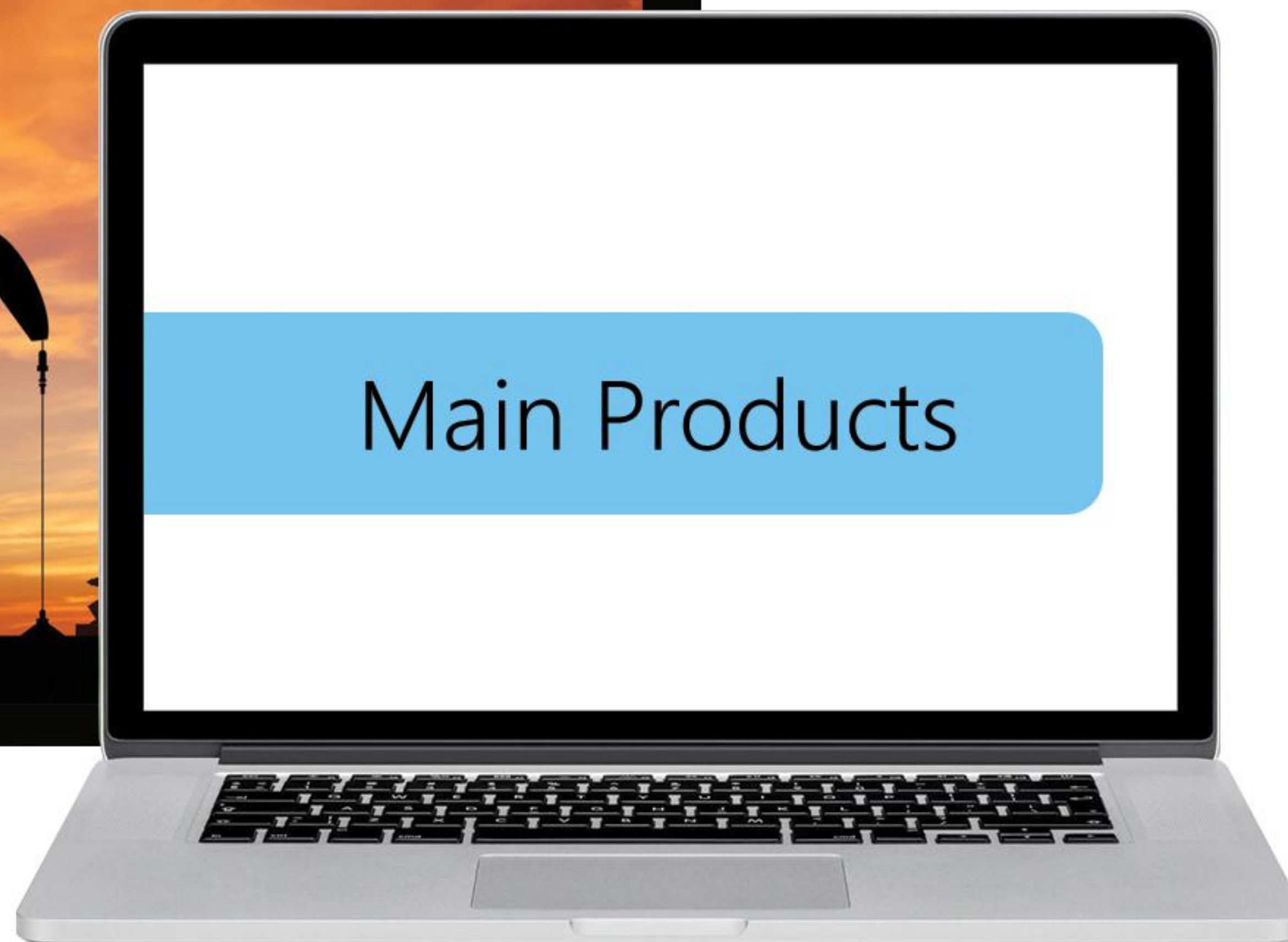
Company Brief

Founded in 2012, Engineering Support & Technology Development (ESTD) is an engineering consultation and software development company focused on upstream oil and gas section. It has developed several engineering software products including :



The main specialty of ESTD, is engineering software development which requires advanced mathematical modeling expertise and numerical analysis capabilities.

In addition to software development, and due to having access to special tools and highly educated engineers, ESTD offers several distinct and professional services. These services range from well stimulation design to non-conventional full field studies.



RETINA Simulation™ is a Black-Oil and Compositional reservoir simulation software fully developed in ESTD during the past 4 years. RETINA has been tested and certified by 4 of National Iranian Oil Company subsidiaries in cases of accuracy and stability compared to ECLIPSE 100™:

KARANJ-Asmari from National Iranian South Oil Company (NISOC), DOROUD-Asmari from Iranian Offshore Oil Company (IOOC), East PAYDAR-Asmari from Iranian Central Oil Fields Company (ICOFC) and North AZADEGAN-Sarvak from Petroleum Engineering and Development Company (PEDEC).

RETINA results have less than 5% difference compared to ECLIPSE 100 in all cases. Main features of RETINA Simulation™ are:

