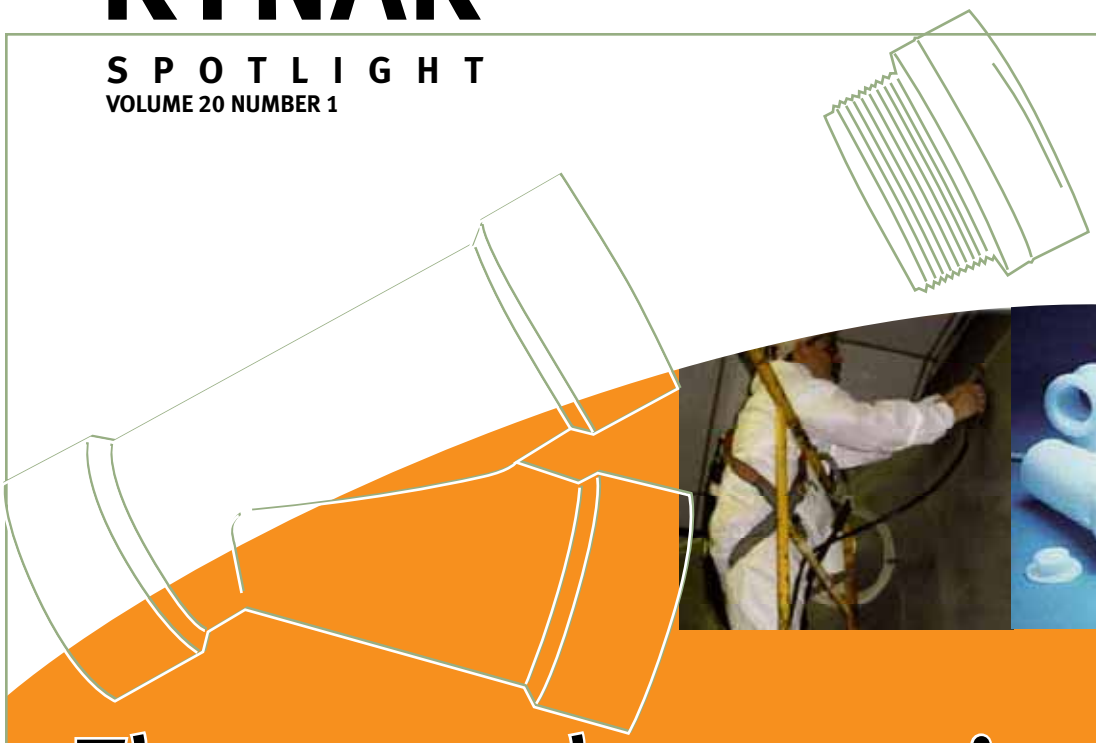
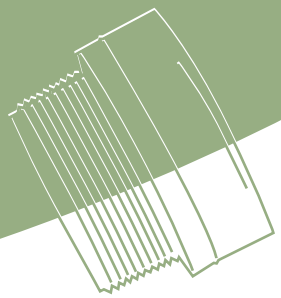
KYNAR®

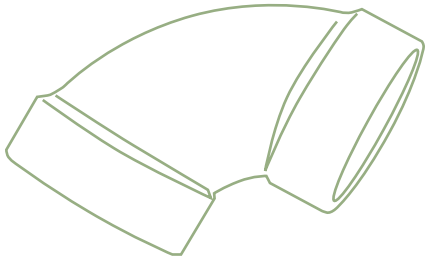
SPOTLIGHT
VOLUME 20 NUMBER 1

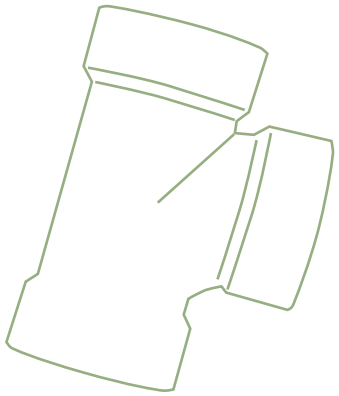


Fluoropolymers in Action

Selected Case Histories Reprinted From Major Industrial Publications







ARKEMA

Plant Services

What works

In-situ relining saves shutdown at Dow Corning*

Electro Chemical Co. puts leaking sulfuric acid tank back online in two weeks

By Steve Beach

Dow Corning has manufactured silicone products at its Carrollton, Ky., facility for more than 35 years. In April of 2004, the lining of a spent sulfuric acid storage tank required repairs.

