

## Bond Enhancement for Underwater Repair

**R**esearchers at the University of South Florida have invented a cost effective repair method utilizing fiber-reinforced polymer (FRP) which greatly enhances the bond strength in underwater repairs while increasing reliability and efficiency.

As marine structures (e.g. bridges, piers, dams) age, the submersed piles that support them inevitably suffer damage stemming from the harsh and corrosive environment in which they reside. The current method of using FRP relies on the pressure exerted by a plastic shrink film that is wound tightly around the repair. The drawback of this method is that the bond achieved between the FRP and the substrate using this method is poor due to the entrapped water and low contact pressure during the curing process.

Inventors at USF discovered that maintaining a constant pressure over the entire wrapped region enhances the underwater adhesive bond by ensuring proper contact while curing. Constant pressure is created by using vacuum bagging, pressure bagging or a combination of both. By using a vacuum or pressure bagging process, water that might interfere with the bond is expelled, and a pressure of up to one atmosphere is constantly applied throughout the curing time. The result is a vastly superior bond that provides long-lasting support and protection for the supporting pile.

This method can be applied to either concrete or wooden piles, making it useful in the maintenance of virtually any aging marine structure. By its clear advantages, this method of repair will serve as an attractive alternative to pile jacketing or replacement.

### ADVANTAGES:

- **Cost-effective and long term repair solution**
- **Compatible with different resins and substrate materials**
- **May be used in all adhesion dependent repairs**

*Novel Method Significantly Enhances the Bond Strength and Increases Reliability*



*Pressure Bagging Process Being Applied to Underwater Pile*

**Tech ID # 05B085    US Patent #: 7,871,483**

University of South Florida | Technology Transfer Office  
813.974.0994 (office) | 813.974.8490 (fax)  
patents@research.usf.edu  
<http://www.usf.edu/research-innovation/pl/>