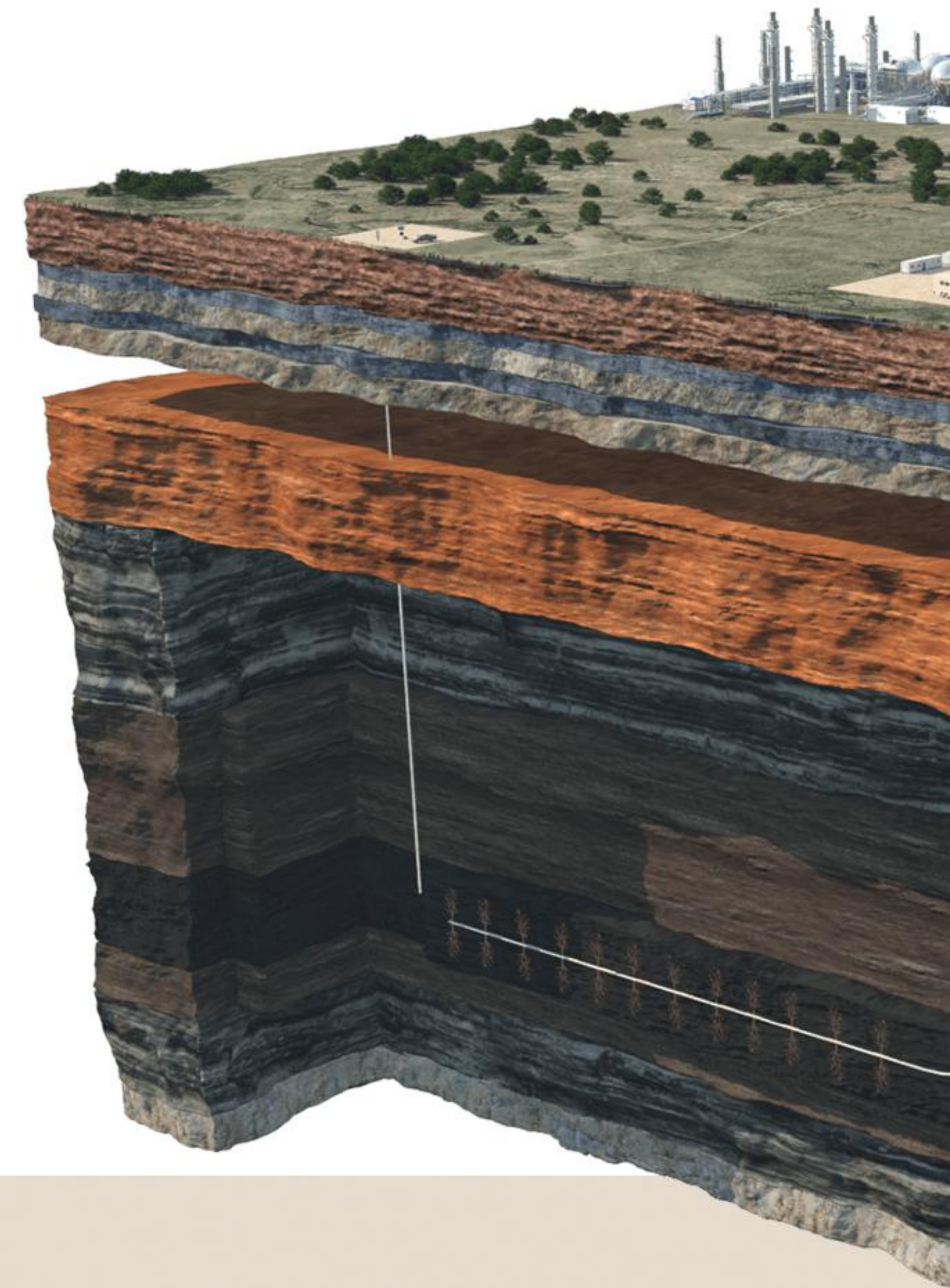
- Powerful and stable linear solver and preconditioner: CPR AMG based ILU0
- All of the non-EOR physical models of ECLIPSE 100
- Fully integrated pre and post processor capable of loading ECLIPSE 100 and 300 DATA files completely and automatically
- Equipped with real time result visualization (plot and 3D) and live update of the model



RETINA STATION

RETINA Station™ is the main platform for data management and workflow integration of the RETINA software suite. It is used to manage all the petroleum engineering data as well as to create RETINA Simulation™ cases. RETINA Station™ is developed specially for E&P companies to meet their needs in management and analysis of their data. The main features of RETINA Station™ are:

- Importing and visualizing all Well data such as path, completion, logs, core data, observed data and well test
- Filtering, correcting and creating well logs
- Importing, organizing, modifying, visualizing and exporting all the common formats of Grid data
- Importing and visualizing all dynamic reservoir data such as PVT, SCAL and VFP tables
- Property calculation, static volumetric calculation, well log filtering and calculation and generating different cross-plots
- Comprehensive and integrated platform for all seismic to simulation tools



