Wide World of Waterfront Applications

CREATIVE COMPOSITES GROUP

CREATIVE PULTRUSIONS | E.T. TECHTONICS™ | KENWAY composites | Harbor Technologies A DIVISION OF KENWAY CORPORATION | TOWER TECH Sustainable Efficiency | Composite Advantage

Waterfront infrastructure projects present a unique and challenging set of demands. Marine fixtures are constantly exposed to saltwater, whether or not they are submerged, along with UV sunlight, changing weather conditions, and even corrosive chemicals. Traditionally, wood, concrete, and steel have been mainstays in the industry, each offering some combination of flexibility, strength, and wear resistance.

However, there are significant limitations to wood, steel and concrete:

Wood decays over time and must be replaced more frequently than is desirable.

Steel and concrete, while more resistant to wear than wood, still deteriorate in this challenging environment.

Steel and concrete are also very rigid. This makes it harder for these materials to absorb high-energy impacts without sustaining or causing excess damage.

Lightweight, strong, and flexible, fiberglass-reinforced polymers (FRP) are emerging as the top contender to replace aging wood, concrete, and metal marine infrastructure. Consisting of a fiberglass backbone encased within a resilient polymer, FRPs combine the maximum environmental durability with design flexibility that non-composites simply can't match.

FRP's unique advantages align closely with the constraints of waterfront infrastructure projects.

Corrosion Resistance

The fiberglass core of FRP is surrounded by a UV and chemical-resistant polymer that protects against waterfront environmental hazards.

Zero Maintenance

Our composite products can last up to 75 years with no maintenance required. Given the complexity of servicing floating fixtures, this can be a huge time-saver and has delivered shorter ROI periods for owners.

Cost-Efficiency

FRP composites gain their strength from fiberglass, which is a cost-effective option that still provides excellent structural integrity.

Strong and Lightweight

Lightweight with a very high strength-to-weight ratio, FRPs are also naturally buoyant, simplifying installation in waterfront environments compared with many metal-based alternatives.

Composite Material Advantages

The Creative Composites Group offers the most advanced waterfront-specific FRP products on the market. This group of leading composite companies, consisting of Creative Pultrusions, Composite Advantage, Kenway Composites, Tower Tech, and E.T. Techtonics, offers decades of industry experience and the diverse capabilities necessary to manufacture innovative FRP products. Whether it is ship separators, fender systems, guide walls, or something else, Creative Composites Group will work with you to identify the best FRP formulation to match and outlast your existing infrastructure—and often at lower project cost.

This eBook outlines some of the many applications of our waterfront composites.

Applications

Waterfront infrastructure encompasses a wide range of facilities and installations. Some elements of the infrastructure are submerged in the ocean, intended to safely guide vessels ashore. Others are permanent land structures that bear heavy loads and direct exposure to sunlight and saltwater spray. Marinas, docks, piers, ports, and similar sites can all benefit from specialty materials designed with the oceanfront environment in mind.

The Creative Composites Group can work with you to develop both specific applications and custom solutions.

Fender Systems

Fender systems protect critical waterway infrastructure like bridge pier and electric towers from damage. Fender systems must effectively absorb high-energy impacts from ships and barges, dissipating the energy in such a way that the fender sustains as little wear as possible.

FRP materials are uniquely suited for this job. The composite material has a lower bending stiffness than concrete or steel while the fiberglass affords a comparable level of high strength. As such, FRP installations offer substantially greater energy absorption, deflecting and recovering their shape without damage to the vessel or the fender.

The Creative Composites Group offers a number of proprietary products designed specifically for use in waterfront fenders and walls. Hollow pipe pilings are composed of high-strength, directional fiberglass encased in a corrosion-resistant resin. Pilings are flexible, durable, and affordable, and thus recommended for use in many different marine applications. Stiff fiberglass wales are used for highly optimized fender systems. Fiberglass walkways are added on top for maintenance access.

Fender systems can take many forms, depending on the size of vessels present. The following fender components are excellent candidates for FRP construction to benefit the entire installation:

Pipe Piles

FiberPILE and SUPERPILE pipe piles are among the most sturdy and durable piling materials on the market. SUPERPILEs are manufactured in a high volume process for smaller diameters of 10, 12 and 16 inches and wall thicknesses of 3/8 or ½ inch. FiberPILEs are manufactured using a medium volume process, which allows for customization of diameters from 18 to 72 inches and wall thicknesses up to two inches. Standard product sizes are available

Wales

FiberWALE is built from stiff, fiber-reinforced structural segments that offer enhanced performance compared to wood or plastic lumber. These segments are stiffer than plastic lumber, so they better distribute impact loads across pilings. FiberWALE sections can be molded for tight-radius sections, which makes it easier to construct an effective fender in a congested environment.

Dolphins

A single, large diameter FiberPILE breasting dolphin can replace entire clusters of timber with no discernable performance drop. FRP dolphins are just as strong and much more durable than traditional mooring dolphins, and they can be installed at low costs.

