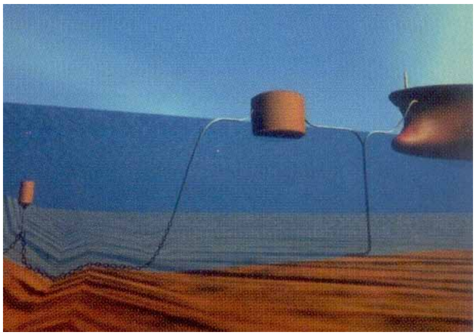
Zebec
MARINE CONSULTANTS & SERVICES

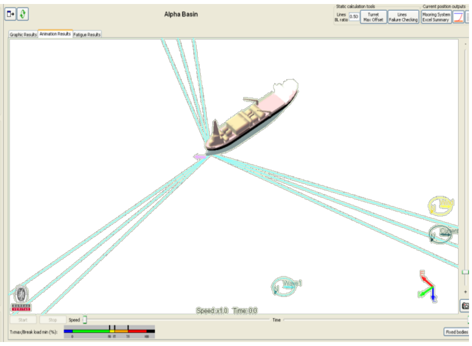
MOORING ANALYSIS

Zebec conducts coupled time and frequency domain mooring analysis for design and analysis of moored floating bodies both for permanent and mobile mooring for deep or shallow water depths. Static, quasi-static and dynamic analyses are used for simulating mooring line responses. Strength and fatigue analysis are conducted for mooring legs for Intact, damaged and transient conditions. Multi-body moorings can also be assessed for up to 5 vessels or structures.

The typical studies conducted for moorings are as follows:

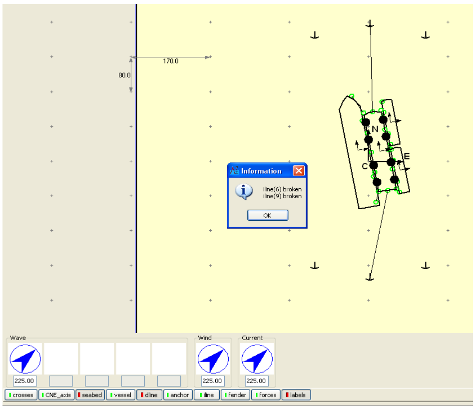
- Mooring of FPSOs, for single point mooring (Turret mooring, Catenary Anchor Leg Mooring, Single Anchor Leg Mooring) for spread mooring and for thrusters assisted mooring, including taut, semi-taut and catenary configuration
- Offloading operations via conventional and full dynamically positioned tankers, with/without tug assistance
- Keeping drilling units on station (semisubmersibles, barges, etc) via taut, semi-taut and catenary configurations
- Connection of a floating unit (LNG tanker etc) to a fixed structure (wharf or platform) by means of a temporary or permanent mooring system
- Harbour mooring analysis
- Installation procedures in difficult environments - complex seabed, presence of pipelines, wellheads.
- Loads on the anchor of a vessel transhipping cargo into multiple barges alongside it
- Loads on the mooring lines/anchors during ship-to-ship transfer operations in varying weather conditions. Tandem offloading analysis
- Local FEM structure analysis for mooring supporting equipment, fairleads, winches etc.
- Transient and damage response after line(s) failure





We can model the following facilities:

- Moring leg with any combinations of chain (stud, stud less), wire and synthetic rope.
- Nonlinearities associated with mooring legs
- Sloping seabed, corrosion/marine growth effects
- Capability of imposing specific loading (thrusters, riser, D.P. system, etc)
- Hydrodynamic effects due to adjacent floating bodies, effects of Buoy and sinker
- Dynamics effects associated with mass, damping and fluid acceleration
- Complex hull shapes – barge, ship, buoy, semis et

