

Unexpected Value Across Three Industries

Expensive repair and replacement of processing infrastructures pose major headaches for operations across the chemical processing, mineral processing and power generation industries—and polymer piping solutions can help.

Corrosion and premature piping failure are two problems that plague chemical piping applications everywhere. Metallic systems are necessarily limited in their life spans by corrosion concerns, and operations managers must always face the question of when their pipes will eventually need repair or replacement.

However, polymer piping systems have made great strides across multiple industries in the past few decades, and investigating the benefits that can be realized by making the switch from metallic systems can help to bring unexpected value to many applications.

This article will specifically evaluate the benefits of polymer piping systems in three industries: power generation, chemical processing, and mineral processing. Within each of these industries, polymer materials, specifically chlorinated polyvinyl chloride (CPVC), can enable operational benefits that have previously gone undiscovered. Due to the chemical and physical properties of CPVC, the material is able to mitigate many of the concerns that continually hang over metal piping, and can be a solution that brings unexpected value to each.

Power Generation

Bringing electricity to the world is no easy task, and power generation facilities require dependability across all components. Simultaneously, the many and stringent regulations that must be adhered to can complicate system choices and solutions—oftentimes, fewer choices are readily available.

Piping, however, is one area where choices aren't strictly limited to particular materials—opening the door for CPVC in its applicable uses. Here, there is an opportunity for increasing operational efficiencies, minimizing downtime, and improving bottom-line performance across all necessary piping systems in a given power generation facility.

CPVC displays the necessary mechanical strength to stand up to all of the caustic fluids that need to be transported throughout a power generation facility, with its excellent balance of properties to help improve overall reliability and user confidence. For instance, Lubrizol CPVC's Corzan® HP Industrial Systems have helped power generation facilities reduce capital and life-cycle costs, avoid costly downtime and boost operational efficiencies.

All metallic piping systems, whether used to transport aggressive chemicals or simply potable water, are susceptible to corrosion—priced alloys and lined carbon steel, common of chemical lines, will only go so far in keeping corrosion at bay before costly repair or replacement becomes inevitable. CPVC products like Corzan HP are inherently resistant to this problem, and Corzan specifically is the first and only Schedule 40/80 CPVC system made from fully pressure-rated materials, allowing systems to work underground (cooling water loops, for instance) and within elevated structures (tower risers and headers) to reliably handle some of the common aggressive chemicals utilized in many power generation plants.

Other applications include demineralized systems for creating boiler feed water, condensate return water applications, flue gas desulfurization systems, environmental systems (common of coal-fired steam plants) and wastewater treatment. Corzan HP has proven reliable in moving all forms of corrosive material, including hypochlorite, caustic soda, sulfuric acid, and sodium sulfite, as well as seawater and high temperature fluids. The material is similarly inert to most acids, bases and salts, as well as aliphatic hydrocarbons.

Due to the corrosion-resistant properties of CPVC, the material can offer a cost-effective choice when deciding upon replacement of chemical processing infrastructure. CPVC has a track record of outperforming competitive non-metallic systems for similar applications, including PVC pipe, FRP, HDPE and polypropylene, and is able to operate continuously for many years without interruption caused by leaks or corrosion concerns. Often, operations managers will find that a CPVC solution like Corzan can pay for itself in as little as a few months, depending upon the scale of the project in question.

Mineral Processing

Mineral processing proves a demanding job of piping infrastructure, and the challenge of maintaining long-term reliability is significant. Indeed, that difficulty is only expected to increase, as existing pits and mine sites are now frequently extracting ores of lower concentration from deeper in the earth's crust, causing a shift in the chemistry of processed ores.

Whether leaching precious materials from the ground or processing raw materials after excavation, the highly corrosive chemicals typically utilized throughout various mining operations can cause ongoing maintenance challenges and costly, premature failures for metallic piping systems. As with power generation, CPVC has built a track record as a suitable and preferable alternative for this application.

