

PP piping systems solve corrosion problems in steel manufacturing plants

PLASTIC PIPE,
VALVES & FITTINGS

by Paulo Ceolin

Surface treatment of steel, such as galvanization, may go through as many as 50 separate processes to produce high quality plated surfaces. Steel plating lines feed raw materials into a series of pickling acid tanks followed by a series of rinsing tanks. Filling the tanks may be accomplished manually, semi-automatically or automatically, depending on which process is being used and how much plant modernization has occurred. As these processes become increasingly automated, steel mills employ a variety of piping products to provide strict control and safe conveyance of process solutions — many of which are highly corrosive — in the most efficient manner as possible.

Products used in these processes include pH, temperature and level sensors, heat exchangers, double containment piping systems, and other types of piping that convey a variety of chemical solutions such as hydrochloric acid, caustic fluids and corrosive wastes. The types of materials used for these products can have a significant impact on the plant's production efficiency.

Traditionally, metal piping systems have been installed in many steel plants to convey these various process solu-



GF Piping Systems' PROGEF Polypropylene Piping System is used for a steel mill's acid recovery and acid regeneration lines.

tions. A large steel mill plant in Mexico, which produces about 12 million tons of steel a year to manufacture steel rods for the construction industry as well as galvanized pipe and conduits for electrical connections, was one such company using a metal piping system. The steel plant was experiencing problems with the piping system because it had an extremely short service life due to chemical resistance problems. Corrosion in these metal pipes would usually start around the flanged areas and tend to leak past the gaskets. Then, the leakage would cause weakness in the joints.

As a result, the steel plant was replacing the metal pipe about every 1-1/2 years. Not only did this prove extremely costly from a materials standpoint, it was also costly labor-wise to remove the existing pipe and install the new pipe. To compound these expenses, system removal and installation forced a system shutdown, resulting in a loss of production and ultimately sales for the company.

To solve these problems, the company began a search for an alternative piping material that would provide a longer, more efficient and cost-effective conveyance solution. After exploring and testing various alternatives, they chose a polypropylene (PP) piping system. Key properties to PP are its excellent chemical resistance, high temperature resistance, and capability for high performance over a long period of time. Additionally, a fully welded PP pipe has less chance of leakage than a flanged metal pipe. In a welded polypropylene piping system, even with flanges or unions that are mechanical joints, the absence of corrosion significantly improves joint sealing.

The steel plant chose a particular PP system because it is chemically resistant to aqueous solutions of acids, alkalis, caustics and salts, and to a large number of organic solvents. Other important physical properties include high strength, low weight, abrasion resistance and low water



GF Piping Systems' PROGEF Polypropylene System has been designed to be highly resistant to impact, abrasion and many chemicals which make it an ideal system for industrial applications.

absorption. During installation, technicians were careful to account for expansion and contraction of the piping system to ensure there would be no problems with hanging pipe or pressure drops.

The installation (seven years ago) was extremely successful. "There have been no repairs or replacement of the lines and the customer was extremely pleased with both the installation and resulting reliability," says the manufacturer's representative, Keith Jansen, managing director for Georg Fischer S.A. de C.V., Apodaca, Nuevo, Leon, Mexico. Following this initial system installation, the customer again chose polypropylene for new installation requirements. "With the seven-year track record of dependability from the first PP

BENEFITS OF STANDARD POLYPROPYLENE PIPING SYSTEMS

- Impact resistant
- Abrasion resistant
- Chemical resistant
- Temperature resistant
- High strength
- Low weight
- Low water absorption

installation, the selection process was easy for them," says Jansen.

In October 2007, the polypropylene piping was again chosen for three projects to supply piping systems feeding the steel plating for two separate lines. In total, 500 meters of 110 mm pipe and fittings, and 300 meters of 90 mm pipe and fittings were installed for the acid recovery and acid regeneration lines.

For the plant's acid recovery lines, 90 mm PP piping was installed to transport 6-7 percent concentration hydrochloric acid at 104°F/40°C with a pressure range of 5-7 kg/cm. In the acid regeneration plant, which handles 35 percent concentration hydrochloric acid, 90 mm PP piping was also installed. "Because the temperature and pressure ranges were the same for both the acid recovery and the acid regeneration sections, standard butt fusion joining was used for both parts of the installation," explains Jansen. "And with polypropylene's excellent chemical resistance capabilities, both concentrations of hydrochloric acid (6-7 percent and 35 percent) were easily handled."

With the success of polypropylene in the steel plant, the company continues to improve its manufacturing capabilities with updated processes and plant expansions using thermoplastic piping systems as the material of choice and optimum solution for manufacturing galvanized metal pipe. ■

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Large steel mill plant in Mexico replaces metal pipes with GF Piping Systems' PROGEF Polypropylene System because it is chemically resistant to aqueous solutions of acids, alkalis, caustics and salts, and to a large number of organic solvents.

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