The DecisionSpace® Velocity Modeling application provides a solution for building velocity models that incorporates raw, edited and interpreted data, as well as existing velocity model information, to build geologically sound velocity models between well control. Landmark’s innovative use of a multi-resolution model incorporates well and seismic information so that interpreters can easily build geologically sound models even in structurally complex geologic regimes. By incorporating seismic, well data, interpreted horizons, faulted frameworks, and multi-Z salt-body objects, as well as other attributes like density and anisotropy, velocity modeling software can be used in a multitude of workflows, such as seismic imaging, depth conversion, seismic inversion, AVO analysis, fracture detection, pore-pressure prediction, and reservoir modeling.

The Velocity Modeling software is a component of the DecisionSpace Geosciences suite, which is a unified visualization, interpretation, and modeling workspace where asset teams can collaborate more effectively to evaluate and develop assets. This suite delivers a true multi-user environment enabling collaboration across multi-domain workflows and data types—all on the award-winning, data-management foundation of OpenWorks® database.
BENEFITS

More Value with an Integrated 3D Velocity Solution
Built in the unified DecisionSpace interpretation workspace, velocity models are displayed and evaluated along with seismic, well, and structural interpretations. This approach leads to increased confidence in the velocity model.

Velocity Models that Assimilate Well and Seismic on the Fly
Dynamic time-to-depth workflows can tie well data, seismic data, faulted frameworks, and salt bodies to create robust imaging and depth conversion models on the fly.

Empowers True Interpretive Processing Workflows for Accurate Model Collaboration
Unique “hybrid” velocity model design provides for a memory-efficient model. This model can be shared between the processor and interpreter, enabling optimized seismic imaging activities like prestack reverse-time migrations.

Data Integrity in Complex Geology
Geologically accurate structures are built using Dynamic Frameworks to Fill® conformance technology. Velocity Modeling integrates the accurate geologic structures with all the relevant time and depth subsurface data from vertical/deviated/horizontal wells and seismic data to build a geologically optimal velocity model. This approach leads to a geologically sound model in complex geology.

Flexible Model Design can be Leveraged Across Deepwater and Unconventional Workflows
Landmark’s unique integrated subsurface software platform provides native access to the velocity model, enabling advanced subsurface workflows, including seismic inversion, reservoir modeling, AVO studies, 4D interpretation, pore-pressure analysis, and fracture analysis.
**FEATURES**

**Enterprise Infrastructure Design**
Landmark’s unique software ecosystem and data design allows for seamlessly building and sharing velocity models between the processing and interpretation environments. Models can leverage Dynamic Frameworks to fill workflow technology for optimal geologic control. The memory-efficient “hybrid” design allows for basin-size models that can be created without computer memory concerns or constraints. For complex, unconventional plays, the software leverages Landmark’s unique handling of faults. For complex, deepwater plays, the workflow allows for multi-Z salt interpretation via GeoShell technologies. All workflows leverage Landmark’s leading OpenWorks data model for dynamic access to well, seismic, and project data.

![Image](image_url)

**Domain Conversion**
The model is used to drive the dynamic domain conversion within the DecisionSpace Geosciences suite. Doing so enables interpreters to view the same data in the time domain on some views and in depth on other views. The model can also be used in batch mode to statically domain-convert seismic or interpretation data.

**Velocity Model Calibration/Optimization Design**
The model consumes all data, including geologic rock velocity behavior constraints per formation. Models can be constrained by fault frameworks and calibrated to fit well picks. Velocities can be constrained by structure and seismic velocities. Optionally, the velocities can be optimized via a least squares travel-time algorithm. The hybrid-model format avoids grid aliasing or triangulation artifacts and is designed to manage large basin-scale prospects via an efficient memory model. Models can also encapsulate key attributes like density and anisotropy within the defined geologic model formations.
Onshore Stratigraphic Workflows

In large acreage areas where the drilling program requires more than 100 well paths, seismic and velocity data become critical as field and well geologic validation sources. Utilizing Dynamic Frameworks to Fill software technology, Velocity Modeling facilitates intelligent stratigraphic-mapping workflows.

Unconventional Workflow Support

The velocity model includes a unique data flag for horizontal well correlation information. This flag is used when trying to keep the wellbore inside the sweet spot of the reservoir interval. Including horizontal well information in the velocity model provides:

• improved understanding of the stratigraphic position of the drilling well,
• real-time “look ahead” well planning in the context of the subsurface model, and
• improved well placement where reservoir quality is best.

The ability to steer the drill bit through the most productive zones in the target formation is one of the most critical operations contributing to the financial success of shale and other plays. Keeping well plans and the subsurface model in sync assists efficient planning and drilling of horizontal wells.

Deepwater Application for Salt Geometry Definition and Seismic Imaging

The deepwater workflows are designed to deliver high-resolution seismic and velocity models used in prospect ranking and optimal drilling decision support. For rapid salt geometry definition, the DecisionSpace software offers a comprehensive set of tools for imaging complex subsalt structure, including the ability to build complex, multi-Z, salt-based velocity models as well as high-resolution basin-scale velocity models. For seismic-imaging iterations, the velocity model can be natively shared between interpretation and imaging and is well suited for processing algorithms residing in high-performance computing environments.

System and Software

SOFTWARE REQUIREMENTS

OpenWorks 5000.10.1
DecisionSpace Base module

OPERATING SYSTEMS

Red Hat® Enterprise Linux®
Workstation 6.4, 64 bit
Windows® 7, 64 bit

“A technological leader in the digital transformation of the oil and gas industry.”

GEOPHYSICIST, INDEPENDENT

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