



Acid-Resistant Construction Solutions Provides Decades of Uninterrupted Service in Chlorine Processing

Background

The client is a leading North American manufacturer of polyvinyl chloride (PVC) resins, chlorine, and caustic soda that serve as key building blocks for a variety of indispensable products such as plastics, pharmaceuticals, and water treatment chemicals.

Situation: Chlorine Processing and Its Caustic Byproducts

In the last step of chemical processing, water vapor is removed from chlorine gas to compress the chlorine into a form available for transport to its next destination. This process occurs within a drying tower where sulfuric acid is employed as a type of desiccant to leach the water out of the chlorine gas.

Once the chlorine gas passes through the tower, it is virtually free of water vapor. However, the remaining byproduct, sulfuric acid mixed with water, is extremely corrosive. The aggressive nature of the process and byproducts severely limits the number of material options available to line the tower. The tower lining materials must protect against leaks that could severely impact the integrity of the tower's outer wall or pollute the processing plant grounds and surrounding environment.

The extremely aggressive process and acidic environment will start to degrade the bricks and walls over time. Nozzles and the external steel shell will start to corrode once this degradation causes a lining failure or leak. Leaks could prompt complications with the EPA. After inspections, companies will decide to either repair or replace older equipment to ensure proper containment.

Challenge: Previous Tower Saw Decades of Service

The typical drying tower will range from six to ten feet in diameter and the height from 20 feet to as much as 40 feet tall. Multiple chemical operations have towers or vessels constructed in the 1980s and 1990s that are still in service but slowly being replaced as their functional lifespan reaches a close.

The drying towers on this particular site had been in service since the late 1970s. Knight Material Technologies (KMT) supplied and built the towers' internal linings and ceramic packing. The result was more than 40 years' worth of operation before plant engineers decided to construct two new towers.

Impressed with this proven track record, the company turned to KMT to reconstruct the towers according to the original design, with slight modifications.

Solution: Customizable Acid-resistant Building Materials from Knight Material Technologies

KMT supplied an entire line of acid-resistant construction products and tower internals to fully line and outfit vessel interiors. In addition, KMT was responsible for building the protective walls, lining, and ceramic packing for the two drying towers.

KMT molds its bricks in simple geometric shapes and sizes to produce custom-designed and fitted linings that can provide decades of service life in vessels that require a corrosive-resistant lining. KMT's true refractory bricks maintain their corrosion resistance in high-temperature environments and conform to ASTM 279C specifications.

To further increase performance, Knight recommended FLEXERAMIC® structured packing blocks instead of the original design consisting of only layers of the random ceramic media. The patented design of the structured media blocks with their geometrically arranged corrugated sheets allows for greater throughput than the random packing. The increased efficiencies help increase throughput by reducing cycle times and utilizing energy more efficiently, adding up to a significant ROI over the lifespan of the vessel.

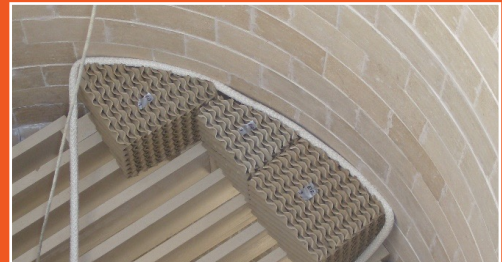
End Result: A Happy Customer is a Quiet Customer

The sign of an utterly thrilled drying tower customer is a silent phone. They don't need to call for maintenance. There are no issues. The next time the plant engineers will call from this location will be in 25 to 30 years, when the company wants two new towers.

Want to achieve peace of mind and replace a chemical processing vessel or tower? Call Knight Material Technologies for a consultation.



The view from under bar support of tower construction.



FLEXERAMIC® structured packing blocks cut and installed above the bar support.



A worker at KMT workshop lining the tower with DURO™ Acid-Resistant Bricks and chemical-resistant mortars.

For this tower, the company utilized:

- DURO™ Acid Brick
- PYROFLEX® Acid-Resistant Membrane
- Chemical-resistant mortars
- Multibeam and bar supports
- FLEXERAMIC® structured media packing blocks