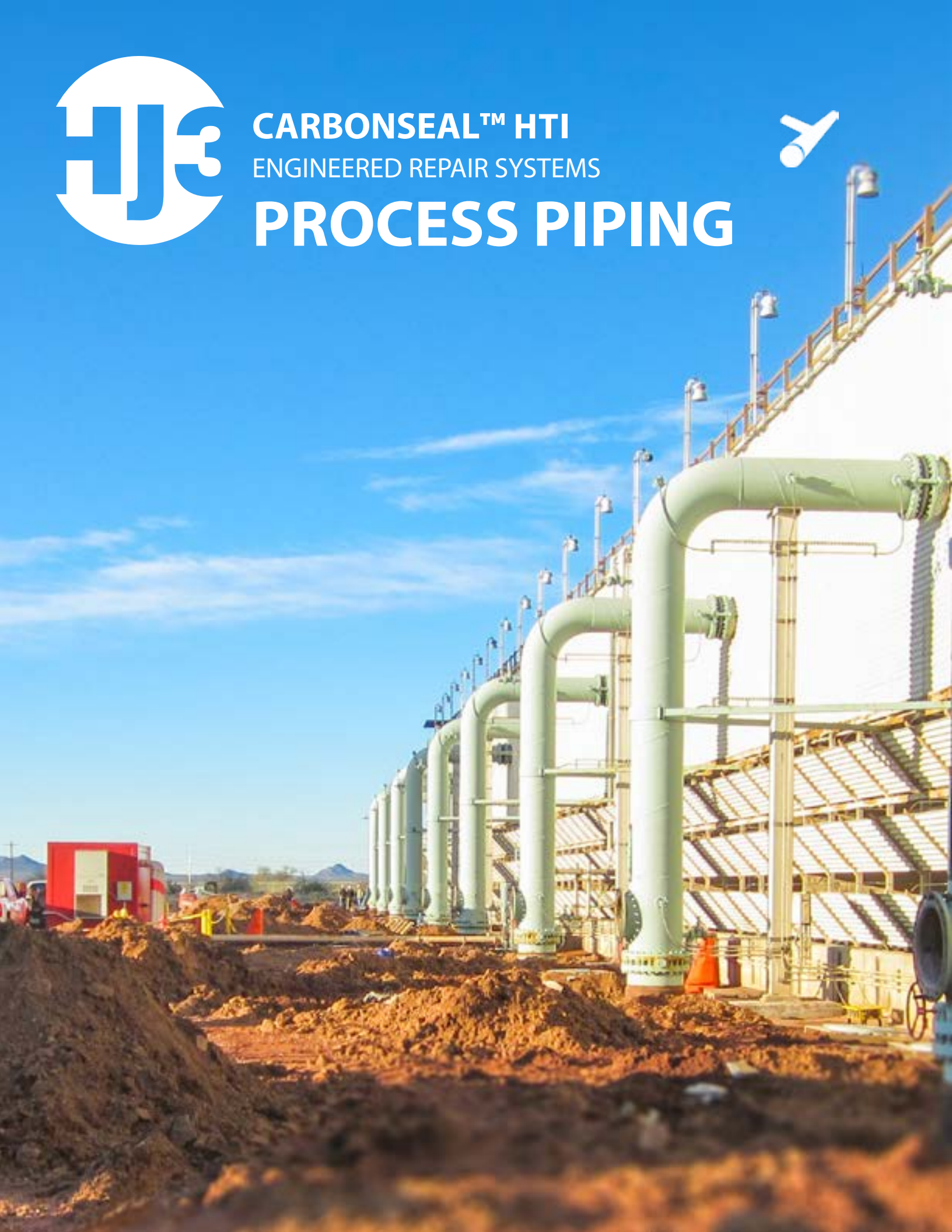




CARBONSEAL™ HTI
ENGINEERED REPAIR SYSTEMS
PROCESS PIPING





CARBONSEAL
ENGINEERED COMPOSITE SYSTEMS

HJ3 provides the most comprehensive line of strengthening products in the world for rehabilitation of process piping systems, tanks and concrete infrastructure.

Over the last 20 years, HJ3 has been proud to service clients around the globe on over 15,000 applications. From large scale piping projects to heavy industrial repair applications, HJ3 has strived to provide unmatched support, products and engineering to keep clients on-line and profitable.

HJ3 Composite Technologies
2440 W Majestic Park Way
Tucson, AZ 85705

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Introduction to Process Pipe Repairs



Corrosion and chemical attack of piping in process facilities is an on-going problem. Managing the integrity of piping systems between scheduled outages and without costly disruptions to operations can be a challenge. For the last 20 years, HJ3 has been on the front lines of these issues and has worked directly with operators, designing in-place, in-service composite repairs to extend the life of their critical assets.