As a mechanical engineer in the Reliability Engineering group, I was faced with three options: 1) install a spray-on epoxy liner; 2) remove the tank and have it recoated with a spray-on fluoropolymer; or 3) have the failed lining stripped and a new sheet lining installed in the field.

My research indicated an epoxy lining would not withstand the process chemistry. The time and money required to ship the tank to be coated or lined at a contractor's facility were deemed unacceptable, ruling out the second option as well. In addition, few ovens are available to cure the spray coating on a tank that size.

We believed that field installation of a fluoropolymer lining was our best bet. We already had two other vessels in the same application performing very well with KYNAR sheet linings, so we were sure we would get the desired life out of a KYNAR lining.

We contacted Electro Chemical Engineering & Manufacturing Co. (www.electrochemical.net) about the project in late April, 2004. I was aware of their quick response time, and their reputation in the industry as excellent sheet lining applicators and one of the few contractors offering field installation.

Stripped, repaired, blasted and inspected

"Within just a few days of the initial phone call, we were onsite with eight trained field technicians and the necessary equipment and materials to complete the job," says Mike Bunner, Electro Chemical president. "The vessel was stripped, repaired and grit-blasted to a white metal finish in preparation for the lining installation. Our crews then began working around-the-clock until the KYNAR FLEX sheet was installed inside the vessel."

Due to its location on the Ohio River in Kentucky, jobsite humidity had to be closely monitored during and after surface preparation and applying adhesive. To control the humidity and provide the required airflow for ventilation, Electro Chemical brought a large skid-mounted dehumidification unit that operated continuously until the job was done.

Lining goes up tight

Upon completion of the interior blast, the tank's inner surface was primed and coated with an adhesive before installing the polyvinylidene fluoride (PVDF) sheet lining. The 90 mil-thick fabric-backed sheet lining system was bonded in place using Electro Chemical's proprietary elastomeric adhesive system, which provides a flexible, tenacious bond capable of withstanding stresses from the differences in thermal expansion between the fluoropolymer lining and the carbon steel shell.

Plastic-welding to ASTM C-1147 specifications with a PVDF cap strip gives seams more tensile strength than the lining.