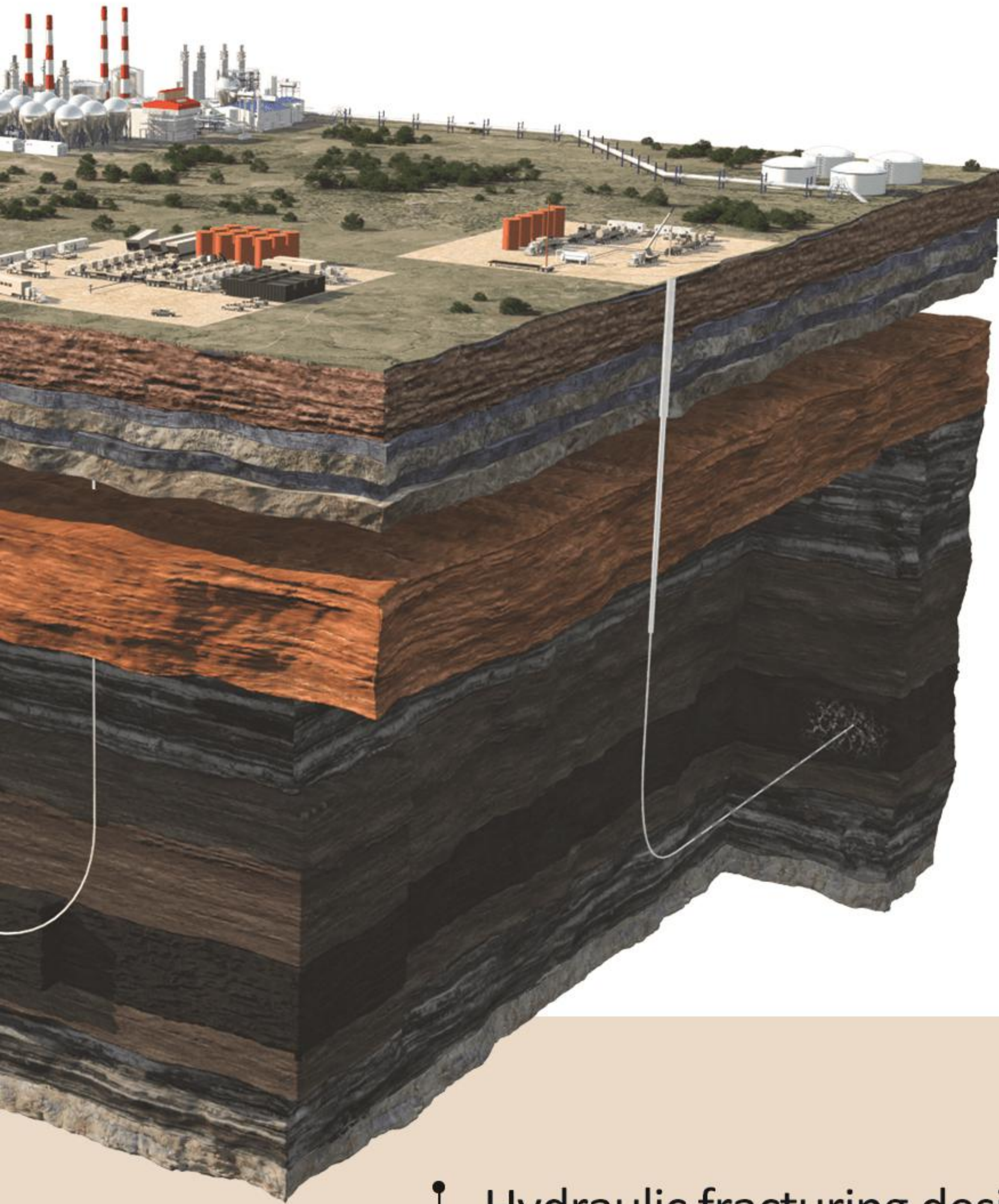
Main Services

Being composed of highly educated and talented engineers and access to their deep knowledge of physical models and numerical analysis, makes ESTD's team one of the best, most flexible and fastest consultation teams in the market. ESTD provides several specialized engineering services some of which are unique in terms of tools and workflows. •



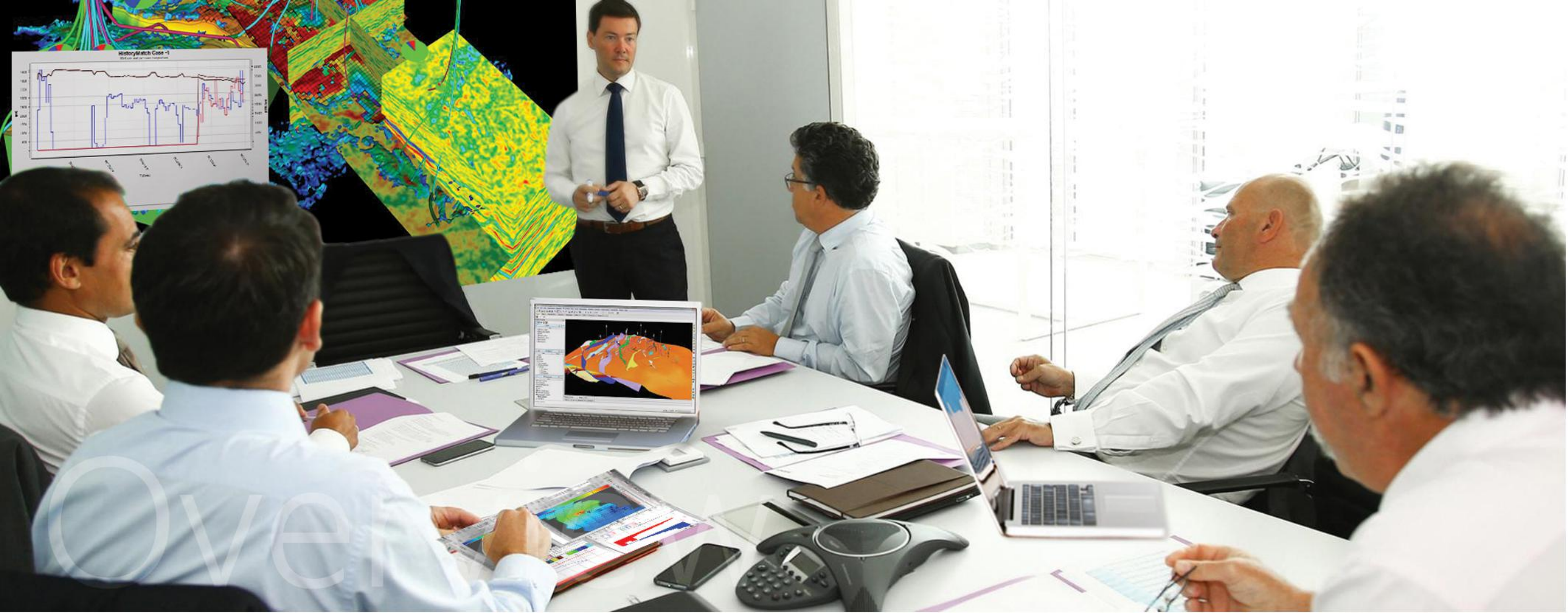
RETINA STIMULATION

RETINA Stimulation™ is a modeling tool used for designing stimulation methods and predicting perforation efficiency. It is used in real field cases to design the dynamic underbalanced perforation and propellant gas fracturing operations in the Persian Gulf region. Hydraulic Fracture design and modeling is also added to the software recently. The main features of RETINA Stimulation™ are:



