

The Case for Composites: OmegaWrap® System Advantages, Capabilities, and Future Applications

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Composite repair technologies have gained significant acceptance over the past 30 years and their popularity continues to grow today. In the early days of their use, these repair systems were primarily used to reinforce corrosion features. However, through extensive research and testing efforts over the last 15 to 20 years, involving pipeline companies, composite repair technology companies, regulatory agencies, research organizations and subject matter experts, their use has extended to the reinforcement of dents, mechanical damage, vintage girth welds, wrinkle bends, and seam welds.

Key Advantages of Composite Repairs

1. **Versatility:** Composite materials that are installed “wet” can be used to reinforce a variety of pipe geometries and configurations, including wrinkle bends, elbows, and branch connections. Their capability of conforming to pipe ovalities is another advantage over other repair methods.
2. **Material Flexibility:** Multiple different fiber types, fiber orientations and resins produce a wide range of technologies that can be used to reinforce everything from corrosion, which primarily requires “hoop” (circumferential) reinforcement, to wrinkle bends and girth welds that require axial reinforcement.
3. **Growth Potential:** Because of continued advances in fiber types and resins, there are numerous opportunities for expanded growth in the composite repair space. As these technologies become more sophisticated, the range of utilization will continue to grow.

Developing the OmegaWrap® Composite Repair Systems



In 2019, Allan Edwards partnered with OmegaWrap, LLC to [bring composite repair solutions to the market](#) that contained both superior strength and the agile customer-first approach for which Allan Edwards is well known. By adding this unique repair to its [existing repair offerings](#), Allan Edwards was able to broaden its array of non-intrusive pipeline repairs to cover almost any application.

The most fundamental test in designing and qualifying a composite repair system is meeting or exceeding the standards set forth by ASME

PCC-2. This series of tests involves fabricating panels and conducting tensile testing to determine the tensile strength, strain-to-failure, and elastic modulus.

While it prioritized exceeding minimum PCC-2 standards, Allan Edwards also conducted a more rigorous performance testing regime to highlight more advanced system capabilities. The OmegaWrap® EG (E-glass) and C (Carbon) systems underwent testing to evaluate their performance in reinforcing dents, severe corrosion and cracks subjected to extreme cyclic pressure conditions. Burst testing was also conducted on test samples reinforced with the OmegaWrap® carbon-epoxy technology, containing 15% and 50% EDM notch features that were pre-cycled to ensure cracking was present. Once testing concluded, the result was two highly vetted, dependable composite repair systems with a myriad of data supporting their capability to reinforce severe defects in need of permanent repair.

Specific Advantages of the OmegaWrap® EG & C Composite Systems

1. Install Speed & Backfill Time

The longer it takes to complete a repair and backfill, the more expensive the repair becomes for the operator. Aside from productivity slowdowns, costs quickly mount through inflated labor hours, equipment rentals, and per diem costs. Simply put, the faster a repair can be properly installed, the more money, time, and complexity the operator can eliminate. OmegaWrap® installations do not require reduced line pressure or shutdowns, and they allow for same day backfill in many cases. All installation steps can be conducted back-to-back without pausing to let anything cure. As with any composite system, colder temperatures will lengthen the cure time of the repair, but, in average temperatures, the typical cure time of an OmegaWrap® installation ranges between 2-4 hours. This streamlined process translates to substantial savings for the operator.

2. Less Steps

When developing the OmegaWrap® composite systems, Allan Edwards aimed to reduce complexity wherever possible. Both the EG & C systems are streamlined with pre-set measurements and fewer installation steps than is typically expected. One advantage of the OmegaWrap® e-glass and carbon systems is that only one side of the fabric is required to be “wetted out” before wrapping the repair. This procedure easily shortens smaller jobs by 30 minutes or more, while large-scale jobs could see time savings of up to several hours. As stated above, time saved is money saved when it comes to facilitating a quicker backfill.



3. User-Friendly Calculator

Many composite companies use proprietary calculator technology to measure the specific requirements of a composite material repair. On the contrary, the user-friendly, Excel-based OmegaWrap® calculator is freely available to all customers. Whether customers make the calculations themselves or Allan Edwards computes on their behalf, it does not shield its technology from public access. Throughout the entire process, from initial inquiry to repair completion, the dedicated Allan Edwards engineering staff is ready to help with calculations and anomaly repair recommendations.

4. Responsive Support

Every offering at Allan Edwards is accompanied by top-tier end-to-end support. Its top priority is making sure that the customer has everything they need for a seamless repair installation – from stock in multiple locations nationwide, to same day shipping, to a constant guarantee to always



reach a helpful human on the other end of the phone line, Allan Edwards makes sure its customers receive the coverage they need with every OmegaWrap® composite installation.

The Next Frontier: Innovative Developments in Composite Reinforcement of Cracks

While composites have been used to repair defects such as dents, gouges, pitting and corrosion in pipelines all around the world for more than three decades, interest has recently begun to circulate in the ability of this technology to reinforce crack defects as well—a largely untested area of composite reinforcement. As a company consistently driven to innovate across every avenue, Allan Edwards jumped on this opportunity.

In 2022, Allan Edwards participated in a full-scale testing program, the Composite Crack Reinforcement Joint Industry Program (JIP), to measure the performance of the OmegaWrap® C composite when reinforcing cracks. The OmegaWrap® C system yielded impressive results throughout the JIP, demonstrating its ability to reinforce cracks for long-term service.

The JIP established a baseline performance benchmark through cycling unreinforced samples (no composite reinforcement of the defect zone) with simulated 15% deep cracks. Every unreinforced sample failed well before reaching 10,000 cycles, with the earliest failure occurring at 1,570 cycles, and the longest-lasting sample failing at 8,990 cycles.

On the other hand, when the samples containing defects reinforced with the OmegaWrap® C system were cycled, seven of the eight tested samples surpassed the runout threshold of 25,000 cycles.



The Composite Crack Reinforcement JIP was significant in several ways:

1. It developed a design method that validated the use of the OmegaWrap® C system to reinforce cracks.
2. It demonstrated the ability of the OmegaWrap® C system to reinforce cracks for long-term service.

What Does the Future Hold for Composite Repairs?

The future use of composite repair technologies is promising, and their numerous uses will undoubtedly continue to expand dramatically. The key to ensuring long-term progress involves the forward-thinking mindset of companies and their willingness to invest time, capital, and resources into developing new and improved technologies, coupled with validation through numerical modeling and full-scale testing. The ultimate goal is to ensure that the performance capabilities of a composite repair technology meet and exceed the rigorous demands of integrity management programs managed by pipeline companies around the world – continually refining today’s technology to meet tomorrow’s needs.

About Allan Edwards

Since 1947, Allan Edwards has leveraged our first-hand experience and trusted expertise to steer advancements in pipeline performance. We engineer, manufacture & distribute products that optimize throughput wherever product flows. Our duty is paramount: to deliver risk mitigation you can count on while partnering with you every step of the way. [Let's partner.](#)