



External Strengthening of High Density Steel Tank HJ3 Carbon Fiber

Case Study – HJ3 CS200908

Introduction

Pulp and Paper plants utilize large steel high density tanks to store pulp. In this particular pulp and paper facility, a steel tank that holds stands 100 feet tall and 50 feet diameter experienced significant corrosion resulting in over 900 through holes.

Problem

To determine the extent of corrosion, HJ3 performed an ultrasonic thickness test to measure the steel loss throughout the body of the tank. Corrosion to the steel ranged from 30% to 50% steel loss on the upper 50% of the steel tank only. The plant considered replacing the existing steel tank with a new tank at the cost of \$2.5 Million but could not afford the interruption to plant processes and the associated down time costs.



Solution

HJ3 engineers developed a carbon fiber solution to repair the top half of the steel tank. The steel substrate was abrasive blasted to clean the steel to white metal, eliminate the existing paint, and profile the steel to a 2-3 mils. 2-inch square thin gauge steel plates were placed over 900 through-holes to create a consistent surface. The steel was then primed with HJ3 PC-200 Primer Coat. After priming 1 to 3 layers of carbon fiber were saturated and boned to the steel to replace the strength lost by the corroded steel sections. To tie the Support Beams to the cat walk into the carbon fiber repair, a carbon fiber shell was fabricated and bonded to the side of the tank walls. Then a polymer concrete was poured to fill the cavity between the carbon shell and the steel I-beam.



Conclusion

The HJ3 installation was completed in 8-weeks and resulted in over \$750,00 in savings when compared to the cost of cutting the corroded steel rings and welding new steel rings to the existing tank. The HJ3 repair resulted in zero downtime and minimal interruptions to plant operations. The installed system was installed with a 3-year warranty that is standard on all HJ3 repairs.



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External Strengthening of 2.5M Gallon Steel Tank with HJ3 Carbon Fiber

Case Study – HJ3 CS200905

Introduction

Mines utilize large steel tanks to store water that is used in various plant processes. In this particular copper facility, a steel tank that holds 2.5 Million gallons of water suffers from severe corrosion to its steel shell resulting in fatigue, cracking, and leaks.

Problem

To determine the extent of corrosion, HJ3 performed an ultrasonic thickness test to measure the steel loss throughout the body of the tank. Corrosion to the steel ranged from 25% to 60% steel loss. At these levels, the existing steel was at risk of structural failure. To minimize risk of structural failure, the water levels within the tank were lowered to 50% capacity.

Solution

HJ3 engineers developed a carbon fiber solution layering carbon fiber to directly replace the strength lost for each ring of the tank. The bottom 50% of the steel tank was strengthened using one layer of HJ3 CF512 uni-directional fabric. The top 50% of the tank received anywhere from 2 layers to 4 layers of CF516 uni-directional carbon fiber. The system was then coated with a urethane top coat pigmented to match the company's colors and logos. The inside of the tank was blasted and coated to stop the internal corrosion from undermining the remaining steel.

Conclusion

The installation was completed in 8-weeks and resulted in over \$3 Million in savings when compared to a new steel tank. The HJ3 repair resulted in zero downtime and minimal interruptions to plant operations. The installed system was installed with a 3-year warranty that is standard on all HJ3 repairs.



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