- Conventional perforation prediction module
- Dynamic underbalance perforation module
- Propellant gas fracturing module
- Hydraulic fracturing module

Hydraulic fracturing design and optimization using RETINA Stimulation™
Perforation design and optimization using RETINA Stimulation™
Carbonate fractured reservoir full field study using RETINA Simulation™
Non-conventional reservoir full field study using RETINA Simulation™



Overview

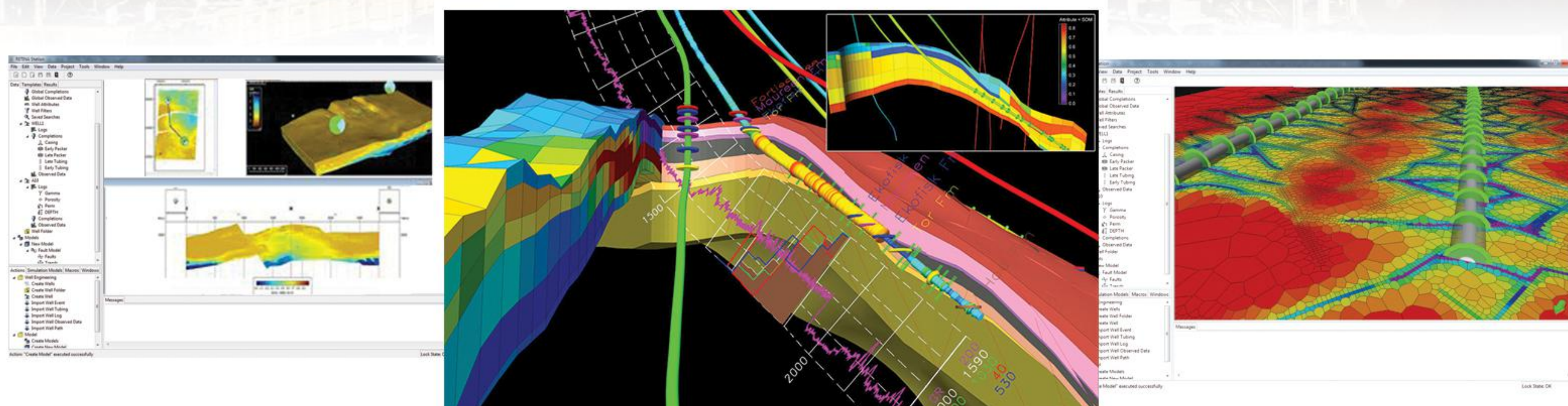
RETINA Station™ is an integrated platform for data management and engineering workflow implementation for all disciplines of field management from seismic to well log interpretation, to geological static modeling and fracture modeling, all the way to simulation and uncertainty and optimization studies. RETINA Station™ also includes workflows for well perforation and fracturing prediction, well path design and drilling parameter optimization. All the workflows are done in an integrated GUI with efficient algorithms and easy to use environment.

RETINA Station™ can be connected to a wide range of database technologies to exchange data with them; RETINA Station™ also has its own E&P customized database. Using RETINA Station™ and its customized database is an ideal comprehensive engineering/management package for big E&P companies for their valuable data management which helps them make decision faster and with more confidence.



Key features





1 Importing all types of well data in the software object model and organizing them in a database

a. Well path

b. Well completion

c. Well logs

d. Well observed data

e. Well fracture data

f. Well core data

g. Well test data

2 Production logging data

3 Drill stem test data

- 4 Repeated formation tester data
- 5 Importing all the data related to 3D grid and organizing them in a database
 - a. 3D grid with the RESCUE and ECLIPSE™ formats.
 - b. Grid properties with the RESCUE and ECLIPSE™ formats.
 - c. Fault and horizon data as surfaces (2D grid formats)
- 6 Importing all the function tables related to reservoir simulation with the ECLIPSE™ format:
 - a. PVT tables
 - b. VFP tables
 - c. Saturation functions
 - d. Compaction functions
- 7 Aquifer tables
- 8 2D and 3D visualization of all data
- 9 Plot and cross plot visualization of vector data
- 10 Intersection visualization in 3D
- 11 Well log track visualization with completion view and well correlation facilities
- 12 Calculation and visualization for all statistical information of data
- 13 Advanced organization, foldering and filtering of data
- 14 Well log, property, simulation result and surface calculator facilities with advanced functions
- 15 Calculating the STOIP using static volume calculation and dynamic material balance

- 16 Automatic fitting and smoothing the SCAL data
- 17 Correcting the PVT tables for operating conditions
- 18 Automatic RETINA Simulation™ and ECLIPSE™ case generation and simulation
- 19 Advanced post processing for RETINA Simulation™ and ECLIPSE™
- 20 Loading RETINA Simulation™ project and ECLIPSE™ data file into RETINA Station™ object model
- 21 Generating and running automatic workflows
- 22 Connecting to its native database or any other data source to exchange data



A large offshore oil rig is the central focus, featuring a complex structure of white and grey modules, yellow cranes, and a tall derrick. It is supported by a yellow jacket structure in the dark blue ocean. In the lower right, a red support vessel is visible. The sky is clear and blue.

