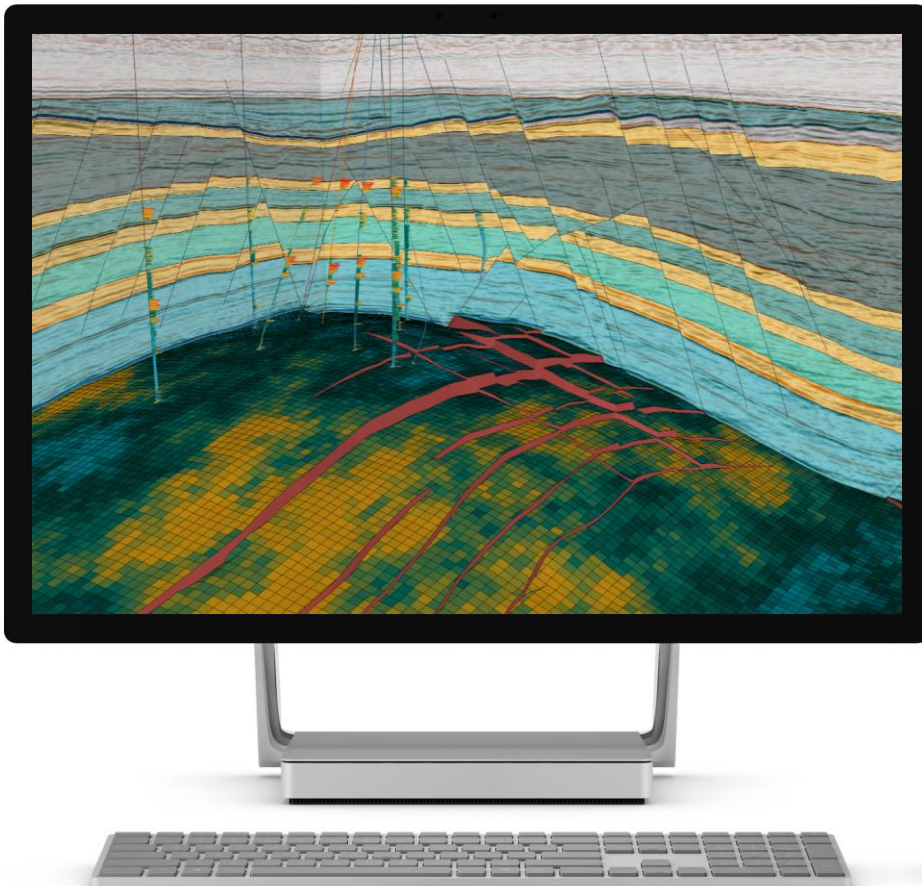
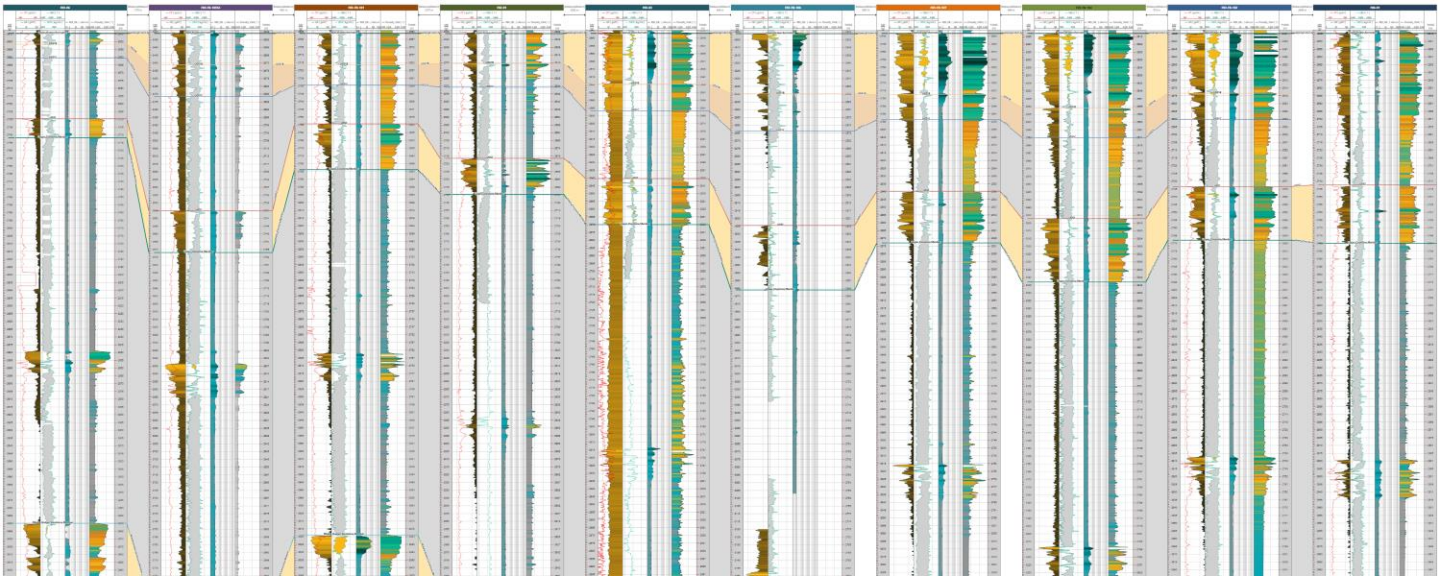