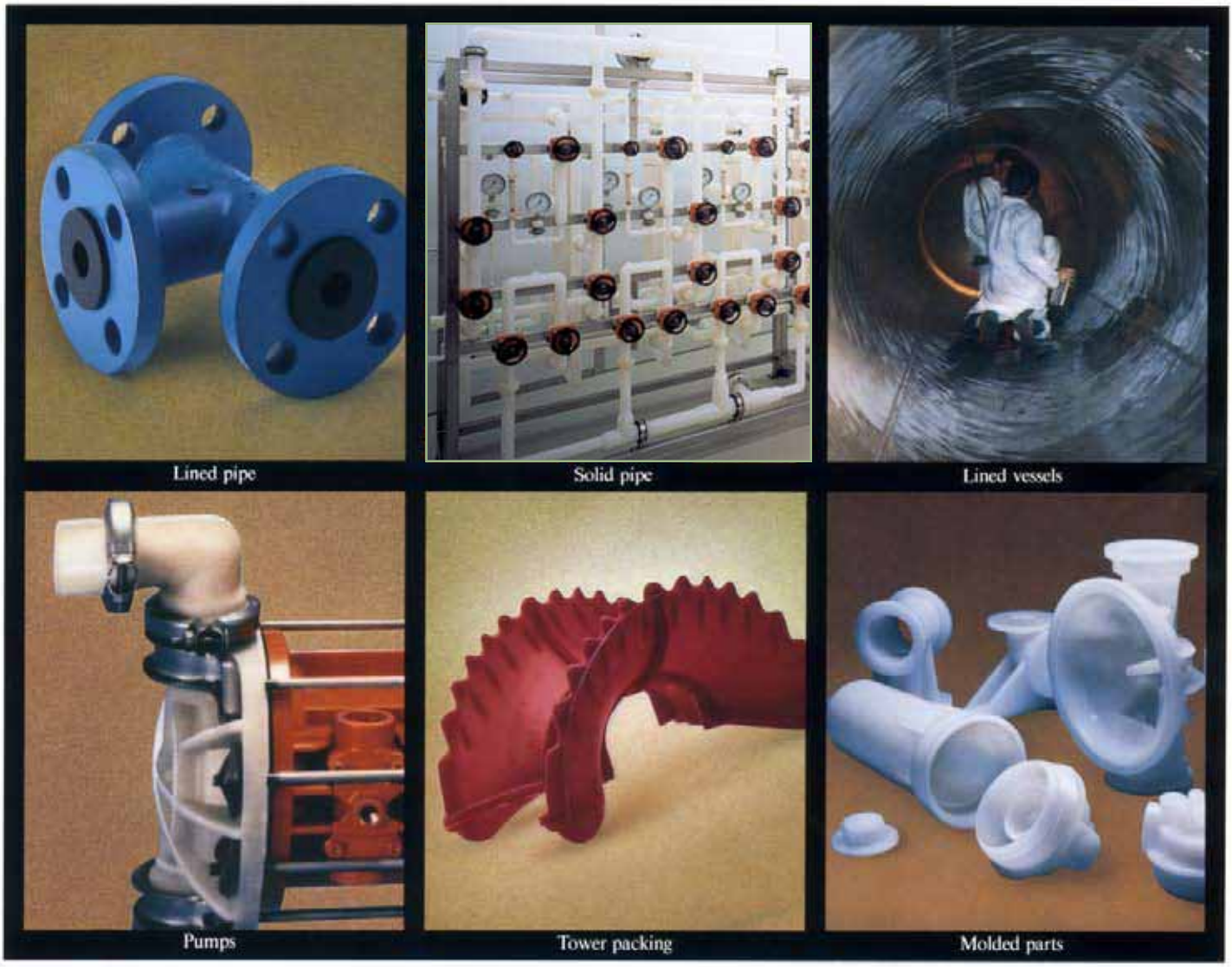
The lining was applied continuously to all wetted surfaces, including through the nozzles and out over the flange faces, to provide a pinhole-free corrosion barrier. The bond between the fluoropolymer and the substrate surface was tested in accordance with ASTM D-903.

"We provided Dow Corning with documented installation procedures, plastic welders well-trained on American Welding Society (AWS) standards, and plastic welds tested in accordance with ASTM C-1147 to ensure a quality installation," says Dale Heffner, Electro Chemical vice president.

Once the lining was installed, internal areas were visually inspected and tested for pinhole leaks using a dielectric spark test. "This attention to detail and quality ensures a PVDF lining system of the highest quality," says Heffner.

Technicians worked 24/7 and completed the project in two weeks. After final inspections, the tank came online without issue. We expect to get 25 years of service from this lining.

KYNAR® Fluoropolymer fights chemical attack many ways.

