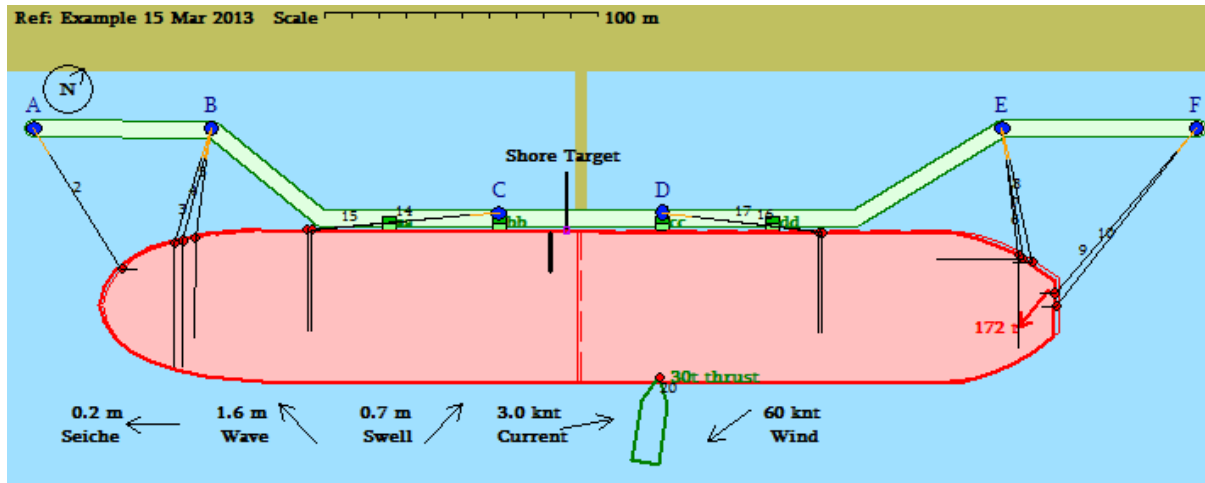




OPTIMOOR Mooring Analysis Software for Ships & Barges



Hand calculation of the various applied and resulting forces, using methods described in several OCIMF documents, is difficult and time consuming. Even then, the results of such hand calculations are only approximations. Computer simulation has in the past been the work of specialists, and was time consuming and expensive. OPTIMOOR is easy to use and employs the OCIMF recommended methods and formulae in a manner that can be run by any personnel to achieve results - fast.

Optimoor checks the static or dynamic response of any type of inshore or offshore mooring to wind, current and waves, tide and draft changes etc, producing clear results very quickly even for the most complex arrangements. It takes a few hours at most to fully master the program, assuming the user is familiar with the basic concepts of mooring. It is aimed at a wide range of users, including terminal operators, ship managers, naval architects, port designers, equipment suppliers, accident investigators, etc. It runs under any 32-bit or 64-bit version of MS Windows and has about 500 users in over 40 countries.

KEY FEATURES

- All types of moorings – pierside, spread, CBM, SPM and CALM
- Separate files for vessels and berths, so that any previous ship can be moored at any previous site
- Option to lock vessel/berth data against change





- End and/or side fendering, with option to shield against wind or waves
- Flat side contour definition for fender compatibility
- Rapid berth/vessel capability checks, including partial fender contact and pressures.
- Rope properties built-in, and catenary effects allowed for
- Fatigue life calculations on basis of user-defined long-term sea-state statistics
- Wind and current drag coefficients supplied for standard ship types (including OCIMF)
- Import of background image over which Optimoor mooring arrangement is displayed
- Graphic drag and drop positioning of fairleads, bollards , fenders
- Generation of capability rosettes for wind current and wave compass sweeps
- Automatic or manual pre-tensioning of lines to any specified level
- Winch brake slippage automatically modelled
- Constant tension winches allowed
- Double bank and side-by-side moorings
- Motion response to standard wave spectra, calculated at any point on ship
- Toggle between metric and USA units
- Batch mode for multiple cases with automatic post-processing
- RTF reporting for ease of editing into client’s own reporting format

60 knt Wind at 15° True | 1.6m Sig Wave Height | 0.7 m Sig Swell Height | Ref: Example 15 Mar 2013
 3.0 knt Current 220° True | Period 6.0 secs at 95° | Period 11.1 secs at 185° | Analysis for Time: 1100 15 Mar 2013
 Vessel Moves 1.3 fwd -0.2 out -0.1° stbd 0.1 up | Water Level 0.0 m steady | Draft: 6.1 m 0.1 Disequilibrium
 (at Target) -0.1 aft -0.1 out -0.1° stbd -0.1 down | Bottom Clearance: 7.2 m | Trim: 5.0 m after 111 iterations