Capabilities and Advantages

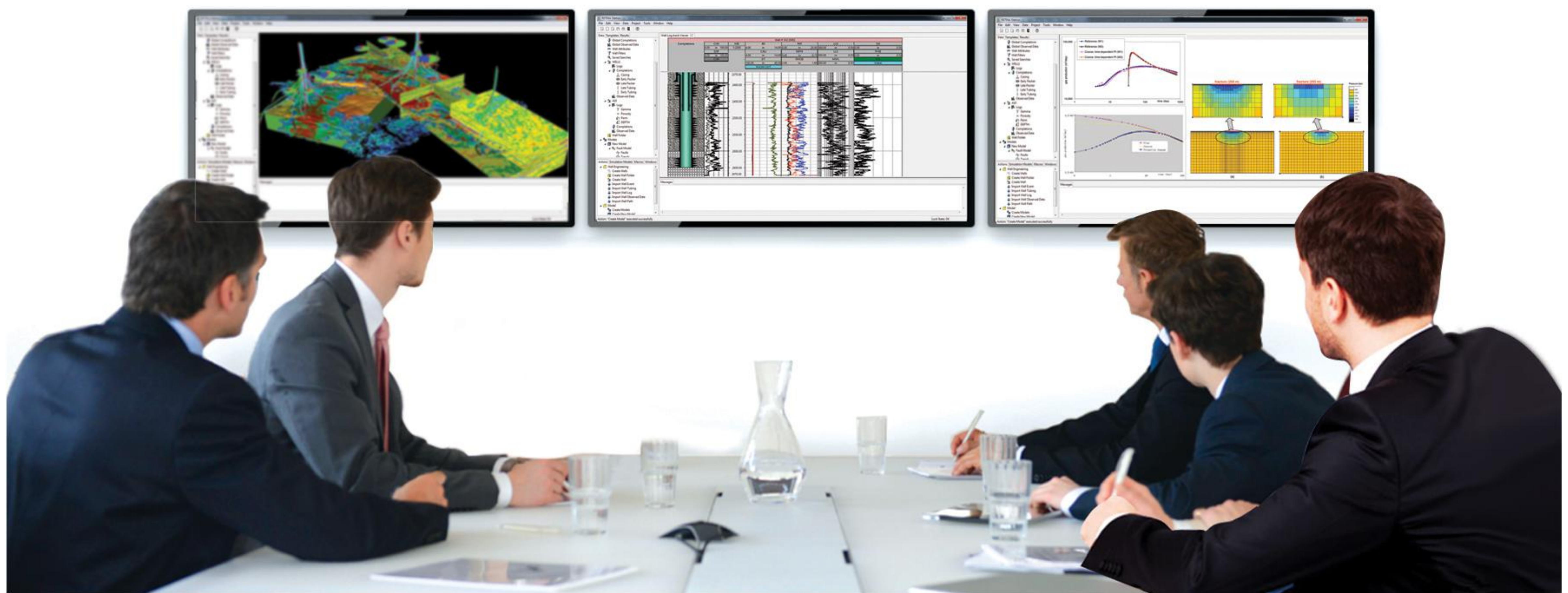


Engineering Support &
Technology Development
(ESTD)



Advanced and Efficient Data Management Capabilities

Data is the beginning of every engineering and management decision. Big E&P companies look at their data as one of their most valuable assets. RETINA Station™ helps these companies manage their data in an integrated and easy to use environment which is created to handle big data.



RETINA Station™ system resource management is efficient enough to handle lots of oil and gas field data together and at the same time manage history matching and prediction simulation runs with lots of iterations and scenarios even on a laptop computer. This makes RETINA Station™ the ideal package for big E&P corporations with lots of fields under production.



RETINA Station™ makes every type of data in the field of reservoir management available in a single package with integrated database capabilities. This feature removes the data exchange workflows between different software and lowers the cost of full field study and management. Having these key features, makes RETINA Station™ an ideal platform for doing automatic/assisted history matching, prediction under uncertainty and optimization workflows. Indeed, using the power of RETINA Simulation™ as the simulation software in this comprehensive integrated environment makes these workflows easy to perform especially for large, complex and unconventional resources.



Making Simulation Process Convenient and Joyful

- Using RETINA Station™ and RETINA Simulation™ together makes the process of reservoir full field study easier and more delightful, because by using these products together, there's only a couple of clicks between your corporation's database and your full field simulation model.
- RETINA Station™ has its own data model which is completely compatible with RETINA Simulation™ model. Therefore, having RETINA Station™ along with its database as company data management software and engineering tool makes it easy to create and run simulation models.