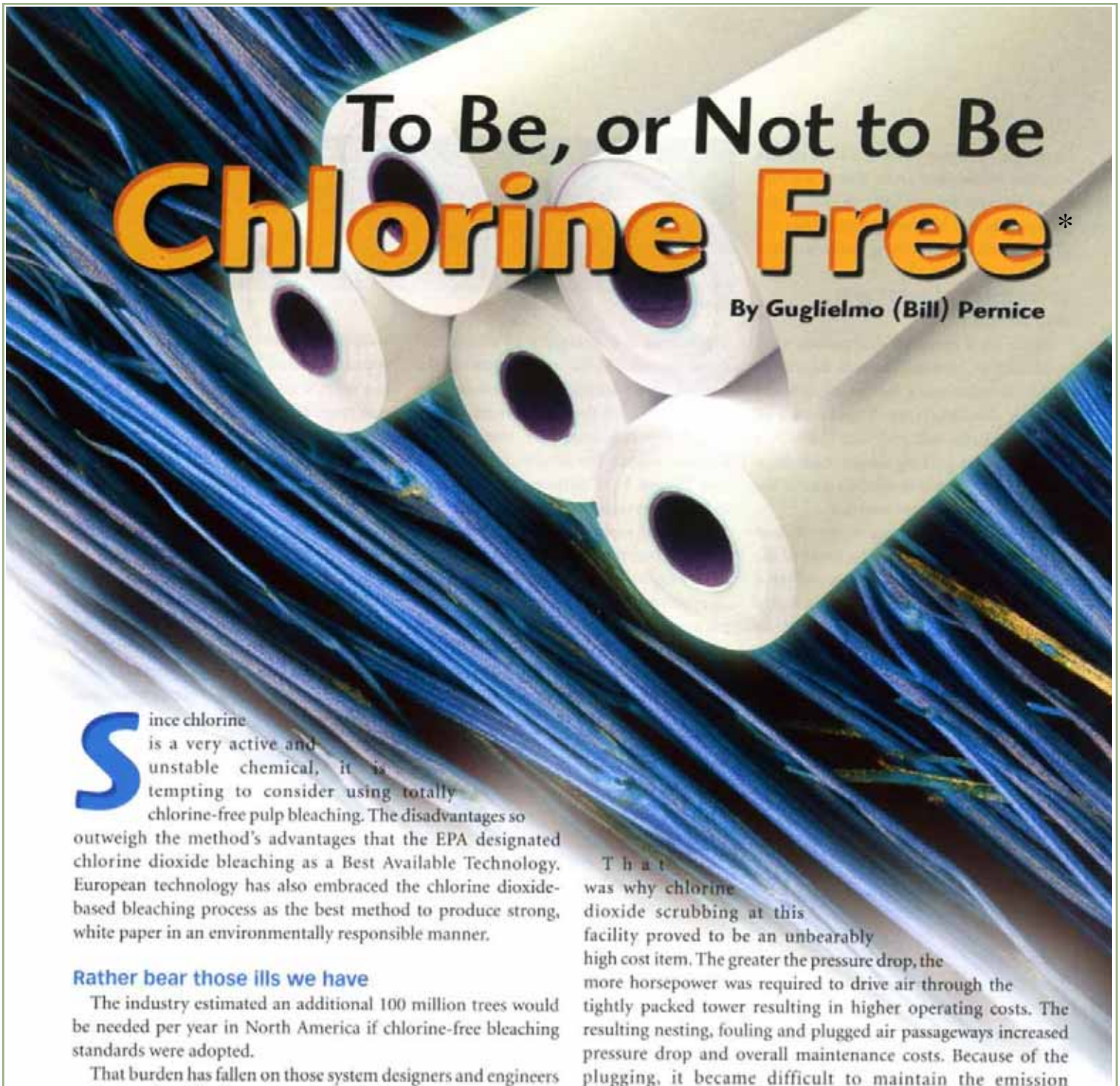


When the job is critical, the world's industries rely on KYNAR® fluoropolymer. Whether meeting the high-purity requirements of the semi-conductor industry, or the rigorous safety demands of nuclear applications, or resisting the chemical corrosion of harsh bleaching agents in the pulp and paper industry, this versatile resin is a proven performer.

Its resistance to aggressive chemicals makes KYNAR fluoropolymer appropriate for use in a wide range of industries, applications and components such as those you see above. KYNAR fluoropolymer safely handles highly corrosive chemicals including acids, halogenated compounds, petrochemicals, brine solutions, ozone and alcohols.

KYNAR resin also exhibits excellent mechanical properties at high temperatures and resists ultraviolet and nuclear radiation, so it is suitable for highly sensitive and specialized applications. For more information about what KYNAR fluoropolymer can do for you, call us at 215-587-7520.