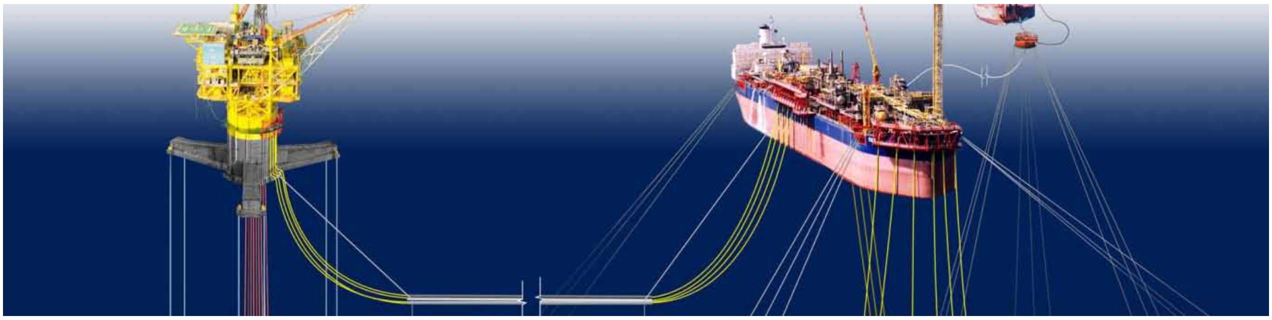


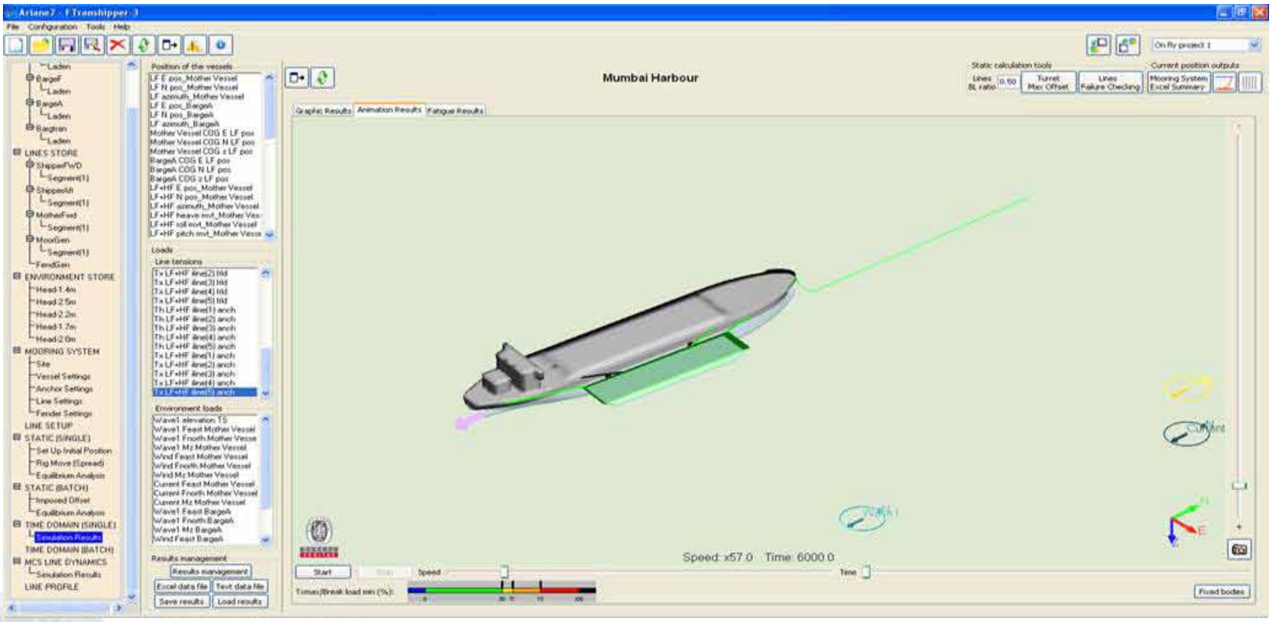
The following environmental conditions can be imposed:

- Range of irregular (many standard wave spectral including Jonswap/Pierson-Moscowitz or user define wave spectral) or regular wave conditions.
- Constant current speed
- Constant wind velocity or spectral (many standard wind spectral including API/NPD) wind formulation.
- OCIMF consistent current and wind coefficient input format and user define coefficient input.
- Constant thruster loads.
- User-definition of additional force-deflection relationships.

Software used:

- We use Bureau Veritas certified ARIANE-3Dynamic software, which offers powerful graphic features, is approved by the NMD and certified by SHELL and ELF Standards for mooring analysis, and meets the needs of engineering and validation processes





Offices at: India (Mumbai, Goa, Cochin, Kandla) & Singapore
Contact Us: At Mumbai, India: +91-22-30205000 / At Singapore: +65-62253579
Email: zebec@zebecmarine.com | www.zebecmarine.com