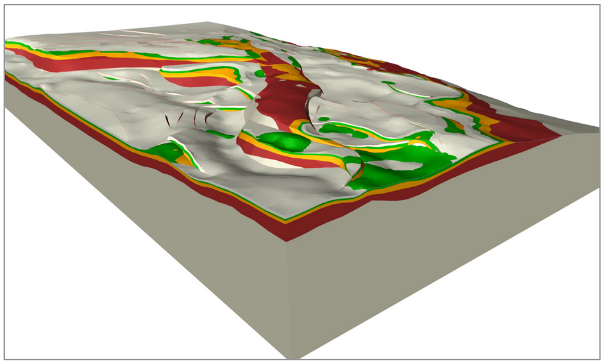
Equinor Uses Emerson's RMS Software to Model Complex Structures in the Heidrun Field

RESULTS

- RMS generated a reliable and robust geometric model upon which a property model and eventual well planning and production strategies can be based.
- The precise and watertight model accomodated all available data and geological complexities.
- The model was ready immediately, adding confidence and value to the field production decisions.



▲ *Full structural model built using the new horizon uncertainty modeling tool*

APPLICATIONS

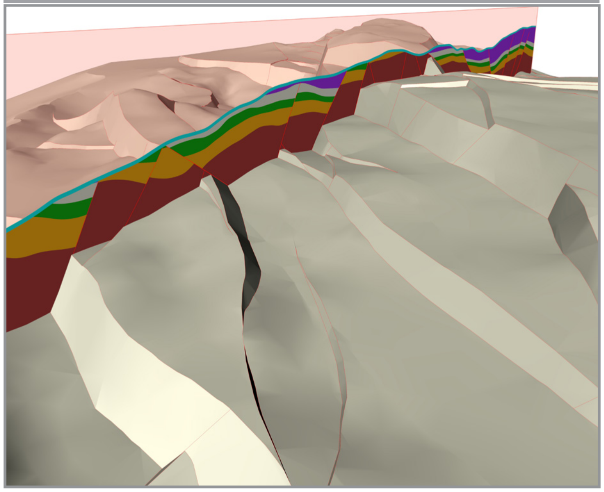
RMS™ reservoir modeling

CUSTOMER

Equinor

CHALLENGE

Equinor commissioned Emerson to improve the model of the Heidrun field, to form the basis of a future reservoir management strategy and help increase production. The company wanted an accurate model that would show all the fault intersections interpreted and the horizons truncated according to the seismic. They also required a full 3D grid without significant pinching out of the cells under the unconformity, enabling reservoir simulation engineers to pick the grid up and use it without the need for further editing. Modeling time, ease of use and reproducibility were also key criteria.



▲ *Cross section of model illustrating the highly complex field.*

SOLUTION

The solution offered by Emerson using its industry-leading RMS industry reservoir modeling software was performed in three stages.