1-800-kynar50
1-800-596-2750



To Be, or Not to Be Chlorine Free*

By Guglielmo (Bill) Pernice

Since chlorine is a very active and unstable chemical, it is tempting to consider using totally chlorine-free pulp bleaching. The disadvantages so outweigh the method's advantages that the EPA designated chlorine dioxide bleaching as a Best Available Technology. European technology has also embraced the chlorine dioxide-based bleaching process as the best method to produce strong, white paper in an environmentally responsible manner.

Rather bear those ills we have

The industry estimated an additional 100 million trees would be needed per year in North America if chlorine-free bleaching standards were adopted.

That burden has fallen on those system designers and engineers at Kraft pulp mills throughout the U.S. who are charged with the responsibility of finding a safe, economical means of minimizing workplace exposure to toxic chlorine emissions. One method was to encourage production of ClO_2 on-site, to couple this with sophisticated packed tower scrubbing equipment, use white liquor as the scrubbing agent, and to control emissions and ensure compliance with strict clean air standards set by the government.

"There's the rub," as Hamlet would have said. Traditional packed towers in Kraft mills use nonmetallic shaped items that are designed to provide extensive surface to liquid contact area to minimize chlorine emissions. These structures significantly add to operation and maintenance costs because of increased pressure drop, higher power requirements and a tendency to nest and foul.

That was why chlorine dioxide scrubbing at this facility proved to be an unbearably high cost item. The greater the pressure drop, the more horsepower was required to drive air through the tightly packed tower resulting in higher operating costs. The resulting nesting, fouling and plugged air passageways increased pressure drop and overall maintenance costs. Because of the plugging, it became difficult to maintain the emission requirements without shutting down and repacking of the tower every 2½ to 3 years.

Their currents turn awry

The chlorine dioxide scrubber at this pulp mill treats 45,000 cfm of air in a 12-foot 6-inch diameter tower designed to house two 30-foot packed beds so that the total packed bed depth equaled 60 feet. The white liquor flow to the tower was 2400 gpm. The scrubber showed a pressure drop of about 30 inches in the water column when CPVC structures were installed in the bed. During normal operation, the pressure drop across the scrubber water column would creep up to 38 inches. This intolerable increase was traced to breakup and plugging of the saddles from solids present in the white

After assembly at the port, the scrubber is moved for pressure testing.

Steel blinds were made to allow pressure testing of the scrubbers at the port.

One of the scrubbers is moved onto the deck of the ship that will transport the vessels to China.

fabric-backed sheet produced by Symalit AG, Lenzburg, Switzerland. The fabric backing is laminated fiberglass over cloth, which prevents permeants from building up at the Kynar/FRP interface. The construction is fully bonded, meaning 100% of the PVDF surface is bonded to the FRP. This bond is sufficient to withstand full vacuum conditions in a process vessel. External lifting lugs, tailing lugs, platform support brackets and platforms were fabricated from stainless steel, FRP and galvanized steel. A portion of the scrubber packing is also made from Kynar PVDF.

Once assembled, the scrubbers had to be hydrostatically pressure tested — all before being loaded onto the ship. Dualam built reinforced concrete foundations upon which to erect the vessels for testing. Steel plates reinforced with steel ribs were fabricated for blinding each vessel during testing at the port. The largest vessel required a blind that was 12 ft. in diameter. The vessels are rated for operation at 12 psig; although the vessels passed the pressure testing, some of the steel ribs in the steel plates failed. Design, fabrication and testing took about six months.

