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FEATURED PROJECT

Carbon Fiber Repair Kit Application

OIL PIPELINE

CUSTOMER
QEP Resources

APPLICATION TEAM
Internal Maintenance Team

SYSTEM
Carbon Fiber Repair Kit

LOCATION
USA

DATE OF APPLICATION
April 2020

SUBSTRATE
Carbon Steel

PROBLEM

A crude oil and natural gas exploration and production company reached out to Advanced FRP Systems when a standard ultrasonic thickness inspection turned up over 80% wall loss due to internal corrosion. The corrosion occurred on a 20-inch diameter crude oil pipe located in an oil terminal facility. As pipe replacement required fully draining the oil tanks at the terminal, an alternate solution was desired that allowed the facility to stay online during the repair while providing a long-term solution. Crucially, the solution had to be installed by the internal maintenance team due to safety restrictions imposed by the Covid-19 pandemic.

Figure 1 Smoothing of the Pipe and Weld Seams with FRP Repair Putty

SOLUTION

As the internal corrosion would not be remedied over the span of the repair area, Advanced FRP Systems recommended our Carbon Fiber Repair Kits to provide a solution that would repair and reinforce the damaged pipe section and be easy to install for the internal maintenance team. Advanced FRP was able to train the maintenance staff through a virtual training session, providing them with the knowledge necessary to install a composite pipe repair that is compliant with ASME PCC-2 (2018) Standard for Non-Metallic Repairs on Pressurized Equipment and Piping, even with minimal application experience and 100% wall loss.

STEPS:

1. A 6 ft. repair area was identified and grit blasted to remove the existing coating and provide a profile for adhesion with >80% wall loss.
2. The area was primed with FRP 120 HT, high-strength adhesive.
3. Six layers of carbon fiber were installed over the repair area by using 3 of the Large Carbon Fiber Repair Kits
4. The system was fully installed in one shift and allowed to cure for 24 hours.
5. The existing corrosion barrier was extended to cover the termination points of the carbon fiber repair.

Figure 2 Saturation of the 25-inch width Carbon Fiber Fabric

Figure 3 Application of Carbon Fiber Composite Reinforcement

BENEFITS

- Compatible with ASME PCC-2 (2018), including with 100% wall loss
- Multiple kits can be used, side by side, without seams or weak spots
- Fully installed in a single shift, without taking the system offline
- The composite system is fully structural and verified to withstand more than 1,000 psi of internal pressure even with a through-wall failure in the host pipe
- Provides a permanent solution with a maintenance-free service life of over 50 years