Through years of testing, development and successful installations, HJ3 has maintained their position as the leader in process piping repair, offering reliable, safe and compliant repair solutions clients around the globe.

Engineering and Compliance



All HJ3 composite repair systems are tested and designed in accordance with ASME PCC-2, ISO 24817, API and CSA Z662 standards. Our staff of in-house engineers work directly with owner/operators and contractors to custom engineer solutions specific to their repair needs.

Engineering Services Include:



1. Site engineering surveys
2. Forensic analysis
3. FEA Analysis
4. PE Stamped Designs

Certified Applicators



HJ3 works with a network of certified contractors to provide local support to any facility. Our contractors are strategically selected based on their experience with composite technology and the MSA's they hold with local facilities. HJ3's engineering and technical staff works side by side with contractors to ensure proper planning, installation and quality control of all projects.



Training:

HJ3's commitment to training and regulatory compliance is an integral part of our corporate culture. Our contractor partners receive ongoing installation and QC training to ensure compliance and quality repairs in the field.



Quality:

HJ3 operates under a strict QMS "Quality Management System". From engineering to installation, our products and processes are designed to produce repairs that will stand the test of time.



Experience:

Process Pipes are our business. Our field supervisors have installed hundreds of thousands of square feet of carbon fiber. We provide contractors with the support they need to provide swift and effective repairs that mitigate risk and extended downtime in your facility.





CARBONSEAL
ENGINEERED COMPOSITE SYSTEMS

PROCESS PIPE



CHEMICAL RESISTANCE



Typical Chemical Resistance of CarbonSeal™ by Industry Type.

Metals & Mining	Petrochemical	Pulp & Paper
Sulfuric	Hydrocarbons	Acid White Liquor (Sodium Sulfide)
Copper Sulfate	Gasoline	Green Liquor
Pine Oil	Diesel	Black Liquor
Ammonium Nitrate	JP-4 Jet Fuel	Sodium Hydroxide
Alcohol	Kerosene	Lime (calcium Oxide)
Petroleum Distillate	Benzene	Bleach (Sodium Hypochlorite)
Sulfosuccinate Surfactant	Hydrochloric Acid	
Foods & Agriculture	Power Generation	Wastewater
Citric Acid	Process Water	Hydrogen Sulfide
Anhydrous Ammonia	Flue Gas	Effluent Waste
Lard	Sodium Carbonate	Methanol
Soy Bean Oil	Bromine	Hydrogen Peroxide
Stearic Acid	Muriatic Acid	
Coconut Oil	Lime Slurry	

POWER PLANT FACILITY

This Washington state facility had extensively corroded steel riser pipe. The corrosion had resulted in pitted areas and water leakage below ground. The 3/4 inch thick pipe could no longer maintain a rating of 60 psi. After cleaning and repairing the steel, HJ3 installed carbon fiber wrap and UV topcoat to protect the risers providing an impermeable to pressurized water. This client saved 50% to 70% cost savings over alternative methods. The installation was completed in a few days install with no down time.



POWER PLANT FACILITY

Twenty-two riser pipes are used to carry water to cool steam that has previously passed through a turbine. Over time, the riser pipes have corroded and cracked. Two of the risers had failed completely. Before the risers could be repaired, they were excavated and the concrete diaphragms were removed. The exposed steel surface was cleaned to near white metal and primed. Saturated CarbonSeal™ fabric was applied to the clean, primed pipes. An abrasion and UV-resistant topcoat was then applied to protect the system. Finally, steel sleeves and new concrete diaphragms were installed at the base of each pipe.

Replacement of the corroded risers would have incurred significant material and downtime costs. The client saved approximately \$700,000, plus months of downtime by repairing versus replacing. Additionally several tons of CO2 were prevented from being emitted into the atmosphere from new steel and concrete manufacturing.

