

Geolog[®] Geosteer[®]

Real-time Geosteering



Well Planning and Drilling Engineering

Optimizing Wellbore Placement in the Reservoir

Paradigm™ provides advanced well planning and geosteering solutions for monitoring and re-planning well paths in real time. The integrated Paradigm environment enables geoscientists to plan and seamlessly engineer optimal well paths in the most productive reservoir intervals, using properties derived from seismic, well and reservoir model data. Real-time data can be visualized directly in the Paradigm 3D visualization canvas.

Meeting the Challenge of Horizontal Wells

The addition of a geosteering module to the Geolog[®] log management, correlation and petrophysics solution provides a powerful interpretation capability that integrates the operator's drilling and geological/geophysical workflows. It provides the geosteering expert with the ability to model LWD tool response in

highly deviated wells, and effectively edit and interpret actual logging data in real time.

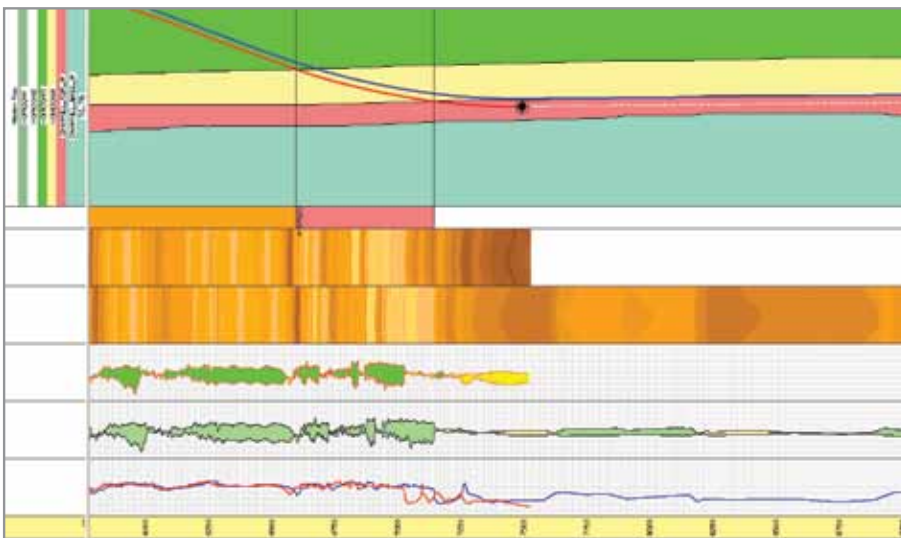
Interactive correlation of modeled logs with real-time responses while drilling allows accurate determination of the wellbore's stratigraphic placement, as well as a detailed update of the structural section along the well path and the determination of whether any trajectory adjustments are required. These trajectory adjustments ensure optimal entry into the reservoir, enable stratigraphic placement to be maintained throughout, and prevent an early exit.

A Comprehensive and Integrated Solution

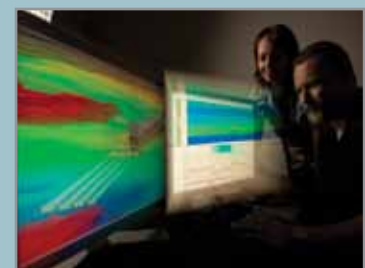
Advanced workflows utilize the tight integration between Paradigm's well planning and 3D visualization/interpretation software solutions, specifically the Sysdrill[®] Designer embedded well planning tool, to provide a powerful log-scale interpretation capability.

"Paradigm geosteering software accomplishes what the human mind is incapable of processing. It combines the information from 3D seismic surveys with the data obtained from MWD tools and produces an excellent visual display of the actual well path while drilling. This display allows us to verify that we are in our target zone and clearly indicates when adjustments to inclination are necessary to remain in the target zone. The end result is laterals properly placed in the target zone, which should yield better completions, higher production rates and greater return on investment."

Scott Roth, Staff Geoscientist, Williams E&P



Geolog Geosteer modeling capabilities include synthetic image log generation to aid in interpretation of real-time data

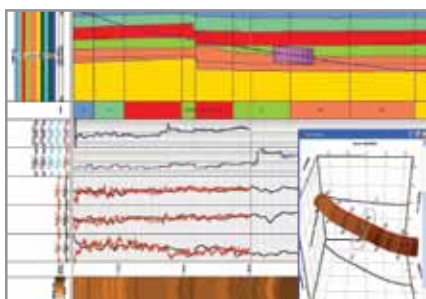


Integrated Well Trajectory Analysis and Planning

The Geolog Geosteer module links Geolog with Paradigm's Sysdrill drilling engineering solutions, enabling the integration of well planning, positional uncertainty modeling, anti-collision, and projection ahead of the bit. This comprehensive set of information ensures that steering decisions are fast, informed and effective.

Advanced Modeling

Geolog Geosteer enables the petrophysicist to model anticipated log responses for high-angle well trajectories based on offset well data from Geolog, and geological structure such as that obtained using the Paradigm SKUA®



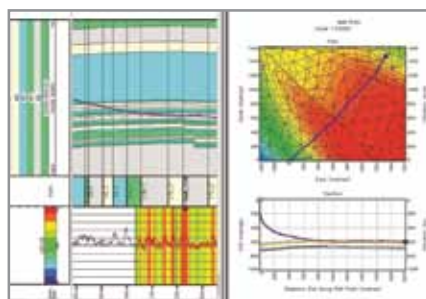
Drilling target and modeled log property image wrapped around the wellbore in 3D

product suite. Modeled log responses, including synthetic image logs, can be correlated with actual log responses received while drilling, for real-time geosteering or for use in post-well analysis.

Support for WITSML

Full support for the WITSML standard for real-time access to drilling data allows the Geolog Geosteer module to be used at the rigsite or the office, for effective and timely decision-making.

Paradigm's OpsLink® WITSML receiver enables real-time drilling data from any WITSML server to be stored directly in the Paradigm Epos® database. Calculations in Geolog can be set to automatically update data in real time as it is received.



Geosteer workspace display of log data on curtain along wellbore; location of well path in plan and section views

Features

- Ability to rapidly model multiple log properties along the wellbore
- Simultaneous display of multiple property models
- Ability to receive real-time updates via WITSML
- Interactive editing of model by changing well path, bed dip or thickness, or by adding faults
- Properties are remodeled on-the-fly as editing is done

Interoperability

All Epos-based applications enable interoperability with third-party data stores, including:

- OpenWorks® 2003.12, R5000
- GeoFrame® 4.5
- OpenSpirit® 3

System specifications

- 64-bit, for x64 architecture processors
- Microsoft® Windows® 7, XP, Vista
- Red Hat® Enterprise Linux® 5.3 and above, 6.0 and above

The Paradigm Advantage

- + Geosteer gives users the independent ability to model, monitor and interactively modify a well as it is drilled.
- + Geosteering increases productivity, reduces drilling risk and optimizes wellbore positioning in the reservoir.
- + Geosteering is performed in the familiar Geolog user interface, and runs on Windows and Linux platforms.
- + Geolog Geosteer offers an effective way to interpret log data in highly deviated wells.
- + Geosteering can be done at rigsite or at the office.
- + The Epos interoperability integration framework provides smooth workflows between drilling, petrophysics and geology/geophysics.