Line	2	3	4	5	6	7	8	9	10	14	15	16	17	20
to Bollard/Hook	A	B	B	B	E	E	E	F	F	C	C	D	D	---
Pull-in (m)	0.36	0.42	0.42	0.40	0.39	0.39	0.36	0.44	0.44	0.48	0.48	0.35	0.35	
Total Line Length	65.0	84.0	83.8	72.9	74.8	76.3	53.7	80.5	83.7	103.6	102.1	93.2	94.6	
Inline Motion (±)	0.28	0.31	0.31	0.30	0.37	0.38	0.38	0.28	0.30	0.12	0.12	0.13	0.13	
Winch Slippage														
Inclination Down	5°	7°	7°	8°	1°	1°	0°	0°	0°	4°	4°	2°	1°	
Tension (t)	slack	19.3\$	17.3\$	14.6\$	45.9	44.4\$	48.6\$	66.7	66.6	37.2	37.5	slack	slack	
% of Strength		16%	14%	12%	38%	37%	40%	55%	55%	31%	31%			

Auto-Calculation

Fender	aa	bb	cc	dd
Thrust (t)	168	0	0	0
Compression (m)	0.15\$	0.00	0.00	0.00
Pressure (t/m ²)	14.6			

Bollard/Hook	A	B	C	D	E	F
X-Force (t)		-12.6	-74.3		26.2	-86.9
Y-Force (t)		49.1	6.9		136.3	101.1
Other X-Load						
Other Y-Load						
Total Horiz Force		50.7	74.6		138.8	133.3
Direction in Plan		-14°	-85°		11°	-41°
Bollard Uplift		6.5	4.7		1.3	0.4





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OPTIMOOR computes and displays vessel movements and mooring forces. Mooring line loads are shown in tonnes (or kips) and percentage of rated breaking strength (RBS). Lines loaded to more than 55% of RBS are highlighted in red. The analysis results are also reflected on the plan graphic display and the numeric results can be printed out.

Licensed by Tension Technology International, the software is available in three configurations with optional add-on modules:

OPTIMOOR STANDARD - For checking the mooring arrangements against standard requirements, or for compatibility studies at piers, jetties and sea islands

OPTIMOOR PLUS – As Standard, plus any sort of spread mooring with or without buoys and catenary chains, or the situation of a loadout mooring where the vessel may be at an angle to the berth, or fenders act on both the side and end of the vessel. The Plus version also allows batch running, which once set up checks an unlimited number of cases where the results are processed automatically to identify the highest line loads, excursions etc.

OPTIMOOR DYNAMIC - This includes all the static analysis features of the Plus version, but in dynamic mode uses vessel hydrodynamics with time varying wind, current, and wave drift. Single point moorings, CALM and turret systems can be modelled. The dynamic force and response of passing ships can also be calculated. The dynamic simulation generates plots of the time varying forces, vessel response, mooring line tensions, fender loads etc and can be run in continuous mode or in step mode to review data and change data, for example to simulate line failure.

WAVE RESPONSE MODULE - Optional add-on to all versions which calculates the vessel response to first order wave effects, taking shallow water and adjacent solid wall effects into account. The changing line load due vessel motion at each fairlead is calculated in the frequency domain.

