

## FEATURED PROJECT

# Coal Pipe Elbow Repair - Drake Station

### CUSTOMER

Coal Fired Power Generation

### APPLICATION TEAM

Internal Maintenance Team

### SYSTEM

Ceramic-Reinforced Carbon Fiber Pipe Repair

### LOCATION

Colorado Springs, CO

### DATE OF APPLICATION

June 2018

### SUBSTRATE

Carbon Steel

## PROBLEM

A coal-fired power generation facility was experiencing through-wall failures on the piping that transfers coal from the mill into the furnace. The failures were primarily located on elbows within the piping system, including some where previous repairs with welded plates or epoxy steel repair sticks had been performed. The facility wanted a cost-effective repair solution that could be performed without hot work in this highly-volatile area and could be installed by their internal maintenance team while the plant was online.

The plant considered three repair options to repair the leaking elbows: installing new, ceramic-lined steel elbows; a protective coating application; and, a composite reinforcement system. Ultimately, the facility chose Advanced FRP's ceramic-reinforced composite carbon fiber composite system as replacing the elbows was costly and time-consuming while the protective coating alone did not provide adequate protection or longevity to the pipe elbows.

The repair system created a structurally-independent, ceramic-lined, carbon fiber composite built around the existing elbow. The plant's internal maintenance team was trained by Advanced FRP and successfully installed the system on three elbows within a two-day mill outage.

### STEPS:

1. The mill being worked on was taken off-line but the plant was still online.
2. A bristle blaster was used to create a profile on the extrados of the elbow.
3. A ceramic-reinforced epoxy putty was applied at 125 - 250 mils thick over the high-wear areas.
4. A high-strength, carbon fiber composite was wrapped around the elbow.
5. An epoxy topcoat was applied via roller at 10 - 15 mils.

Though the tank was brought offline for a limited time during the repair, the entire repair was installed and fully cured well within the planned repair window. This was done at a fraction of the cost of replacing the tank roof and with minimal impact on production.

## SOLUTION

## BENEFITS

- Existing elbow is left in place and no hot work was required for installation.
- Composite system is hand-applied and is lightweight, eliminating the need to replace hangers or adjust them to account for added weight.
- The composite system provides a repair solution at less than 1/4 of the price of installing new replacement elbows.
- The repair solution will provide the operator with a 20+ year, maintenance-free service life.



Figure 1 Bristle Blast Surface Preparation over Previously Repaired Elbow



Figure 2 Application of Ceramic Repair Putty over Extrados of Elbow



Figure 3 Coal Pipe Elbow After Installation of CF Composite and Topcoat