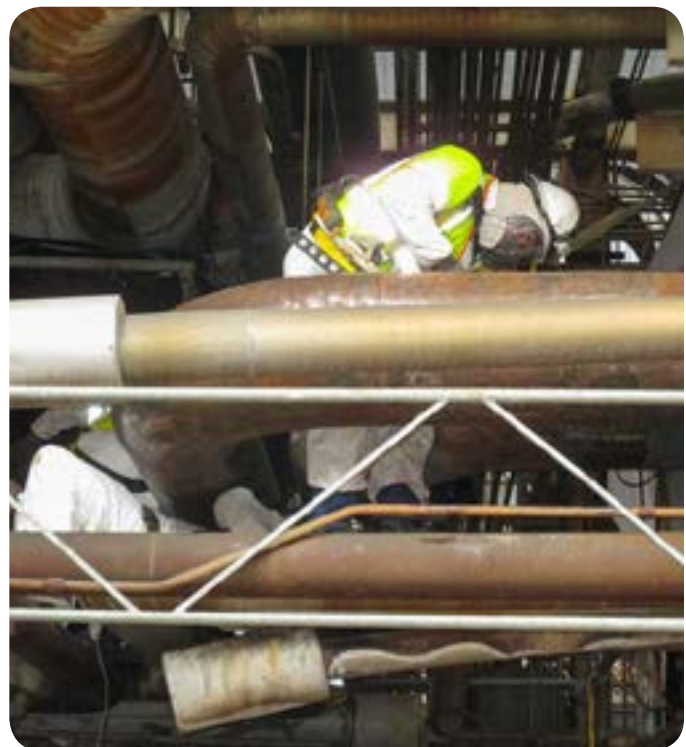




AGRICULTURAL FACILITY

This agricultural facility has network of Class 4, carbon steel pipelines, estimated 700 LF total length (supply and return) 18" diameter, that had moderate to severe internal and external corrosion. Also, there was moderate-to-severe internal cooling water corrosion and fouling which caused the majority of the leaks and damage to piping.

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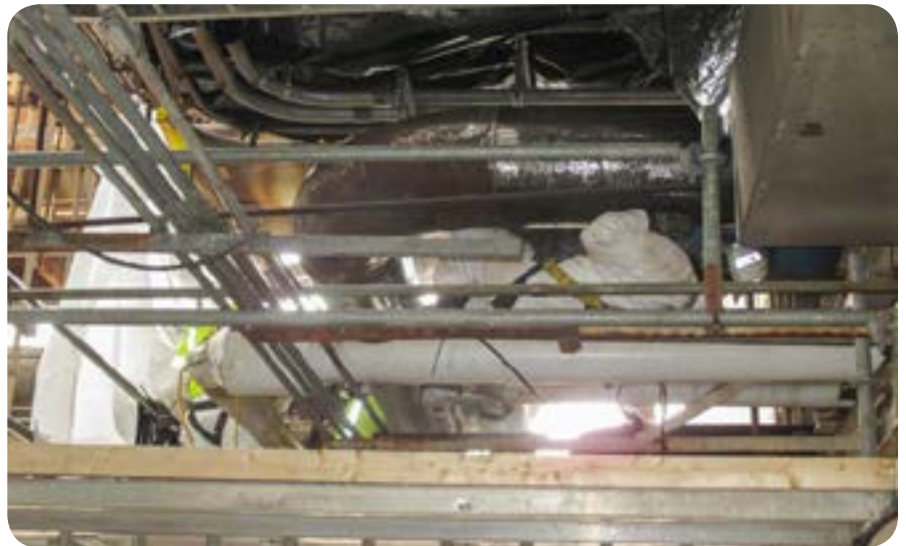


PROCESS PIPE CASE STUDIES



... Continued

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AGRICULTURAL FACILITY

This agricultural facility had a vessel heat exchanger with erosion/corrosion in its shell. The client wanted to use CFRP to help achieve the desired pressure rating for this ASME pressure vessel. The steel vessel required structural strengthening to be able to withstand original 75psi operating pressure and surface temperatures up to 365°F.



The 29"-diameter steel vessel had been previously patched two times with a "non-code repair", and needed a stronger, the code compliant repair. Steel thinning had resulted in the vessel's inability to withstand normal operating pressures. HJ3's CarbonSeal system was installed in 2 days and returned the vessel to its original strength, without requiring a shutdown.





CARBONSEAL
ENGINEERED COMPOSITE SYSTEMS

CarbonSeal™ Products

CarbonSeal – HT™ – High Temperature
CarbonSeal – AR™ – Abrasion Resistant CarbonSeal
CarbonSeal – CHEM™ – High Chemical CarbonSeal
CarbonSeal – SUBSEA™ – Underwater CarbonSeal
CarbonSeal – NSF61™ – Potable Drinking Water
CarbonSeal – FLARE™ – Flare Line Repairs

Common Repairs

Flare Lines
Acid Lines
Cooling Water Piping
Sour Water
Fire Suppression Piping
Blow Down Lines
Hydrocarbons
MIC Corrosion
Corrosion Under Insulation (CUI)
Chemical Attack of Process Lines





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