The specialty, high-performance polymers that make up Corzan HP systems enable them to perform at higher levels, demonstrating the necessary mechanical strength for industrial-grade systems along with a host of benefits to offset constant maintenance and repair. Throughout mineral processing operations specifically, CPVC has demonstrated advantages in eliminating internal and external corrosion, as well as minimizing sedimentation-crystallization. CPVC has proven to handle extremely aggressive chemicals, including:

- Copper sulfate
- Zinc sulfate
- Sodium sulfate
- Metabisulphite
- Sodium cyanide
- Sulfuric acid

By resisting corrosion, sedimentation and crystallization that compromise the integrity of metallic systems, CPVC can prove advantageous for a variety of mineral processing applications, including electrolysis operations, electrowinning, electrorefining, acid service lines, tailings lines, gas vent scrubbers, froth flotation operations, and wastewater treatment. This translates to lower life-cycle costs, as well as the reduction of maintenance time and corrosion monitoring. Coupled with the benefits that CPVC can offer through its simplified solvent-welding installation process and stable pricing, replacing a metallic system with CPVC can prove to be a preferable option.

Chemical Processing

With more demanding applications than most, chemical processing requires a piping infrastructure that can maintain efficiency and safety. Dependability is paramount, and as with other applications, corrosion and necessary expensive repair and replacement are a major concern.

The highly corrosive substances of the chemical processing industry plague metallic piping systems, with process leaks and premature failure being of top concern, jeopardizing plant operation, safety and environmental compliance. Lined carbon steel, as well as non-metallic options including HDPE and FRP, has demonstrated issues, with long-term reliability becoming problematic.

CPVC again displays the necessary mechanical strength and chemical resistance to make it a solution for all types of chemical processing applications—production facilities, blending operations, reagent processes, air scrubbing, demineralization operations and more. Corzan® Industrial Systems, powered by Lubrizol CPVC compounds, have displayed inherently superior resistance to corrosive chemicals, high temperatures and other harsh application conditions, making CPVC a logical choice to maintain operational efficiency and dependability far outstripping that of many metallic systems.

Cost Benefits

The cost of installation and the cost of maintenance—two sides of the same coin for decision makers to consider when weighing chemical piping options, no matter the specific industry. Replacement means downtime, and downtime can translate to major losses, often exceeding the cost of the installation itself. It is of utmost importance to limit the amount of downtime experienced when performing repair or replacement.

Metallic systems pose several challenges for installation—first, working with and welding large metallic pipes will often require the use of specialized, heavy-lifting machinery in order to place the pipes in the desired locations. Additionally, welding—the use of open flame—within chemical environments requires special care, sometimes necessitating additional downtime. In all, replacement and retrofitting using metallic piping are often slow and cumbersome processes—and the time can add up to meaningful losses for a given facility.

Polymer piping systems like CPVC can often help sidestep these issues. CPVC piping weighs far less than metallic counterparts, and does not require specialized heavy-lifting equipment. Additionally, the solvent welding process used to join CPVC pipes and

fittings together does not require the same safety precautions that must be taken when welding with open flame, and can be performed far more quickly than traditional welding with metallic pipes and fittings.

Due to the stable pricing of CPVC as a material, as well as the simplified solvent welding installation process, the installation of a Corzan system can often be performed more cost-effectively than metallic systems.

Choosing a CPVC Partner

The Lubrizol Corporation has long been a pioneer in driving CPVC solutions for a number of different markets—and with Corzan Industrial Systems, the story remains the same. As the industry's first and only Schedule 40/80 CPVC system made from fully pressure-rated materials, Corzan HP gives engineers and facility managers a solution that often exceeds expectations.

Additionally, Corzan HP piping meets the ASTM F441 material classification 4120-06, with a pressure rating 25 percent higher than standard CPVC at 180° F, and offers drop impact strength up to three times that of other CPVC. Corzan HP also maintains the highest heat deflection temperature of any CPVC compound, and is able to withstand long-term, high-temperature hydrostatic pressure.

Choosing Corzan Industrial Systems also means choosing the robust support provided by Lubrizol CPVC. From design to installation, Lubrizol offers its expertise throughout the industrial market—from chemical processing to mineral processing to power generation. Offering education on the many benefits CPVC can bring to any operation is a major component of the Lubrizol advantage.

With Corzan systems, installers also have access to Lubrizol's FBC™ System Compatible Program, eliminating the guesswork associated with chemical compatibility and helping to offer peace of mind. Installers can feel confident that the installation was performed without any incompatibility of ancillary products.

Coupled with The Lubrizol Corporation's extensive R&D operations and experienced field support team, the knowledge and resources to successfully implement a CPVC solution at many facilities is right at your fingertips.