CHEMICAL PROCESSING

Texas Chemical Plant Validates Corrosion-Protection Performance of RMB Products' Rotationally Lined Fittings

Southeast Texas is home to numerous multinational chemical processing companies. One such company, well known for developing and manufacturing chemicals, plastics and agricultural products, went looking for long-lasting corrosion protection for its buried industrial pipes and fittings and turned to RMB Products. Fifteen years later, the company found RMB Products' rotationally lined components still had service life to spare. During the scheduled shutdown when the inspection was performed, the company chose to have RMB Products reline components, confident that the relined parts will deliver a minimum of 15 years of service life.

Challenge

Chemical production comprises continuous processes that are critically dependent on the quality of a plant's piping systems. The harsh environment created in chemical conveyance places high demands on pipes and fittings. Leaks resulting from a mechanical problem, cumulative wear or destructive corrosion can cause losses of millions of dollars annually when production must be shut down to correct the problem.

Chemical plants have always sought to increase equipment service life, extend the time between maintenance shutdowns and reduce the cost of equipment replacements. All components—vessels, pipe, fittings, valves, pumps and other equipment—must demonstrate they can withstand long-term exposure to the chemicals

At a Glance

Client: Large Southeast Texas chemical plant

Industry: Chemical Processing

Manufacturing solution: Rotational lining with XLPE and HDPE

PROJECT GOAL

- Increase service life and time between shutdowns

REQUIREMENTS

- Underground installation
- Corrosion resistance to slightly acidic brine
- 10" diameter spool pieces, 45° and 90° elbows

HIGHLIGHTS

- XLPE linings: No leaks or failures throughout 15 years of service
- Service life 2x that of unlined fittings
- No visual cracks or flaws
- 3–5 years of additional service life verified at inspection
- 14 of 21 original fittings passed a spark test per NACE SP0274 at inspection after 15 years with no visual cracks
- Minimum lining thickness at inspection was 0.221" (above minimum allowed at time of lining)
- 16 of 21 original fittings had minimum thickness readings above 0.250"
- Upgrade to new HDPE linings completed in 4 weeks
- Reused original steel pieces

they come in contact with throughout the entire range of pressures, temperatures and other conditions they might encounter.

Such was the situation for the Southeast Texas plant in the late 1990s. The combination of piping system materials (unlined steel pipe and fittings), the slightly acidic brine handled and other factors required the plant to dig up and replace buried components every 7 years due to leaks in the system caused by corrosion.

The plant looked to replace its existing metal fittings with a solution that would improve corrosion protection, eliminate non-routine maintenance shutdowns and extend the service life of parts to reduce the frequency of scheduled shutdowns. The plant approached RMB Products for help. The company's demonstrated success using rotational lining with high-performance polymers for chemical processing applications provided the evidence the plant was looking for in a new solution.

HDPE lined fittings after 15 years of service

Solution

Rotational lining is well-suited to lining simple or complex structures, including components with diameter changes, multiple outlets, nozzles or other unique requirements. RMB Products worked with plant engineers and operators to analyze part geometries and determine the most appropriate lining strategy and material selection to deliver the extended service life the plant was targeting.

Polyethylene is the most widely used plastic throughout the world. Compared with stainless steel and other alloys, the initial capital cost of polyethylene-lined fittings is lower, and the fittings last longer. In the 1990s, the material most used for rotational lining was cross-linked polyethylene (XLPE). Today, high-density polyethylene (HDPE) is the material of choice because of its superior bond to metal substrates and its lower cost.

Over the years, RMB Products rotationally lined hundreds of fittings at its Fountain, Colorado, manufacturing facility for use in this particular Southeast Texas plant, demonstrating the customer's confidence in RMB Products' lining system. The 21 XLPE-lined fittings targeted for inspection in 2012 included 10" diameter spool pieces and 45° and 90° elbows.

The plant had installed the fittings underground between 1997 and 1999, where they remained until December 2012. During a scheduled maintenance shutdown, the fittings were taken out of service and subsequently sent to RMB Products' Houston facility for inspection and testing.

Results

The customer reported no leaks or failures throughout the time the parts were in operation. At the Houston facility, RMB Products performed a series of tests and measurements on each of the fittings, including a visual inspection and spark test per the NACE SP0274 standard. Ultrasonic gauges were used to measure lining thickness during the inspection.

Visual inspection. All liners were examined for cracks, gouges, nicks and abrasion. All fittings appeared to be in good shape: no missing fragments, exposed metal or scratches.

Spark test. All liners were subjected to a high-voltage electrostatic test per the NACE SP0274 standard. Fourteen of the 21 fittings (67%) passed the spark test after 15 years of use.

Lining thickness. The nominal lining thickness for the fittings was 0.320". At time of delivery, the minimum allowable thickness was 66% of nominal (or 0.2112") per the RMB Products lining specification. During the inspection, the minimum thickness found was 0.221". Despite 15 years of use, the lining thickness of every fitting was within the minimum allowed at the time the lining was completed. Furthermore, 16 of the 21 fittings had minimum lining thickness readings above 0.250".

At completion of the round of testing and inspection, RMB Products estimated that the fittings exhibited 3 to 5 years of additional service life before needing to be replaced. Because the cost of shutting down service again in 3 to 5 years greatly outweighed the cost of relining the fittings, the customer chose to have RMB Products remove the XLPE liners and replace them with new HDPE liners, confident that the components could be placed back underground for another 15 years with no service issues. RMB Products completed the relining project within 4 weeks, well within the time allocated for the scheduled shutdown.

To learn more about how our innovative solutions help you extend the service life of your infrastructure, visit our website at **rmbproducts.com.**