

EVALUATION OF COMPOSITE MATERIALS FOR WAVE AND TIDAL ENERGY TECHNOLOGIES

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Composites are promising materials that could provide lightweight marine durable structures for wave and tidal energy conversion technologies. However, some composite materials are expensive and are unproven under required performance conditions. To reduce uncertainty in using composites, we are investigating their performance, potential for manufacture, and providing validated resources to industry. Sandia National Laboratories, along with Pacific Northwest National Laboratories, National Renewable Energy Laboratory, Montana State University, and Florida Atlantic University have partnered to investigate carbon and glass reinforced composites.

We are evaluating environmental effects (biofouling, salt water, corrosion) on performance of composites coupons using materials provided by U.S. Marine & Hydrokinetic (MHK) technology developers and supply chain vendors. Coupons were submerged in actual and simulated seawater to learn how to mitigate composite biofouling/environmental effects & metal-carbon fiber interconnect corrosion in saltwater. Tensile static and fatigue testing on 33 different laminates, from five suppliers were also conducted. Testing was performed on unconditioned and simulated seawater conditioned coupons of each laminate. Preparation for substructure testing and understanding of wave and tidal load challenges are current tasks in which developers have been directing our program. Results will provide industry a better understanding of the materials science and engineering behind MHK composite structures to avoid costly redesigns. Data will be housed in the open source U.S. DOE MHK Materials & Structures Database. This poster will focus on our understanding of marine composites and share with the audience that data will be housed in the open source U.S. DOE MHK Materials & Structures Database.

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