Guide Walls

Guide walls and slip walls are another excellent application for FRP materials. FiberPILE guide walls are specifically designed to bend under incidental vessel contact before recovering fully to the initial shape. This flexibility eliminates concerns of damage to either the guide wall or the mooring ship. FRP materials are less costly and more reliable for these applications, making them an excellent investment for any waterfront construction project.

Sheet Piles

SuperLoc® piles replace traditional retaining walls with decay-proof fiberglass sheeting. Compared with wood, vinyl, concrete, or steel alternatives, these sheet piles offer high strength to weight ratio, corrosion resistance, virtually maintenance-free operation, and product versatility.

Camels and Separators

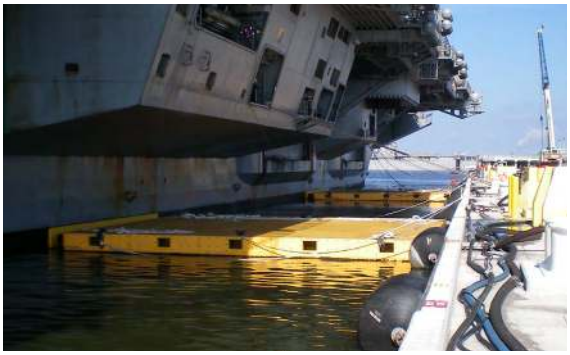
Camels and separators comprise a diverse set of floating structures that allow safe berths for vessels as they approach a docking site. Camels fit between a vessel and the pier to protect both from accidental impact, while separators help regulate traffic and maintain space between vessels.

Virtually any camel or separator can be made more durable with the use of FRP composites.

- **Log Camels.** Log camels float between the ship and the pier to ensure that the vessel maintains a safe distance. They also help distribute berthing loads across multiple fenders so that the piling structures can better absorb the impact.

- **Submarine Camels.** Similarly, submarine camels are shaped to facilitate proper spacing between submarines and a pier or wharf. Low maintenance reduces operational costs over traditional steel and wood camels (which require repairs every two years).

- **Aircraft Carrier Camels.** Aircraft carrier camels are uniquely tasked with providing separation between the massive, valuable naval vessels and the dock. Low-maintenance FRP composites withstand these rigors with a service life of 25 years, offering a clear alternative to high-maintenance steel camel structures.



- **Ship Separators.** Ship separators maintain an appropriate distance between vessels ranging from personal watercraft to commercial barges. In any case, FRP separators are lightweight and durable, operating for decades with minimal maintenance required.

Docks and Marinas

Specialty FRP composites can be used to build the framework of fiberglass piers, ports, harbors, marinas, and similar installations. FRP marine decks perform better against the demands of an oceanfront environment and maintain that performance over many years. FRP can also be used to construct floating pump-out stations, which require a stable, lightweight platform that can support a 1,000-gallon holding tank. Compared with wood piles, FRP dock piles provide higher performance and longer lifespan.

Specialty Applications

FRP may be used in any number of specialty waterfront applications. For instance, its lightweight nature makes FRP an excellent option for trench covers, substantially decreasing weight compared to concrete while still supporting heavy loads. FRP trench covers are just as functional as concrete ones, but they afford easier access to utilities.

Another specialty application, the Army Corps of Engineers (ACE) has adopted FRP as a material for wicket gates. Wicket gates are mobile dams that can be lifted from the river bottoms when higher water levels are needed for safe navigation. Traditionally, these have been made of wood and steel, which require frequent maintenance. However, the ACE recently installed an FRP version in the Illinois River, drawing on its improved strength and longevity.

Whether or not we've addressed it here, the Creative Composites Group can help you determine the best FRP formulation for your specialty application. **Contact our team** with your project needs today.

Creative Composites Group Solutions

The Creative Composites Group are experts in FRP formulation and have extensive experience meeting the needs of waterfront industries. To learn more about how we can bring enhanced performance to your worksite, **request information or quote** today.

Partner With Creative Composites Group

Your Single Source for Innovative Engineered Solutions Using Fiber Reinforced Polymer Composites

Advance your products and projects beyond the limitations of traditional concrete, steel, and wood by leveraging the combined strength of Creative Composites Group.

We are the driving force of technical innovation that has created the industry's most advanced engineered FRP. Our team of industry leaders includes:

- **Creative Pultrusions**
- **Composite Advantage**
- **E.T. Techtonics**
- **Kenway Composites**
- **Tower Tech**

As Creative Composites Group, we can help you to create products and structures of any size or shape — for projects of any ambition or vision.

Other companies commoditize FRP in off-the-shelf shapes and forms; Creative Composites Group does not. We are the single source for the broadest range of engineered FRP solutions to build your ideal projects. That's possible only with our proven engineering processes and end-to-end collaboration, service and support resources.

Discover Your Custom Engineered FRP Provider

We're much more than a construction material supplier. Creative Composites Group is committed to becoming a trusted business partner who is keenly interested in your project's success.

Creative Composites Group works alongside your team, from facility owners to design engineers to contractors, to help you develop the most economical FRP solution that meets the most demanding structural requirements and environmental conditions.

Have a project that you think engineered FRP is right for? Call us. We'd be thrilled to discuss it with you.

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