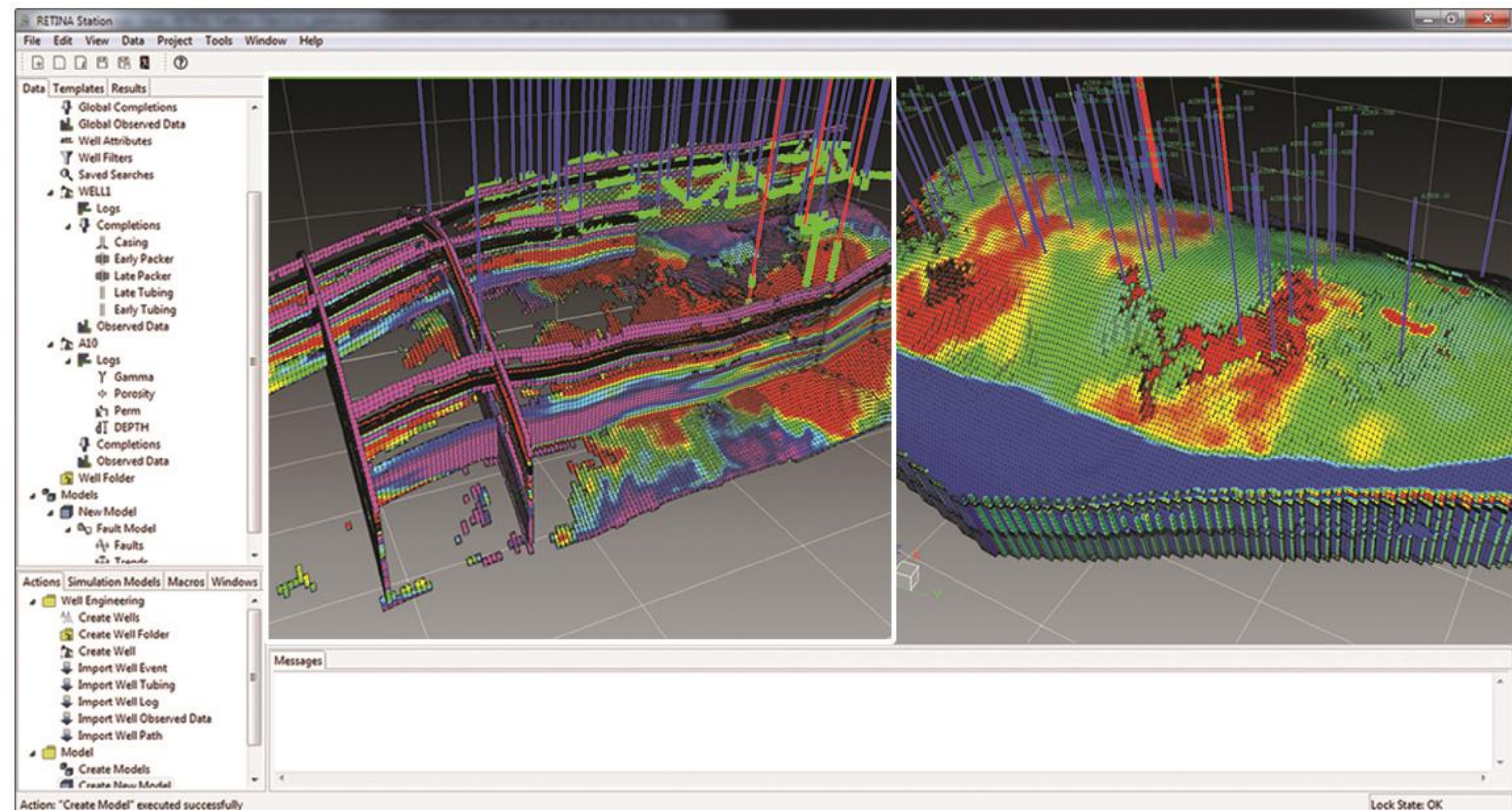




- RETINA Simulation™ has no DATA file and everything is passed to the simulator using objects. Thus, every detail of reservoir simulation model could be set at RETINA Station™ and used in automatic workflows, which removes the need for manual DATA file editing.
- RETINA Station™ can also load RETINA Simulation™ project or ECLIPSE™ data file and extract all their data to its own object model. This helps engineer to migrate from ECLIPSE™ to RETINA in the fastest way possible. As the next needed capability, RETINA Station™ can create and run both RETINA Simulation™ and ECLIPSE™ simulation models which gives the user the power to use RETINA Station™ as a pre/post processor for ECLIPSE™ as well as RETINA Simulation™. All the generated automatic workflows in RETINA Station™ are also runnable using both simulators.



Visualization: The Key to Data Analysis



All types of visualization windows are implemented in RETINA Station™ to give the user the power to visualize the petroleum world. Visualization has the power to create a common vision between members of a study team with different disciplines, which helps decision making become faster and more efficient.

Almost every object could be visualized in RETINA Station's powerful 3D engine, where different types of filtering, intersection planes and object types help display all the required objects in a customized perspective. RETINA Station is a powerful tool in the hands of geophysicists and geologists that allows them to model the reservoir structure in an easier and more accurate way. It also creates a common perspective among different team members and makes their collaboration more comfortable.

An advanced well correlation window is a must for a comprehensive seismic to simulation software. This window brings well logs, core data, fracture data, zonation, PLT, RFT, reservoir structure and well completion data altogether, in order to help engineers analyze the data and make decisions about the reservoir or well with more ease. By having an advanced, yet easy to use well correlation window, RETINA Station™ works wonders for well engineers.

Plot window of RETINA Station™ can display all types of data from SCAL and PVT tables to simulation results and property cross-plots. This window is fully customizable to satisfy the reporting and printing needs of engineers.





Data Generation and Modification for Creative Engineers

Several calculation and modification tools are available in RETINA Station™ for doing calculations on different objects. These calculators make RETINA Station™ a handy instrument for engineers to implement their novel ideas. Objects on which the calculators work are: well logs, well core data, 3D grid properties, 3D grid horizon surfaces, simulation vector results and simulation 3D results.

Each of these calculators has a list of specialized useful mathematical, geometrical and statistical functions which make creating complex and customized objects easier.

