



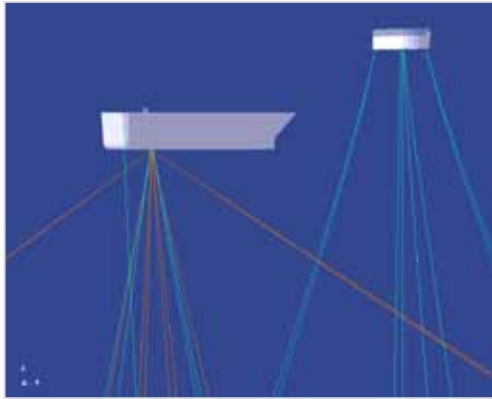
Sesam DeepC

Improving safety and performance of deepwater floating systems

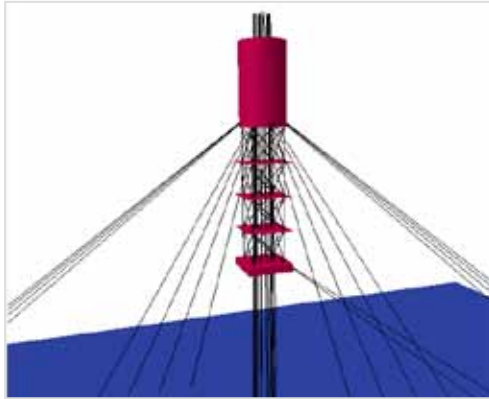
DNV Software

Deepwater floating systems

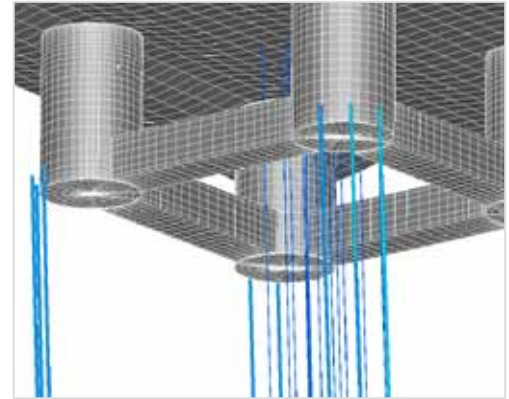
Fast and accurate results give flexibility in design



MULTI-BODY COUPLED ANALYSIS



SINGLE BODY COUPLED ANALYSIS



RISER DESIGN

DeepC is a proven solution for deepwater floating systems, marine operations and SURF (subsea, umbilical, riser, flowline) analysis. It is known in the offshore oil and gas industry for its efficiency, speed and accuracy, with the mooring and riser systems of many recently installed platforms having been designed and/or verified using the software.

More advanced, more accurate

DeepC incorporates state-of-the-art methods of predicting the global motion response of floating vessels for deepwater oil exploration and production. These methods are both more advanced and more accurate than traditional computational methods. The methods used in DeepC have been extensively validated, and have unique multi-body capabilities for complex field layouts involving many floaters, including side-by-side moored systems.

Complete software system

DeepC covers the range from riser, pipeline and mooring design and analysis to marine operations. In addition, DeepC now supports design and also fatigue analysis for umbilicals, which sets us apart in the market. As part of Sesam, DeepC has been designed to predict the extreme response and fatigue damage to mooring and riser systems under wave, wind, and current loading conditions automatically taking the coupling effect and other important non-linearities into account.

DeepC supports traditional riser design analysis (un-coupled),

marine operations as well as mooring analysis in the frequency domain. Pipelines are designed according to DNV Offshore Standards.

Fast, accurate solvers

DeepC is known for its market-leading speed and accuracy. Multi-core computers are supported and fast, robust solvers (Riflex, Simo) give the designer the necessary tools to undertake design iterations. Graphical modelling of risers and moorings are quick and efficient. All of these attributes contribute to saving users significant man-hours. Functionality for quick estimates (based on regular waves) prior to detailed analyses saves time and resources.

