DYNEL3D

Rock mechanics for structural geology

APPLICATIONS

- Structure interpretation
- Basin modeling
- Fractured reservoir modeling
- Hydrocarbon migration
- Drilling planning

BENEFITS

- Increase productivity by better understanding and modeling your prospects
- Reduce risk by modeling natural fractures and seal integrity
- Reduce uncertainty in seismic interpretation

FEATURES

- Structure geometry through time as inputs for Petrel*, PetroMod* 3D, PSQL, VISAGE*, and Poly3D*
- Model natural fracture type, density, and orientation to constrain discrete fracture network simulation
- Model reservoir traps
- Analyze fault activity through time and hydrocarbon migration pathways

Dynel3D* structural restoration software enables the easy construction and analysis of complex folded and faulted 3D geological models, both in contractional and extensional settings. This innovative technology, which incorporates the fundamental laws of physics that govern rock deformation, features easy-to-follow workflows to guide geologists from model construction to structural restoration.
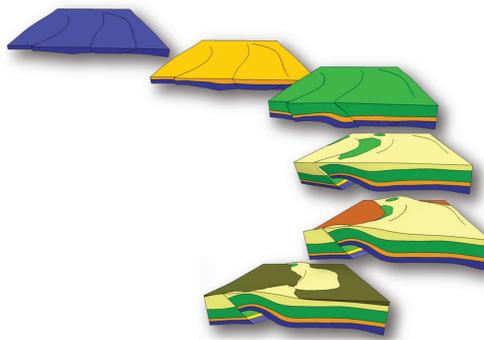
Complex model building

Complex geological structures, such as thrusting and folding observed in contractional settings, are often poorly imaged. It is therefore essential to check the consistency of the subsurface structural interpretations. Dynel3D software includes powerful 3D model builing capabilities and tools to check the consistency of geological interpretations, resulting in reduced uncertainty in seismic interpretation and more accurate underconstrained complex geological models.
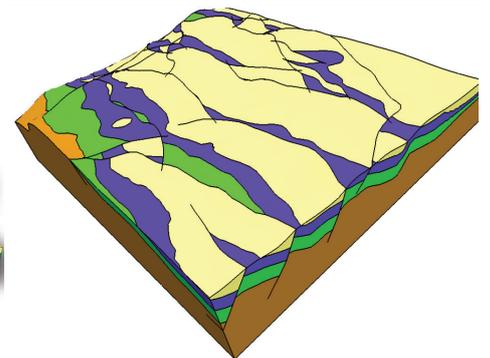
3D structural restoration

Generating a structural model through geological time has many advantages. Dynel3D software performs palinspatic reconstruction at basin, prospect, or reservoir scale for assessing trap formation, compartmentalization, and structure evolution through geological time. Reconstructed geometries can be used as inputs for

- Petrel seismic-to-simulation modeling
- PetroMod 3D and PSQL petroleum systems modeling
- VISAGE reservoir geomechanics
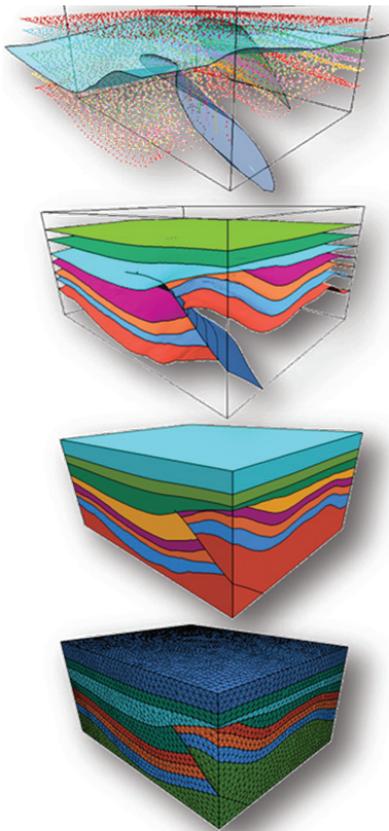- Poly3D fracture modeling.

Sequential restoration of a fold and thrust system with erosion.

Complex geologcal structure with intersecting faults built with Dynel3D.

Natural fracture modeling

Modeling natural fractures in reservoirs is a challenging task, requiring physics of fracture development through time to be taken into account. Dynel3D software computes retro-deformation between the restored and deformed states, helping to understand their impact on seal integrity and product as well as to model subseismic fractures and faults.
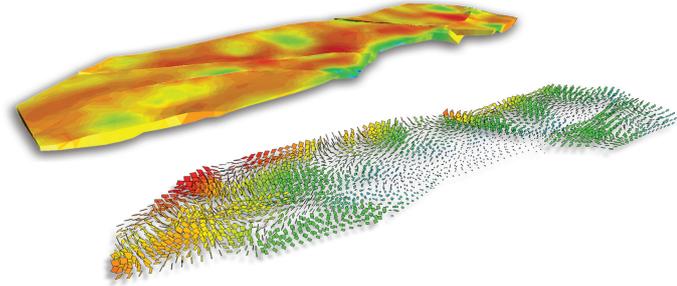
DYNEL3D

Structure construction from sparse data to fully meshed model.

Powerful model-building engine

Dynel3D software allows structural models containing hundreds of faults to be built, independently from the complexity of the fault network (multiple X, Y, and thrust faults are handled). By enabling the construction of poorly constrained layers in an ideal unfaulted and unfolded space, the software provides an easier and more accurate alternative to isochore-based surface construction.

Users can visualize and slice watertight volumes representing layers and fault blocks for model validation and QC. It is also possible to correct existing models by enforcing structural consistency (e.g., layer thickness and fault displacement control) or to build fully consistent models from interpretation data, even in structurally complex areas where little data is available.

Restoration of a faulted reservoir showing deformation distribution and fracture modeling.

Efficient and accurate 3D structural restoration

Dynel2D software is based on the fundamental laws of physics that govern rock deformation, rather than geometrical assumptions and kinematics postulates. Using a single algorithm, faulting and folding can be restored simultaneously, with a single restoration step taking a couple of minutes at most.

After structural restoration, any object (e.g., 2D and 3D grids, point sets, and triangle meshes) can be moved back and forth in geological time. These objects can then be populated with restoration properties, such as displacements, strains, and stresses.

Restoration results (e.g., properties and paleo-geometries) can easily be visualized and exported to Petrel software or third-party modeling software, while built-in strain-based decompaction allows fault slip while decompacting.

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