The vessels had to be secured on the deck of the ship for transport to China because they were too big to be stored below deck. The voyage to China took about three weeks. One vessel was delivered to a site in Kaoshiung, Taiwan, and the other to Zhuhai, Guangdong Province, China. Both sites are on the coast, eliminating the need for ground transport of either vessel. The vessels have been operating successfully for about six months. CP

Conductive Kynar® 340 Resin Meets ATEX Requirements

Kynar® PVDF 340, a new electrically conductive fluoropolymer resin, is now available for ATEX compliant applications. ATEX (Atmosphéres Explosible) is the European Commission Directive 94/9/EC that defines special safety requirements for equipment working in an explosive environment or handling flammable products. Kynar® PVDF 340 resin has been designed for pipe or sheet extrusion. It shows outstanding elongation at break (>15%) and toughness. Also, Kynar 340 can be injection molded.

Properties of Kynar® PVDF 340 resin	
Conductivity	10-100 Ohm.cm
Elongation	> 15%
Toughness/Notched Charpy	8kJ/m_

Kynar® PVDF fluoropolymers offer high chemical, abrasion and thermal resistance. Kynar® resins are frequently specified for a wide range of fluid handling products, such as pipe, pumps, tubing, valves, fittings, storage and process vessels that must not rust or corrode, must withstand temperatures up to 150ºC and must safely handle aggressive chemicals such as acids, halogens or solvents.

materials of construction

Stainless steel meltdown*

How stainless steel failed U.S. Steel — and the material that saved them

by George Black, Materials Editor

Costly corrosion-related maintenance problems involved with the handling of aggressive fluids such as hydrochloric and sulfuric acids at U.S. Steel's Gary, Indiana plant, were affecting production and delivery schedules. The 2"-6" stainless steel pipe lines that had been installed to transfer the aggressive fluids required for removing oil, dirt and other contaminants from steel sheets prior to surface finishing operations were failing after only two years of service.

The problem was discussed with the piping specialists at Bushnell, the NIBCO distributor in Des Plaines, Illinois. NIBCO is a century-old innovator in the flow control industry. Based on the servicing problems reported by the maintenance department, it was obvious that chromium-nickel stainless steel piping was not sufficiently resistant to the acidic materials. All metals corrode, but for many applications the low metal loss of the stainless steels makes them suitable. What was needed for this application, was a nonmetallic material that was chemically inert. The decision was made to substitute thermoplastic pipe and fittings for the stainless steel components. The material finally specified was RED KYNAR®, a polyvinylidene fluoride resin that is not only inert to the aggressive chemicals, but it also offers high abrasion resistance as measured by the standard Taber test — a resistance 10 times better than stainless steel (See Table).

Table 1. Comparative material characteristics

MATERIALS OF CONSTRUCTION		PROPERTIES			
MATERIALS		MAXIMUM TEMP °F	MAXIMUM TEMP °C	SPECIFIC GRAVITY	WEIGHT LOSS (MILLIGRAMS) TABOR SHEC/CS/10
PVC	polyvinyl chloride	140	60	1.30	12 - 20
CPVC	chlorinated polyvinyl chloride	210	99	1.49	20
PE	polyethylene	200	93	0.92 - 0.94	5
PP	polypropylene	185	85	0.94	15 - 20
PVDF	polyvinylidene fluoride	275	135	1.75	5 - 10
ECTFE	ethylene chlorotrifluorethylene	300	149	1.75	5 - 10
PTFE	polytetrafluorethylene	500	260	2.14 - 2.20	500 - 1000
FRP	fiberglass reinforced plastic	250	121	3.4 - 5.0	388 - 520
SS	stainless steel type 304/316	NA	NA	7.9	50

KYNAR PVDF is a strong, tough and abrasion-resistant fluoropolymer produced by Arkema Inc., that retains its strength at temperatures to 300 degrees F, and is inert to most solvents, acids and alkalis as well as chlorine, bromine and other halogens. Its high hardness and low coefficient of friction makes it ideal for corrosion- and abrasion-resistant applications.

Behind this decision to specify components made of engineered plastics for the transfer of highly corrosive and abrasive fluids was the growing industry preference for specifying pumps, valves, piping and related liquid handling equipment made of these materials by the chemical, pharmaceutical, food and other process industries, as well as by the broad segment of metal fabricators and product manufacturers concerned with lowering maintenance costs, maintaining high productivity and avoiding product contamination.