Coupled and uncoupled analysis

Uncoupled analyses can only account accurately for the static restoring forces as a function of floater offset. A coupled analysis will, on the other hand, accurately account for current forces, damping due to dynamics, inertia forces from the dynamics of the riser and mooring systems, effects of sea-floor friction and effects of riser-hull contact. DeepC is capable of automatically including the coupling effect from mooring/riser systems on the global response of the floating vessel itself.

Coupled and uncoupled analysis can be integrated in DeepC, and it is easy for users to switch from one to the other.

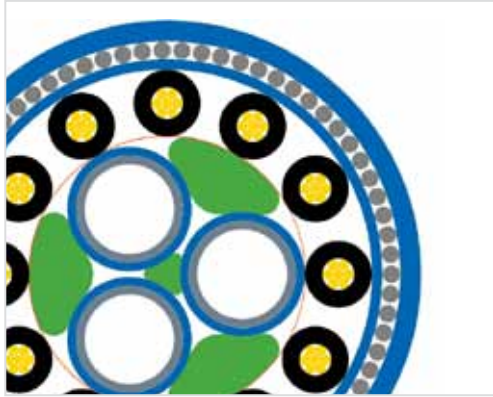
Coupled simulations in combination with model basin tests are a prerequisite for new deepwater projects. When model basin tests are conducted with a truncated mooring/riser system, the coupled analysis becomes indispensable as a tool for verifying the system performance at the real water depth.

“As the oil and gas fields get deeper, the installations of deepwater platforms become more challenging. The coupling effects between a floater and its moorings become more pronounced and more important. Sesam is an excellent tool for analysing the interaction between hull, moorings and risers.”

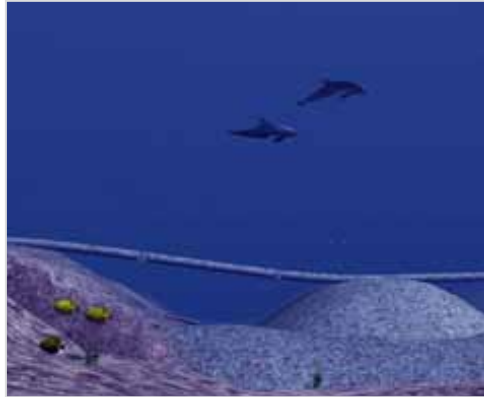
Andy Kyriakides, Project Manager, MODEC International LLC

A complete software solution

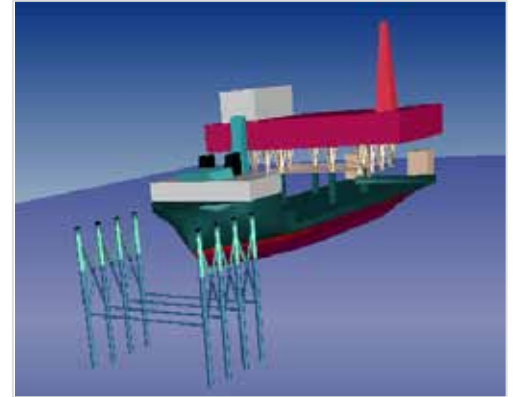
Covers the range from riser and mooring design to marine operations



UMBILICAL DESIGN



PIPELINE DESIGN



TOPSIDE INSTALLATION

Riser design

DeepC offers fast and reliable riser design, computing riser motions, stresses and fatigue life as well as performing code check of the risers. Riflex is the market's fastest solver for riser analysis. For the deep and ultra-deep water scenarios, a steel catenary riser design adopting prescribed displacements from coupled analyses will provide more realistic and optimum results, compared to a more traditional uncoupled analysis.

Umbilical design

DeepC offers umbilical design, including detailed cross section fatigue analysis on umbilicals. UmbiliCAD is a modular umbilical design program offered in the Sesam DeepC package, and has an intuitive interface that makes umbilical design possible without the need for a designated CAD expert. UmbiliCAD enables engineers to produce cross-section drawings and linear cross section analysis within hours, increasing the precision level in the bidding process as well as in the detailed engineering phase.

