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Top 5 Tips and Best Practices for Engineered Pipe Composite Repairs

Following These Guidelines Will Ensure Protection for the Environment

By Matt Green and Casey Whalen

Engineered composite repair systems have aggressively grown in popularity in the last decade. These highly beneficial and easy-to-use repair materials allow pipeline owners and operators to safely and effectively maintain operations before, during and after the repair is in place, and they provide a high level of confidence in successful future operations.

While composite repair systems have a high level of validation testing, engineering and development, they provide a relatively easy repair process. But as with any process that includes the human touch, mistakes can still be made. These five tips and best practice recommendations can help to ensure a safe and successful repair is made which can withstand the test of time for years to come.

1. Product testing and qualification

**Be sure that any repair system that will be used on your assets has the appropriate testing for your needs and intended use.*

It goes without saying that any product used should have relevant and sufficient product testing and qualifications to back up their intended uses. There are existing industry standards that provide a list of product qualification tests that are good practice to conduct. However, this should be viewed only as a minimum level and not as the full expectation of testing documentation. Many repairs are on specific defects (dents, wrinkle bends, cracks, etc.) that should be evaluated on their own with a specific set of testing programs to ensure the interactions of the repair and the defect are understood and can be appropriately designed for.

2. Repair design

**Be sure your composite repair design is relevant and appropriate for your specific repair needs.*

The design of a composite repair system, while complex, is one of the many benefits of composite materials. Knowing the requirements of the repair and being able to customize a design package accordingly can create a much more beneficial and economical repair option. But it requires a knowledge of the repair system materials, performance testing capabilities and the needs of the specific defect with regard to reinforcement and to interaction with the repair system. It is not as simple as plug A into B, and the outcome is the design. There are multiple methods and equation sets that should be reviewed and not all design equations in standards are applicable or relevant for all defect scenarios.

3. Installer training

**Be sure all technicians have been fully trained and certified to install the specific composite repair system being used for your repairs.*

As with everything in life, when a person is involved, there is risk of failure. All the qualification testing and perfect repair design won't mean anything if the material is not installed correctly. To reduce this risk, any installer of composite repair systems should go through the proper training programs, so they are fully aware of the product and its proper application and capabilities. While the installation of a composite repair is generally easy, it does not mean that it is simple. There are specific steps and specific processes in place that must be followed to ensure that the repair system will function as intended and be durable for the expected lifetime of the repair. Without proper training and knowledge on the repair system, the installer may not know these critical steps.

4. Installation Method

**Be sure the installation method is appropriate for the scenario being repaired.*

While most consider the design output to simply be repair thickness and overall length, one of the most overlooked outputs is the installation method. While different methods are taught during training, it is important to review the installation method prior to any installation. Many repair systems come in various widths of fabric to help ensure an easy, successful installation. For example, it is near impossible to install a 12-in. wide wrap onto a 6-in. outer diameter pipe while spiral wrapping. A better method would be to spiral wrap a 3-in. wide wrap or to apply the 12-in. wide wrap using the offset-method instead of spiral wrapping. For different geometries, such as pipes with nozzles, valves or elbows, specific installation methods should be known prior to beginning installation.

5. Installation Documentation

**Be sure proper steps are taken and specific processes are followed during the installation of composite repair systems.*

Once all of the up-front items have been thoroughly and completely vetted and confirmed and you're ready to install a repair on your pipeline, field installation and documentation becomes the next critical step in the process. Any repair system supplier should have a detailed process for field installation (as the obvious follow up to a robust training program) to ensure that all steps have been considered and are measured. Installation guides, quality documentation, and specific reports for the composite repair system being implemented should all be available and used before, during, and after any repair is executed. Documentation and traceability are critical to ensure not only that the installation was done correctly, but also for future inspection and review programs to ensure it is available at later dates.

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