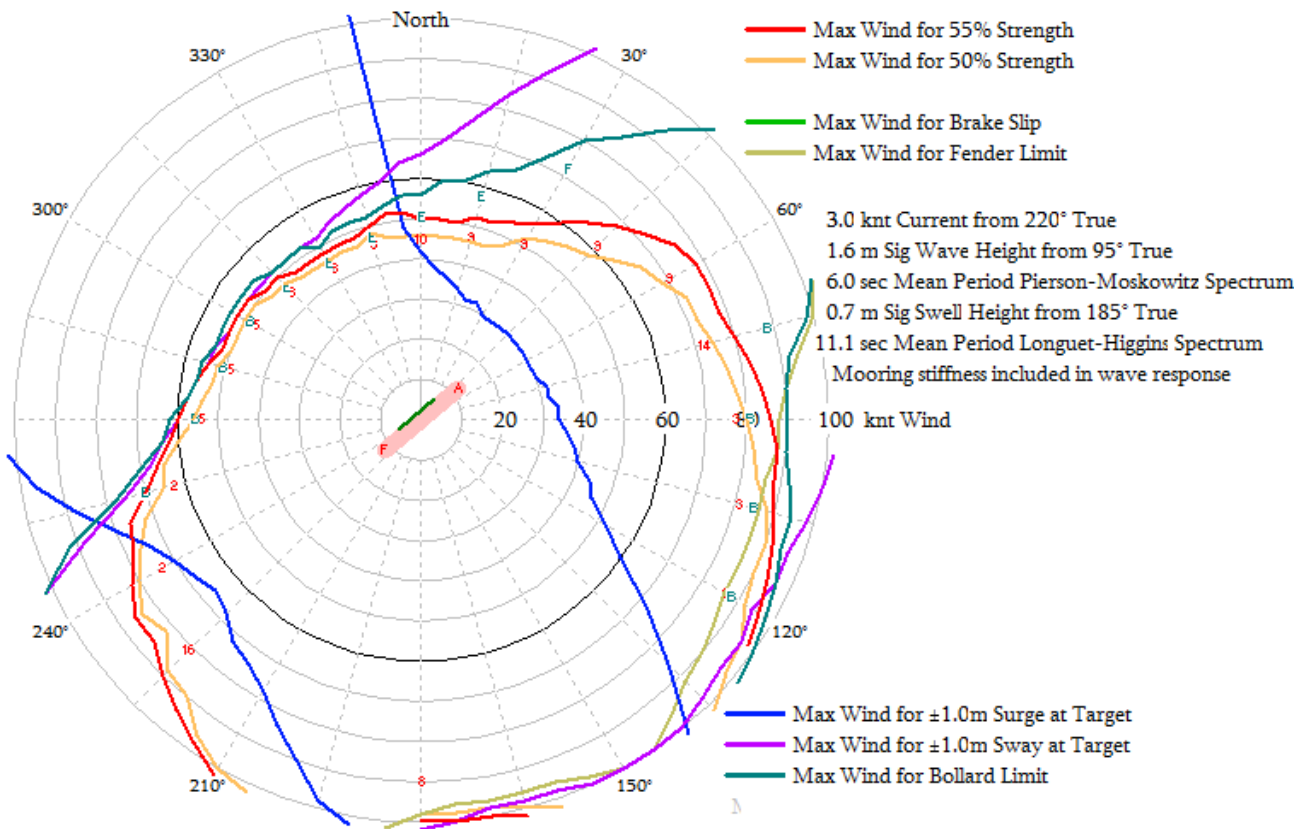
SHIP2SHIP MODULE - Optional add-on to all versions for the mooring of two ships side-by-side. Lines can run from both ships either to the other ship or to dolphin/anchor

Files are prepared in a “spread-sheet” form describing the vessel mooring system and the berth mooring points. A simple case file is then created describing the mooring arrangement for the tanker at the berth. The only other inputs required are the wind and current velocities and directions. Provision is made for entering other applied forces, for example assisting tugs, passing ships, ice, and waves.





The powerful OPTIMOOR features are easy to access. One command brings a case back to its initial conditions and resets target pretensions. Another brings all lines up to the optimum tension for minimum vessel movement. The user may alter individual line tensions (in a manner analogous to tending the mooring winch) so as to bring the mooring line load distribution into better balance. A single command sweeps the wind through 360 degrees to determine the “worst-case” loading on each line, and a graphic wind or wave capability rosette can be generated:



OPTIMOOR can calculate the non-linear RBS (strength) and load-extension characteristics for mooring lines. Data is provided for wire, aramid, HMPE, nylon double braid, nylon plaited and stranded, polyester, and polypropylene.





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OPTIMOOR has provision for initial and final draft and trim conditions and times. It also supports tidal variations via tide tables with automatic application of local correction factors. With these inputs, line tending requirements can be anticipated by stepping forward in time by minute or hour intervals. A single

key command “fast-forwards” and displays the times at which various lines would become overloaded.

Vessel and port personnel can train on OPTIMOOR to learn good techniques for arranging and tending mooring lines. The advantages and problems of various mooring arrangements can be explored and demonstrated. The time forward feature with tide, draft and trim changes, will show how to anticipate line tending requirements and decide on what might be the best tending action at a particular time.

For further information contact: info@tmcmarine.com

