

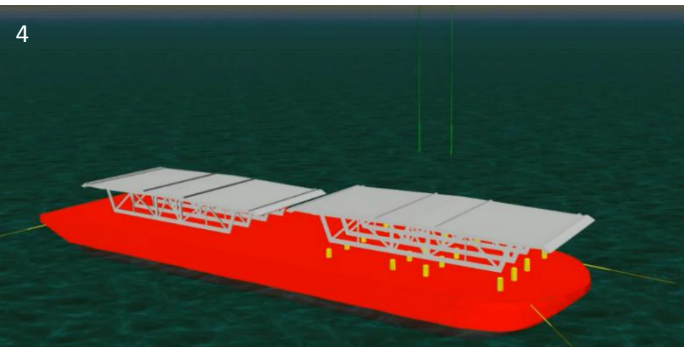
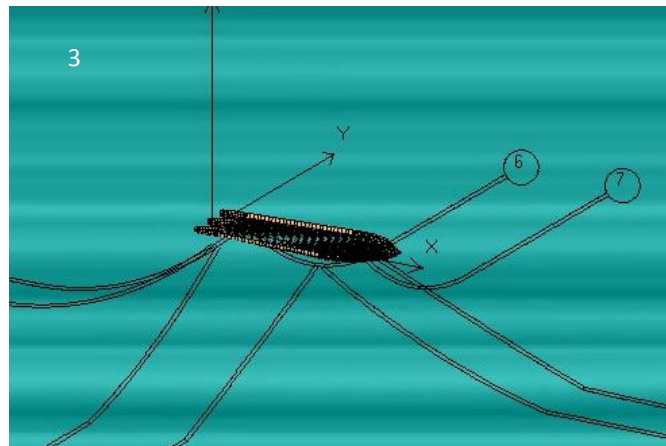
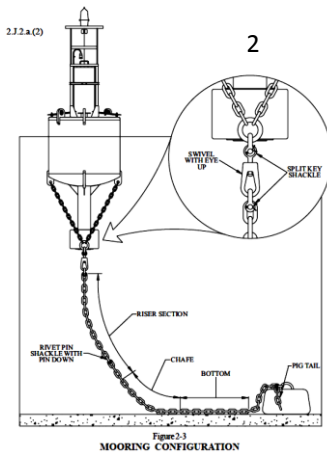
# MOORING SYSTEMS



Maine Marine Composites



## Engineering... for the Marine Environment



*The ocean environment is challenging in every way. MMC can reduce your risks by analyzing your boat, ship, mooring system, energy converter... whatever system you need to deploy in the water.*

Photo Credits: (1) Drag anchor (Vryhof Anchors) (2) Mooring arrangement for a US Coast Guard Aid to Navigation buoy. (3) Simulation model of the mooring arrangement for an arctic oil spill recovery barge. (4) Simulation model of a moored construction barge with cargo being lifted by a crane. (5) Simulation model of a floating offshore wind turbine.

MMC specializes in motion prediction for ships and platforms, advanced hydrodynamic analyses, and mooring system design and simulation. Our engineering staff has decades of experience with design and analysis of ships and offshore energy systems, and has successfully completed diverse and challenging projects for many of the most highly regarded offshore and ocean energy companies.

**Sample Projects:**

- Maine – Mooring and seakeeping response – tidal and river current energy converters.
- BSEE/BOEM – Fatigue analysis of offshore floating wind mooring systems
- Scotland – Simulation and mooring system analysis for barge-transported road segments for Firth of Forth replacement crossing bridge

**Specialized Services:**

- Advanced Hydrodynamics Analysis using CFD, ANSYS Aqwa
- Finite Element Analyses of complex structures and materials
- Mooring System Design and Analysis using OrcaFlex, Aqwa with Cable Dynamics
- Ship and Barge Seakeeping and Stability Analysis using Aqwa
- Analysis and Simulation of Complex Marine Systems using multi-body simulation in OrcaFlex

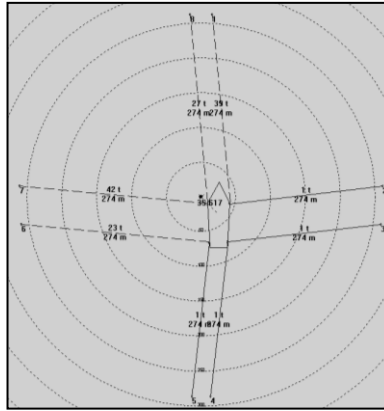
**Meeting Customer Needs, Exceeding Customer Expectations**

We offer each customer the right mix of expertise, performance and price. Our staff has expertise in marine, civil, electrical, software and aerospace engineering.

Our software analysis capabilities include:

- ANSYS Design Modeler, Rhino3D, MultiSurf, SpaceClaim

- CAD/CAE models of ocean platforms, hulls, wave and tidal energy converters
- ANSYS-Aqwa with Cable Dynamics
  - Potential flow (Radiation/Diffraction) analyses
  - Determine wave loads, Response Amplitude Operators (RAOs)

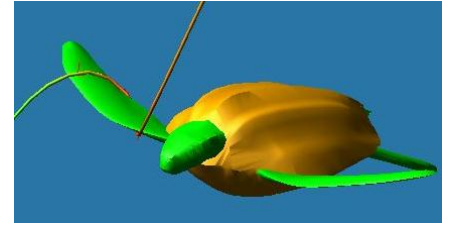


- Orcina OrcaFlex
  - Nonlinear finite element mooring model in time domain
  - Coupled with FAST to Analyze Floating Offshore Wind Turbines (FOWT) hydrodynamics including platform, turbine, moorings
- ANSYS Structural Professional
  - FEA of complex structural systems
- NREL FAST and WECsim
  - Simulation of Wave Energy Converters and controllers

**Mooring Systems for Demanding Environments**

The correct mooring system can make the difference between the success of your project, severe system failure, or the burden of excessive costs.

MMC is experienced in the design and analysis of deep water ocean moorings, shallow water wave / wind energy moorings, and river moorings. Our software analysis tools are “best in class,” selected to give you the accurate answers you need on a timely, cost-effective basis. We can help you select the best anchor, embedment, piling or gravity, and the best mooring components, chain, steel, synthetic rope or pipe.



*Computer model to study turtle entanglement in mooring equipment*

Based on our ongoing research, we can predict the life expectancy of your mooring system and we can help you to develop a maintenance schedule to minimize your operating risks.

**Mooring Systems and Vessel Hydrodynamics**

MMC staff have participated in the design and analysis of mooring systems for:

- Marine hydrokinetic systems
- Offshore wind turbines
- Marine installation projects
- Aquaculture systems
- Bridge construction

Our engineering staff has analyzed existing and future mooring system concepts to ensure that stationkeeping, anchoring, and global load requirements are satisfied. We have conducted government-funded research into mooring equipment reliability and have authored and co-authored papers and presentations on the technology.



Adding MMC to your project team will ensure that your mooring system is developed, analyzed and deployed successfully.