— BROCHURE

JewelSuite™ Subsurface Modeling

Field development planning software





Field development planning software

JewelSuite™ software delivers subsurface intelligence and insight through a portfolio of applications focused on geological modeling, geomechanics, reservoir simulation and visualization to optimize field development plans and drive greater production. The JewelSuite Subsurface Modeling application is an innovative, powerful tool to create precise geological models that can seamlessly transfer into any industry standard simulator.

Superior gridding technology

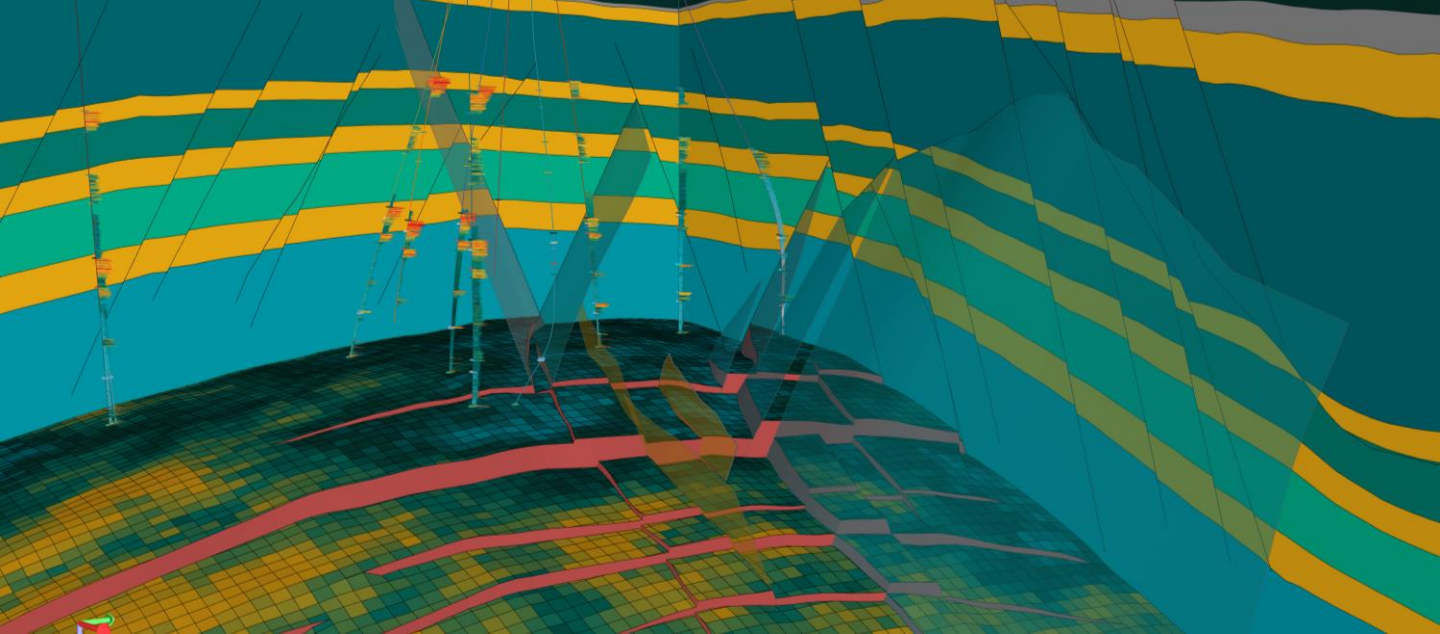
The JewelGrid™ patented gridding technology enables modeling of complex geological structures, such as intricate fault systems, unconformities, and salt intrusions, without compromises. Unlike pillar or stair-step gridding, our gridding technology has no restrictions with respect to geometry and topology handling; all geometries are accurately captured and models can be full-field extending from the deepest point of the field to the surface. What you see is what you model.