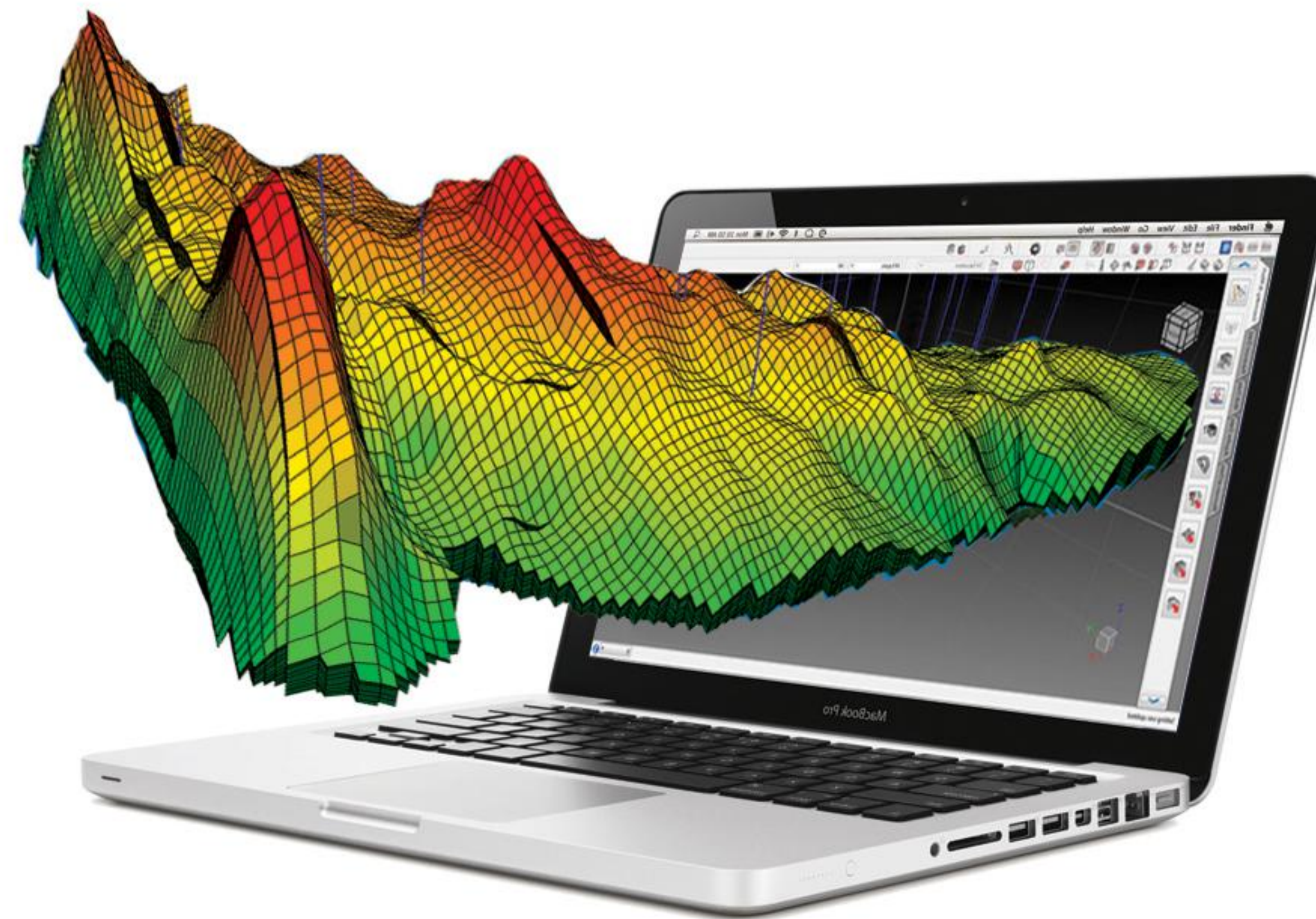
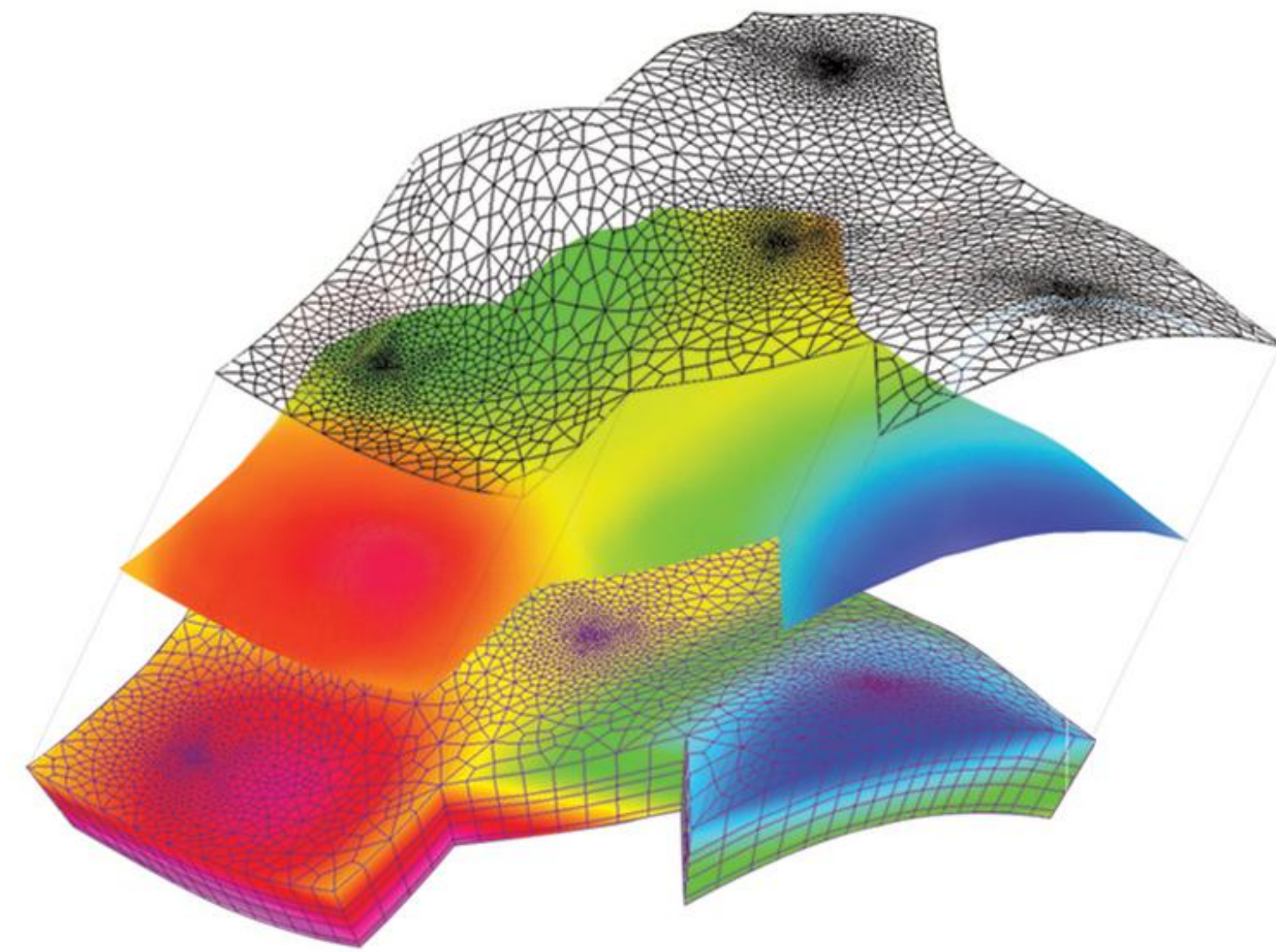
In addition to the mentioned calculators, RETINA Station™ also has several data refinement tools. These tools are used to validate and refine different data types, like well logs and well core data.

