

## 2D/3D Horizontal Well Correlation & Geosteering

### GeoSteering within a dynamic, 3D geomodel

Plan more wells, drill more wells, and do so faster, and with greater accuracy. Geoscientists today are tasked with this challenge as horizontal well drilling and “factory production” development methodologies increase in popularity. As they seek to tackle this seemingly daunting challenge, these same geoscientists are also responsible for developing new plays and drilling locations. Needless to say, it is imperative that the geosteering process remain efficient; as new drilling data arrives, the geoscientist can interpret and integrate it into the geomodel quickly, all in an effort to keep the drilling on target.

Such efficiency is achieved with smartSTRAT®, an add-on module to LMKR GeoGraphix® smartSECTION®. It enables fast, easy, and accurate horizontal well geosteering with instantaneous geomodel updates. The module offers easy-to-use, geosteering tools with the capacity to view depth-converted seismic backdrops and formations and faults. It also offers direct integration with mapped, geologic surfaces within the 3D geomodel. This unique ability affords the geoscientist greater efficiency and accurate, geologic correlations and predictions. This additional level of quality assurance allows the geoscientist to stay ahead of the drill bit, avoid faults and other geohazards, and keep the borehole in-zone.

During the geosteering process, geoscientists interactively update their geologic models in smartSECTION® with new picks, inter-well points, and revised drilling targets. The resulting interpretations are displayed seamlessly in GeoGraphix® advanced 3D visualization, allowing for effortless problem identification and avoidance.

### Benefits

#### Increased Productivity

Because smartSTRAT® is an integral extension of smartSECTION®, the geosteering process facilitates quick updates to the project database and 3D geomodel, saving time and ensuring accurate, structural modeling.

#### Multiple Type Logs

Because accurate type logs are required for the horizontal correlation process, smartSTRAT® incorporates multiple, type-log curves to correlate LWD data, resulting in precisely-steered, long-reach, horizontal wells and accurate, geomodel interpretations.

## Real-Time Geological and Geophysical Interpretations

Seismic data provides valuable information about a reservoir's structure and stratigraphy away from the borehole. View dynamically depth-converted seismic data and interpreted seismic horizons and faults as a backdrop, or as surfaces within the Framebuilder<sup>™</sup> geomodel (scaled to the extents of the smartSTRAT<sup>®</sup> vertical section). To refine the geomodel further, superimpose log curves, surface correlations, and borehole data on the vertical section to provide key information about the geology and structure of the reservoir.

## Geomodeling While Drilling

To tie a smartSTRAT<sup>®</sup> interpretation to a Framebuilder<sup>™</sup>, geomodeled surface, hang the type logs used for each dip segment along the wellbore in Vertical Section view to facilitate inter-well, correlation point picking.

To maintain an optimal borehole path, once the geomodel updates, draw drilling target lines on the smartSTRAT<sup>®</sup> vertical section to generate the required trajectory parameters. As the horizontal well correlates in cross section view, the project's geomodel updates dynamically for immediate viewing in Map View (with the purchase of Framebuilder<sup>™</sup>) and in the, advanced 3D visualization view.

## Pack-and-Go Portability

From the well site, geoscientists geosteer using smartSTRAT<sup>®</sup>, then email the vertical section and smartSTRAT<sup>®</sup> model files to the home office, where the new data can synchronize with the parent project instantly to update the geomodel with the new interpretation.

## Features

### Horizontal Panel View

View predicted log curves vs. Logging-While-Drilling (LWD) log curves beneath the smartSTRAT<sup>®</sup> vertical section in a horizontal panel. The predicted response is modeled by varying the dip angle and/or fault offset of the 2D active surface. Determine the geometry of the model by matching the predicted curve response to the LWD curve. Ancillary curves like ROP, and resistivity can be displayed along with the LWD curve in the horizontal panel view.

### Vertical Panel View

Display true vertical thickness (TVT) type logs (generated from the drilling well or from any offset type log in TVD or TVT) in the vertical panel. In the same panel, view the TVD of the LWD log for the active correlation dip segment against the type log. Stretch/squeeze and/or offset the TVD/LWD curve to determine the dip angle and/or fault offset.

Depth-converted seismic backdrops, formations and faults when SeisVision<sup>™</sup> interpretations are present, generate dynamically depth-converted seismic backdrops and formations and faults on-the-fly and display in smartSTRAT<sup>®</sup> vertical section view. The seismically controlled surfaces and backdrop allow the interpreter to look ahead of the borehole to detect and avoid geohazards, or to anticipate seismic scale faults.

### Velocity Model Updates

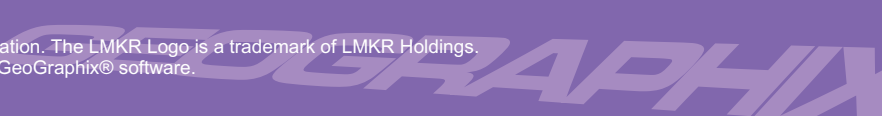
Update surfaces and backdrops sourced from SeisVision<sup>™</sup> with inter-well points tying the 3D Framebuilder<sup>™</sup> surfaces to a smartSTRAT<sup>®</sup> model. This feature helps generate an accurate and comprehensive SeisVision<sup>™</sup> velocity model for use in depth conversions.

### Dynamic Mapping in Framebuilder<sup>™</sup>

Framebuilder, the 3D, topology mapping engine (smartSECTION<sup>®</sup> add-on), offers real-time mapping of an updated geomodel with Framebuilder<sup>™</sup>; the 3D geomodel surfaces are displayed in Map View. In addition, data generated from the geomodel can be exported back to GeoAtlas<sup>™</sup> as IsoMap<sup>™</sup> layers for mapping. Such a feature gives a geoscientist instant access to map geometry changes resulting from smartSTRAT<sup>®</sup> correlations.

### Drilling Target Lines

Once a geomodel is updated, draw drilling target lines on the smartSTRAT<sup>®</sup> vertical section to generate the required drilling parameters, thus keeping the drill on target and in-zone.



## Requirements

### Hardware (MINIMUM)

- 2.4GHz 64-bit Intel class or better
- 4GB RAM
- 1,024 x 768 graphics resolution
- CD-ROM drive
- 19-inch monitor

### Hardware (RECOMMENDED)

- Quad 2.4 GHz 64-bit Intel class or better
- 16 GB RAM or greater
- NVIDIA GeForce or Quadro - 2GB video RAM
- DVD-RW drive
- Dual 21+-inch monitors

### Software

- Microsoft® .NET 4.5
- Microsoft® DirectX 11

### Operating System(s)

- Windows® 7 Professional x64
- Windows® 7 Enterprise x64
- Windows® 7 Ultimate x64