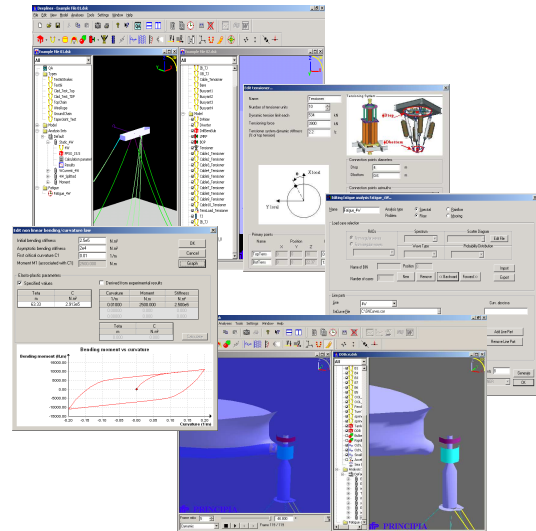


## DeepLines™

Risers, pipelines and moorings design software

**DeepLines™** is part of the marine software solutions developed by Principia and IFP Energies nouvelles. DeepLines™ is based on the finite elements method and forms an integrated software solution to perform in-place and installation analyses of a wide range of offshore structures including flexible and steel risers, umbilical risers, pipelines, floating hoses and mooring lines. The software package combines a powerful finite elements engine featuring advanced modeling capabilities with an intuitive user interface offering optimum productivity through multi-threading.



### Applications

- Flexible risers, umbilical and loading hoses
- Production and drilling rigid risers
- Hybrid riser systems such as riser towers
- Mooring lines and multi-body offshore systems
- Subsea equipment installation
- Towed systems analysis
- Pipeline S-lay, J-lay and on-bottom stability analysis
- Design of pipelines and spools submitted to thermal loads

### Type of analyses

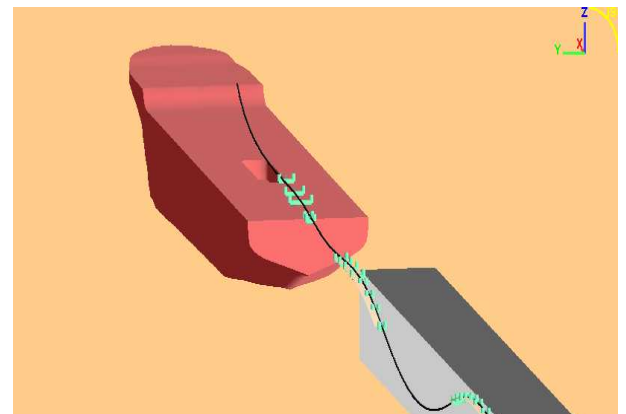
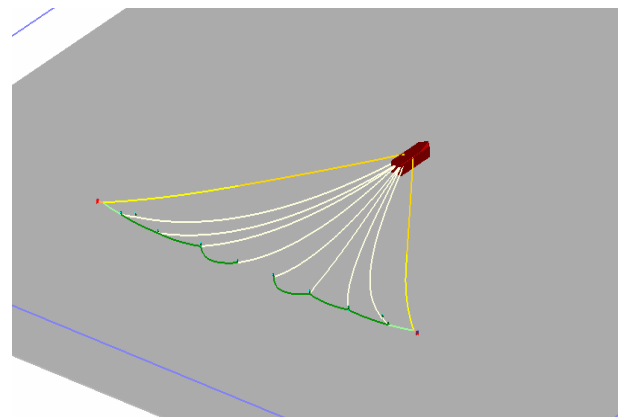
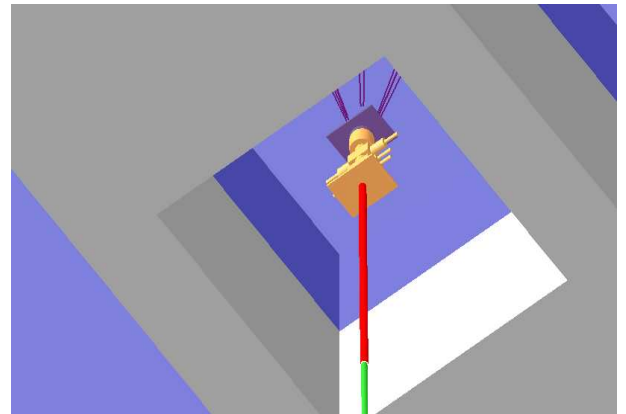
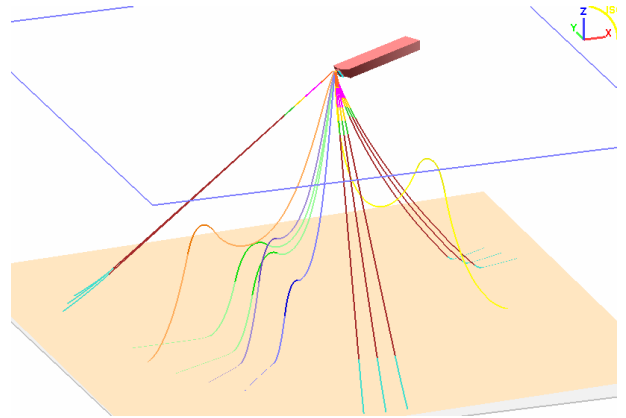
- Static and quasi-static analysis
- Time-domain dynamic analysis
- Frequency domain dynamic analysis
- Design of drilling riser based on API RP 16Q
- Modal analysis of complete risers and mooring systems
- VIV prediction models
- Fully coupled analysis of floating bodies & lines