Marine operations

Simo is a modular time domain simulation program available as part of Sesam's DeepC package for coupled analysis of floating vessels and station keeping systems, including surface vessels spars and complex marine operations. Users can flexibly model station keeping forces and connecting force mechanisms (anchor lines, ropes, thrusters, fenders, bumpers, docking guide piles). Simo can handle for example analysis of offloading (tankers in tandem or side-by-side), offshore crane operations, subsea installation, topside installation and removal, installation of tension leg platforms (TLPs) and up-ending of spars.

Mooring analysis

The analysis of interactive static and dynamic mooring systems is possible with Mimosa, available in Sesam's DeepC package. Mimosa is a market leader in mooring analysis and offers a variety of options such as calculation of the vessel's wave-frequency and low-frequency motions and mooring line tensions.

Several options are available for analysis of mooring systems and individual mooring lines. Mimosa is up-to-date with calculations required by the Norwegian Maritime Directorate (NMD) and the American Petroleum Institute (API) for approval of positioning systems.

Pipeline design

Four DNV calculation tools supporting pipeline design, verification, re-assessment and lifecycle extension in accordance with DNV-OS-F101. FatFree, Stable Lines, Pipeline Engineering Tool (PET) and DNS-OS-F101 Code Compliance Spreadsheet.

Packaging of DeepC

DeepC comes in packages for coupled analysis (Simo and Riflex), riser analysis (Riflex), umbilical analysis (UmbiliCAD and Helica) marine operations (Simo only) and mooring analysis in the frequency domain (Mimosa only). Simo, Mimosa and Riflex are owned, developed and maintained by MARINTEK. UmbiliCAD is owned, developed and maintained by UltraDeep. These products are commercialised and marketed by DNV Software as part of Sesam.

Oslo
Det Norske Veritas AS
DNV Software
NO-1322 Høvik
Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11

e-mail: dnv.software@dnv.com
web: www.dnvsoftware.com

DNV Software regional offices:

Beijing
7/F, East Tower Prosper Centre,
Chaoyang District
No. 5 Guang Hua Road
Beijing 100020
P.R. China
Tel: +86 10 6562 7792
Fax: +86 10 656276666

Busan
7th Floor, Kolong Bldg, 36-7
Namcheon 1 Dong, Suyong Gu,
Busan
613-815
Republic of Korea
Tel:+82-51-610-7792
Fax:+82-51-611-7154

Dubai
Bur Juman Office Tower,
14th Floor, Trade Center Road,
Dubai,
United Arab Emirates
Tel: +971 4 352 6626 Ext 308
Fax: +971 4 352 3717

Houston
1400 Ravello Drive,
Katy
Houston, Texas 77449
USA
Tel: +1 281 396 1700
Fax: +1 281 396 1880

London
Palace House
3 Cathedral Street
London SE1 9DE
United Kingdom
Tel: +44 (0)20 7716 6525
Fax: +44 (0)20 7716 6738

Mumbai
Emgeen Chambers
10, C.S.T. Road
Vidyanagari, Kalina
Santacruz (East).
Mumbai 400098
India
Tel: +91 22 26676667
Fax: +91 22 266 56102

Rio de Janeiro
Rua Sete de Setembro
111/12 Floor
20050006 Rio de Janeiro
Brazil
Tel: +55 21 3722 7232
Fax: +55 21 3722 7572

Shanghai
House No. 36
1591 Hong Qiao Road
Shanghai 200336
P.R. China
Tel: +86 21 3208 4518
Fax: +86 21 6219 5107

Singapore
DNV Technology Centre
10 Science Park Drive
Singapore 118224
Singapore
Tel: +65 6508 3284
Fax: +65 6779 7949

DNV Software is a commercial software house fully owned by DNV, and is a leading provider of software for managing risk in oil & gas, offshore, petrochemical, refineries and maritime industries. Our software products are recognised market leaders in design, engineering, strength assessment, risk and reliability, safety and integrity management.