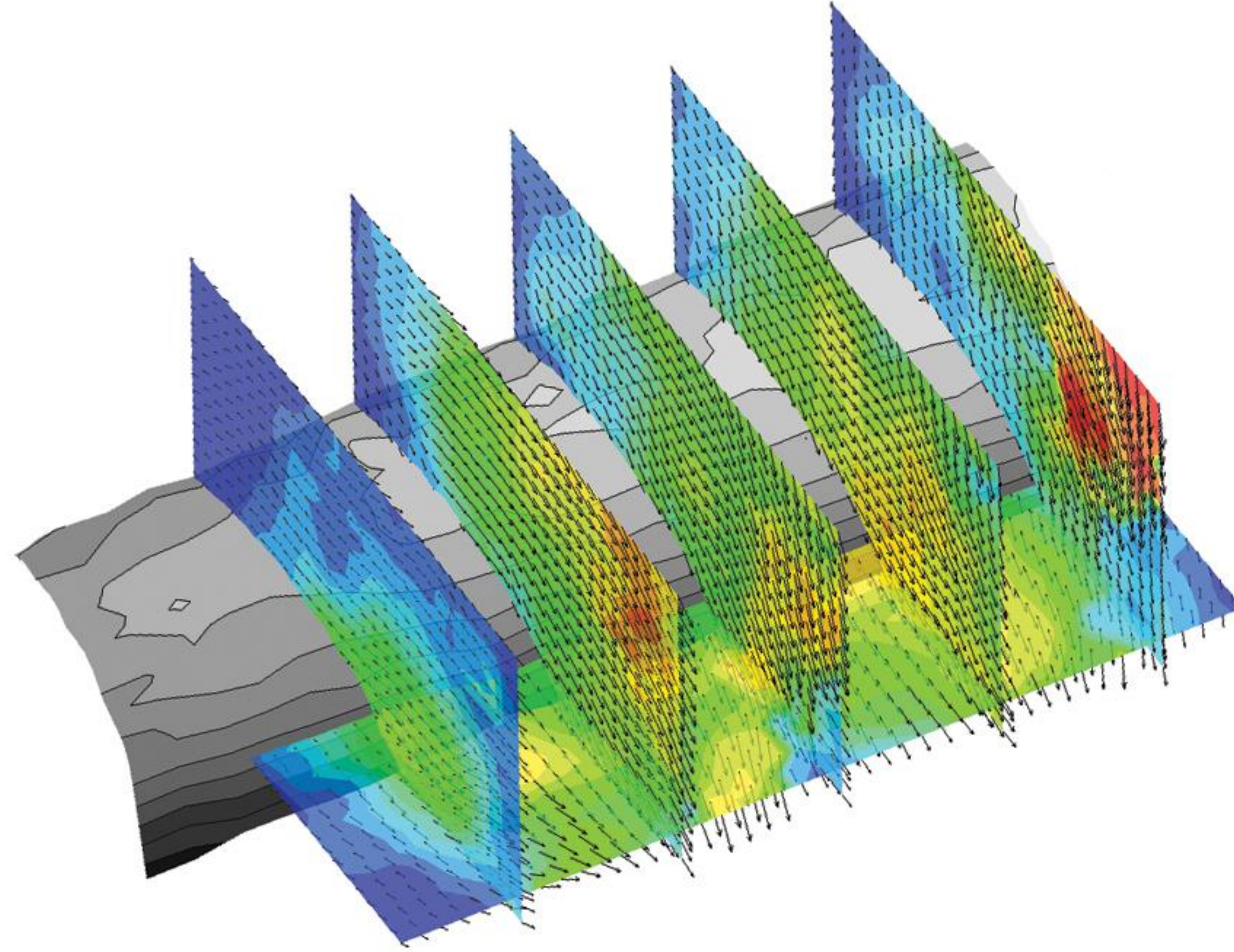


A Platform for all Engineering Tools

RETINA Station™ is designed and implemented as a comprehensive and integrated platform. Having this generality, makes it possible to implement any seismic to simulation and operation toolbox. Some of the currently available toolboxes are:

- 1 Automatic history-matching based on global optimization algorithms
- 2 RETINA Simulation™ model creation and execution
- 3 Structured and un-structured mesh generation
- 4 Well perforation prediction and optimization
- 5 Hydraulic fracturing design and optimization
- 6 ECLIPSE™ DATA file creation and execution
- 7 Material balance based STOIP estimation
- 8 Fault modeling and structure modeling
- 9 Static volume based STOIP calculation
- 10 Automatic uncertainty quantification
- 11 Seismic interpretation and inversion
- 12 Fracture modeling
- 13 Data analysis and variography
- 14 Facies modeling
- 15 Petro-physical modeling
- 16 Sensitivity analysis
- 17 Well path design
- 18 Well completion design
- 19 Drilling optimization
- 20 Well outflow modeling





ESTD

Engineering Support & Technology Development

Tehran : Unit 313, No 450, Mirdamad Boulevard, Tehran, Iran
Phone : +9821 8888 4437

Dubai : Office 31-B, Silver Tower, Cluster I, JLT, Dubai, UAE
Phone : +971 56811 3141

Sofia : App 26, Entrance A, Block25E, Goce Delchev, Sofia, Bulgaria
Phone : +359 88412 4966

Website : www.estdco.com

Email : info@estdco.com