Precise geological models

With its revolutionary gridding technology and advanced structural modeling capability, the JewelSuite Subsurface Modeling application allows faster, better, more robust evaluation of even the most complex geology. Its ability to rapidly build multiple scenarios accelerates analysis of alternative possible outcomes for determining optimal field development plans.

Reservoir simulation

Integrate geologic models, without losing any structural detail, seamlessly into your reservoir simulation. This software application includes all workflows required for dynamic modeling and can be used as a powerful pre- and post-processor for your simulator of choice. Updates to the structural and geological models easily transfer into your simulation workflow allowing you to assess the effects on reserves, production rates, and other critical parameters of your field development planning. This seamless integration enables extensive and efficient history matching, sensitivity analysis, and field development planning optimization.



Flexibility, connectivity, and extensibility

The JewelSuite Subsurface Modeling application is built on the JewelEarth™ development platform that enables you to easily enhance existing functionality with new plug-ins or modules that contain your own algorithms or methodology; build your own workflows; and connect to proprietary databases or other subsurface applications by using the JewelEarth Software Development Kit (SDK).

Embracing uncertainty

Execute uncertainty and sensitivity studies to identify the most important changeable parameters and to quantify the probability of success resulting from uncertainty in material or other parameters. Utilize a patent-pending mini-language to describe uncertainty parameters in a concise form and choose from different sampling strategies.

Analyze your results with tornado, percentile and scatter plots and export study inputs and results into CVS file format, including individual fracture results and summary results per stage or realization. Also, extract realizations as independent cases and visualize them in the 3D view along with other subsurface objects and fracture design workflow cases.

Wellbore Hydraulics Simulator

The MWell™ wellbore hydraulics simulator calculates surface and/or bottomhole pressures, gravitational head, restrictions, transport times, and hydraulic power requirements in the wellbore. Near-wellbore and perforation pressure losses can also be calculated to determine the bottomhole treating pressure in the formation. The application was designed for real-time analysis to calculate bottomhole treating pressure from surface conditions. You can also use the application as a design tool for determining wellbore pressure characteristics prior to treatment.

Integrated modules with intuitive workflows

Workflows

Geological Modeling

Data import	Using Kingdom™, Openworks™, and Petrel™ connectors or our multiple industry standard formats readers to import seismic, surfaces and well data
Data preparation	Organize, create, modify and quality control the imported data while protecting original raw data
Stratigraphic modeling	Define the vertical hierarchy of the geological layers Create different models with varying resolutions using different interpretations
Structural modeling	Define the structural framework for the 3D model by combining one stratigraphic model with one fault model Create multiple scenarios to analyze alternate possible outcomes
Fluid modeling	Define fluid compartments and fluid distributions from the structural model
3D gridding	Create the 3D geo-cellular model from the structural model
Property modeling	Populate the 3D grid with rock and petrophysical properties using geo-statistical methods
Upscaling	Coarsen the 3D grid resolution, if needed, to accelerate flow simulation calculations
Volumetrics	Calculate original fluids in place in the 3D grid

Reservoir Simulation

Pre- and post-processing	Pre- /post-process flow simulation cases
Hydraulic fractures	Create 3D models and flow simulation cases for hydraulic fracturing scenarios

4D Geomechanics

3D meshing	Create Finite Element Mesh from the structural model using Abaqus as the meshing engine
Pre- and post-processing	Pre- /post-processing to run and analyze dynamic geomechanical simulations