Once the decision was made to switch from stainless steel to a nonmetallic material, the search was narrowed by an analysis of the available choices. Should it be one of the thermosets in the fiberglass group with mechanical properties closer to those of the stainless steel, or one of the thermoplastic materials with broader resistance to chemicals over the full pH range? The nod was given to this latter group because of their inertness to the many aggressive acidic solutions required for chemical cleaning operations involving hydrochloric and sulfuric acids.

Considering the service conditions included chemical and abrasion resistance at varying pH and temperature levels, all of these thermoplastics had to be evaluated: polypropylene, polyethylene, polyvinyl chloride, chlorinated PVC, and the fluoropolymers, PVDF, ECTFE, CTFE and ETFE.

Another problem faced by the engineering department at U.S. Steel was the choice between Chemtrol's socket fusion joining system and an available alternate butt fusion system. Although the butt fusion system would make the installation somewhat simpler, according to NIBCO's analysis, the Chemtrol socket fusion PVDF joint would be stronger and more reliable, and where a seal tight connection is required, the socket fusion joint was preferable.

Red and white KYNAR piping components.

materials of construction
Reprinted from Processing Magazine

Material selection critical to ozone water treatment cooling towers *

Ozone is an allotropic form of oxygen, and an unstable gas with a pungent odor. It is the strongest oxidant and disinfectant in commercial use by thousands of municipal plants worldwide, and is probably the primary oxidant of choice in many water and wastewater municipal and industrial applications. A recent lecture by Jim Jackson of Mazzei Injector Corporation described an interesting cooling tower retrofit at a liquid food plant in Arizona that resulted in substantial cost reduction through the installation of an ozone treatment system.

I took the liberty of calling Mr. Jackson and asking him for a rundown on the materials of construction used to inject and distribute the corrosive ozone gas in the system. Thanks to his patience and cooperation, it is my pleasure to share this information with you.

The basic cooling system at this plant consisted of a 4,400 ton fiberglass, induced draft cooling tower supported by a concrete sump containing 51,000 gallons of evaporative cooling water. The ozone injection system was designed to address concern regarding the possible exposure of the plant personnel to ozone off gas and the potential for ozone gas to cause corrosion of metal support structures and the delaminating of the tower's fiberglass structures.

The answer was found with a pre-basin pressurized mass transfer and degas system utilizing the GDT process that includes a Mazzei 3090 KYNAR® PVDF Injector, a pressurized 316 stainless steel reaction vessel and PVC piping. Although the injector was available in polypropylene, the fluoropolymer construction was chosen because it offered higher strength, superior chemical and abrasion resistance, and comes with a 5-year rather than the standard 1-year warranty. Independent tests show that ozone gas injected into water streams through these fluoropolymer injectors produce a significantly higher transfer of ozone into the water.

Mazzei ozone PVDF Injector, stainless steel demister and stainless steel separator in cooling tower ozone system that has helped to reduce water treatment costs $70,000 per year.

Following the success of this initial ozone cooling tower system, two additional ozone systems were planned. After two years of operation, this facility has saved over $70,000 per year in water treatment costs.

What lies beneath*

Basement of museum relies on PVDF piping system to protect specimens.

Although the famous Chicago Field Museum of Natural History already contained more than one million square feet of display space for its priceless collection of 22 million artifacts, it was not enough. More space was needed to display newly acquired relics.

Finding the extra space was not easy. Since the museum was located close to the lake shore, building out on ground level was not an option. There was no alternative but to dig down and build a new subterranean Collections Resource Center, below grade, underneath the existing building. That responsibility was turned over to McGuire Engineers, a Chicago-based design, engineering and construction firm. The new two-level facility provides 182,000 additional square feet for new artifacts and the extensive underground chemically resistant piping required by the museum for the inspection, preservation and testing of archived specimens.

