



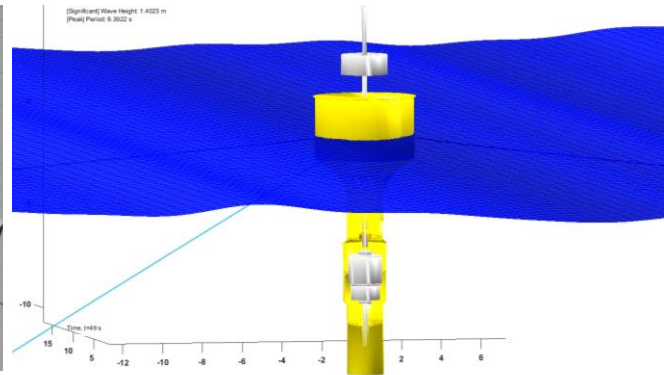
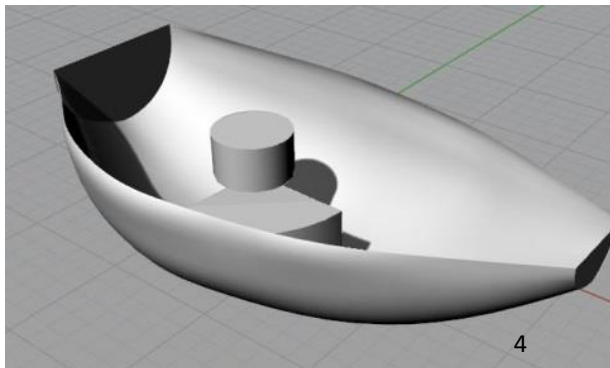
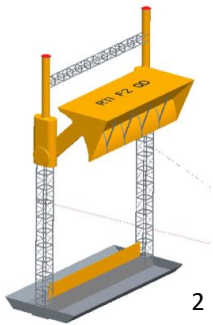
MARINE HYDROKINETICS (MHK)



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) Section of an ORPC-supplied foil, from which substrates were cut (energy.sandia.gov). (2) RTI F2 QD WEC technology (waveenergyprize.org). (3) ORPC's TidGen® turbine generator unit (www.orpc.co). (4) MMC model of Asymmetric Resonant Hull WEC. (5) MMC model of Point Absorber using modified version of WEC-Sim.

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.
- US DOE Wave Energy Prize— Optimization for Finalist Team increased projected ACE metric (performance/cost) by 60%
- 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:

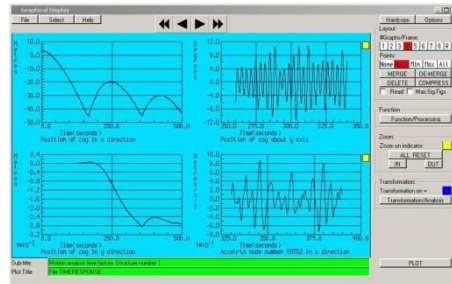
- Advanced Hydrodynamic Analysis
- Finite Element Analyses of complex structures and materials
- Mooring System Design and Analysis
- Ship and Barge Seakeeping and Stability Analysis
- Analysis and Simulation of Rigid and Flexible Multibody Marine Systems

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:

- WEC-Sim

- Multibody Wave Energy Converters, controllers, and complex power take-off systems
- 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

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.



Corroded chain from USCG ATON Buoy (MMC)

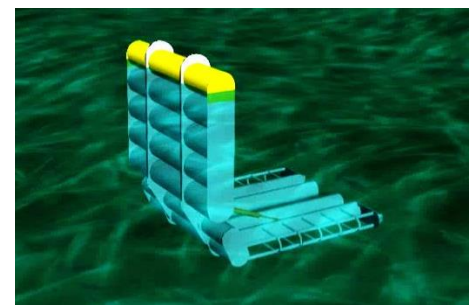
Based on our ongoing research, we can predict the life expectancy of your mooring system and we can help you to develop a maintenance schedule to minimize your operating risks.

Renewable Energy Systems in the Marine Environment

MMC has analyzed and participated in the design of energy converters for:

- Wave Energy
- Tidal and River Current Energy
- Floating Offshore Wind

Our engineering staff has analyzed existing and new wave and tidal energy concepts for mechanical, hydrodynamic and economic feasibility, and we have authored or co-authored a number of papers on the technology.



MMC model of Surge Flap Wave Energy Converter

MMC staff has assisted a number of wave energy development teams during their development efforts, and adding MMC to your project team will help to ensure that your new wave energy conversion technology is developed, analyzed and deployed successfully.

