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FEATURED PROJECT

Composite Pipe Repair

PERMANENT COMPOSITE REPAIR FOR ACTIVE PIPE LEAK

CUSTOMER
Steel Manufacturing Facility

DATE OF APPLICATION
September 2022

SYSTEM
FRP 110 HT Tack, FRP 211 HT Saturant, CF-500 BD, GF-130 MCU

LOCATION
Ohio

SUBSTRATE
Carbon Steel

PROBLEM

A major leak in a process water pipe caused by a failed weld repair resulted in a partial shutdown at a steel manufacturing facility. The heat from weld repairs is known to damage internal coatings, resulting in localized corrosion and ultimate failures. Major failures are difficult to fix, and time was critical because of the partial plant shutdown. The pipes were depressurized, but not completely drained, so water was still leaking while the repair was installed. Fortunately, a leak repair specialist was already onsite and could work towards implementing a solution.

Figure 1 Identified holes in the tank were repaired with carbon fiber

SOLUTION

Once the leak was under control using a moisture-cured urethane system, surface preparation could be performed by thoroughly cleaning and grit blasting the remainder of the pipe. The carbon-fiber composite was then installed over the outside of the pipe.

INSTALLATION STEPS:

1. Grit blasted to SSPC-SP 6/NACE No.3 Commercial Blast cleanliness.
2. Used HP 110 HT Tack to fill in pitting and adhere the fabric to the pipe's complex geometry.
3. Externally wrapped four layers of CF-500 BD, a bi-directional carbon fiber fabric, saturated with FRP 211 HT Saturant.
4. A fast set polymer was injected into the wrap annulus where water was observed weeping through the repair area.
5. Wrapped an additional four layers of CF-500 BD saturated with 211 HT around an area with a large through-wall failure.

The final steps were performed with the pipe in full-service conditions. The work proceeded as quickly as possible to get the plant back online.

Figure 2 Repair putty filled in pitting

Figure 3 Permanent pipe repair using carbon fiber composites

BENEFITS

- Within 48 hours of starting the repair, the facility was back online with a long-term repair solution fully installed.
- The composite repair was compatible with an injection and rewrapping technique when a minor leak was discovered after re-pressurization.
- The composite system repaired extreme corrosion, a large through-wall failure, and an extremely complex pipe geometry.