### Main features

- Time-domain and frequency domain dynamic analyses can both be run from the same GUI
- Powerful and robust finite elements method including coupled bending/torsion effects
- Wide range of boundary conditions
- Non-isotropic 3D seabed friction and suction effect
- Wake models to assess drag loads on lines
- Modeling of sliding device including friction : J-tube, guides, keel-joint, PIP...
- External contact between lines for clashing analysis
- Contact with any user-defined surface, either fixed or moving (soil, moonpool, bellmouth,...)
- Automated detection of contact zones based on proximity criteria
- Non-linear bending stiffness including hysteresis effect for modeling unbounded flexible pipes
- Includes the effect of thermal loads for any type of temperature profile
- Multi-linear stiffness for risers and specific elements to model synthetic ropes
- DNV-OS-F201 and DNV-OS-F101 unity checks are available straight from the user interface
- Assessment of in-line VIV response of pipeline span according to DNV-RP-F105

## User interface

- Intuitive user interface including a model browser and 3D view window allowing very efficient model set-up and straight access to analyses results
- Project-oriented model files including all input data and parameters required to run several analyses from the same model file
- Batch processing form enabling automation of large sets of simulations
- Multi-threaded execution of analysis and post-processing tasks
- Easy access to all model data, copy/paste facilities
- Post-processing of a wide range of results for risers, moorings and floating supports : tension, stress, curvature, built-in angles, tensioner strokes, deformed shapes, iso-angle curves for TTRs
- Batch post-processing facilities
- Clearance post-processing form
- Automated export of results to Excel™ and export of AVI files from the 3D View window
- Statistics on every graphs
- Fatigue analysis of steel risers and mooring lines
- Export of .MDS modal database files for input to SHEAR7



## Coupled analysis

Fully coupled multi-bodies analyses of offshore systems including support vessels, risers, anchor lines and any other connection such as yokes, etc.

Wind, current and wave loads on the floating body

- Wind, current and wave loads on the floating body
- Low-frequency motion (based on Newman's approximation or full QTFs)
- Wave frequency coupled analysis in time-domain or frequency domain with regular or irregular waves

Definition of hydrodynamic properties of support vessels through simple text files

## Technical support

Best in class client support is provided by email at [deeplines@principia.fr](mailto:deeplines@principia.fr). Our team of experienced risers design engineers will always be pleased to bring timely responses to all your queries.

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