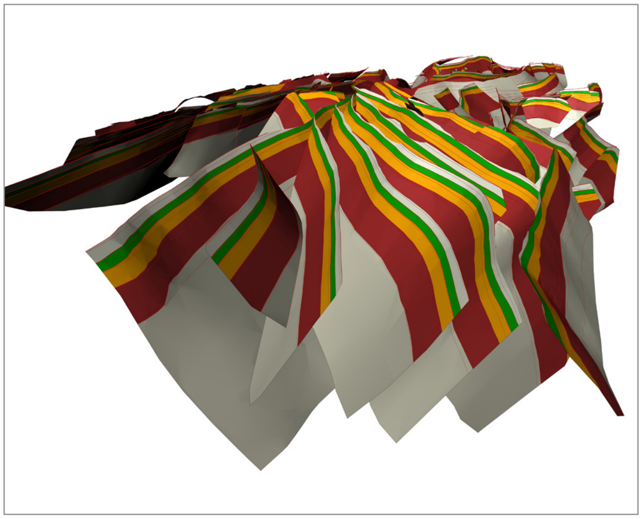
Model Building

After importing the data, the first step was to build a model from the fault population. A selection was made of the more problematic faults and the required input data defined. Once the initial fault surfaces were built, the model was examined for its intersection behavior, with the user able to specify extrapolation limits beyond available interpretation. Manual adjustments were made in places where the data quality was too poor to adequately define the fault intersection. The majority of the modeler's tasks in this case were to quality control the model rather than construct it. In this way, RMS enables geologists and modelers to spend mostof their time making geological decisions about the model, rather than working around the limitations of the software.

Stratigraphic Modeling

After a complete and accurate fault model was built and QC'ed in just a few days, the modeler was able to move on to the stratigraphic modeling phase. The faults were sometimes so closely spaced that high quality stratigraphic interpretation was not possible. To ensure that these areas were dealt with at Equinor's high standards, an initial model was built and isochors extracted to check for geological consistency. The input data was refined through data point filtering and amplified with the addition of control points until the seismic horizon geometry was precisely defined.

This provided the seismic scale stratigraphic framework with reservoir intervals which were resolvable only in well data. From this well data, isochors and vertical thickness maps were built to define the reservoir intervals. After additional filtering and trimming, these were extrapolated to cover the full area, representing the original uneroded thickness and extent of the interval. Horizon modeling could now be set up as a single job, considering the seismic interpretation, the isochors, and well data or other control data, and using it all to build the model.



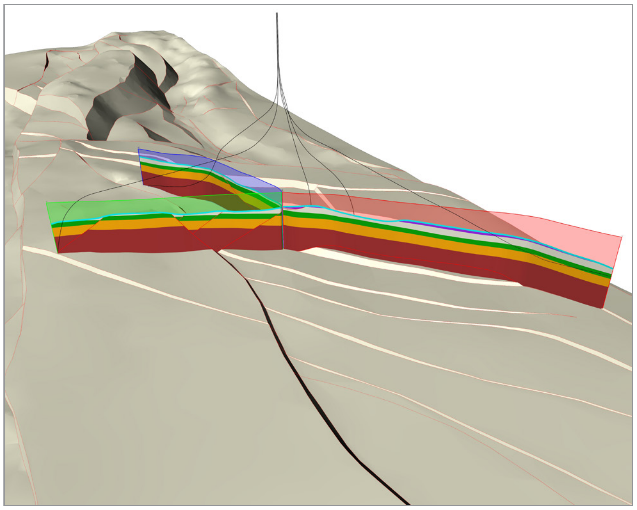
▲ *A highly dense fault model did not compromise the result.*

Developing the Grid

The horizon model 'remembers' the geometry of the uneroded stratigraphy, and was used by the gridding tool to guide the construction of grid layers in the 3D grid, ensuring that the 3D grid is as geologically accurate as the horizon and fault models.

The erosion truncations built through stratigraphic modeling was further refined through pinch-out and erosion polygons, helping the algorithms identify precisely where the eroded section goes to zero thickness. Similarly to adding additional data to the fault modeling, this can be added individually by horizon or as a global data source.

Therefore, RMS was able to take advantage of every form of data that was likely to be available. Together, these features generated an extremely precise and watertight model that was immediately ready, adding confidence and value to the field production decisions.



▲ *The final model honors all input data, resulting in a high quality geological model.*

RESULTS

A reliable and robust geometric model was provided, upon which a property model and eventual well planning and production strategies could be based. RMS can also be applied to other geologically complex areas of the North Sea – particularly Jurassic regions.

BENEFITS

The integrated RMS structural modeling system is able to generate a highly accurate and geologically representative model – often in areas of poor data resolution – which accommodates all available data and geological complexities, with no compromises or simplification grids. RMS allows geomodelers to rapidly build models, spend more of their time refining and QC'ing them, and achieve more accurate results with less effort.

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