The new facility provides the physical space needed, but many other critical decisions had to be made concerning the safe handling of the many corrosive and volatile fluids required by the various research laboratories. Here is a partial list of the troublesome fluids that had to be stored and transferred in keeping with very strict fire prevention, OSHA workplace safety and EPA environmental regulations:

- Acetic acid, alcohol, boric acid, bromic acid, chloral hydrate, chromic acid, copper sulfite, diethylene, ethanol, formaldehyde, glycerin, glycol, isopropanol, methylated spirits, sodium acetate, phenoxetol, sulfuric acid, sodium sulfite, sulfur dioxide, xylol and mixtures.

Critical piping specifications

In selecting the basic materials of construction for the wide variety of chemicals that had to be transferred from tanks to laboratories, thought had to be given to chemical resistance, avoiding fluid contamination, maintaining high purity of the waters in contact with artifacts and to keep maintenance costs low. In addition, because the pipes were underground, some encased in concrete, consideration had to be given to materials that would not corrode nor deteriorate. One other important concern had to be factored in when pumping alcohol — gas leakage. Piping for laboratory gas systems had to include an automated, instrumented leakage detection system to ensure safety.

The two most critical fluid handling piping systems were those handling de-ionized water and alcohol.

The engineers selected piping made of homogenous thermoplastic materials rather than stainless steel or other metals. This automatically eliminated the danger of rust or rouge formation, metallic contamination of the specimens or the degrading of the 10 mega ohm reagent grade water, and avoided the hazards of on-site, high temperature welding. Detailed specifications centered on the fluoropolymer Kynar® PVDF.

Another important requirement for the critical laboratory gas piping system required that they utilize double containment construction — a fluid carrying

pipe set inside another large diameter pipe of the same material with open space between the two, instrumented to identify any fluid leak from the inner pipe and report that leak to a remote control box.

For general chemical fluid piping where the superior characteristics of the PVDF fluoropolymer was not considered essential, the use of lower cost polypropylene pipe was considered to be acceptable. Here is the data from the specifications for the alcohol and de-ionized water systems as determined by McGuire Engineers:

Alcohol double containment gas piping systems

1. The system shall be an Orion Basic natural 1-1/2" carrier PVDF inside of 3" SuperBlue PVDF double containment pressurized carrier piping system. Both the primary schedule 80 pipe and secondary schedule 40 containment pipe and fittings shall be manufactured from a Kynar PVDF resin.

2. The primary shall be joined by socket fusion. The containment shall be jointed wherever possible using Orion fittings with a PVDF liner. The outer shell of the mechanical joint couplings shall be made from type 300 stainless steel.

De-ionized water system

All de-ionized piping from the reverse osmosis skid-mounted 165-gallon polyethylene storage tank is to be 1-1/2" PVDF material. The return line to the tank is to be 1" pipe of the same material.

KYNAR® PVDF Closed Cell Foam Passes ASTM E-84 (25/50)

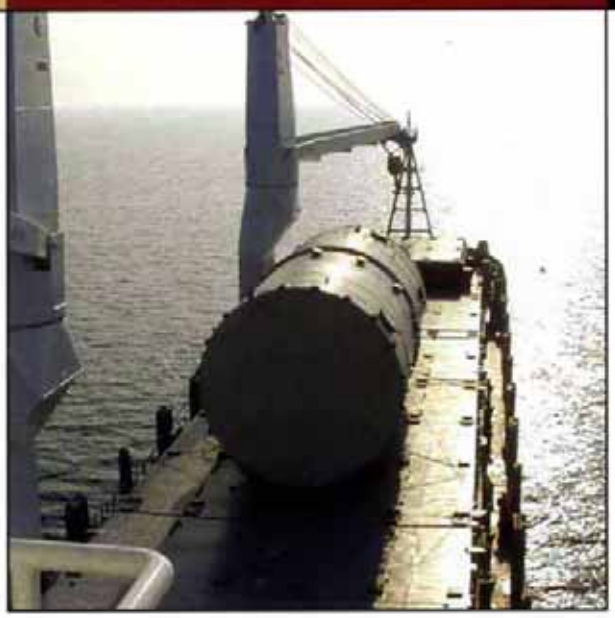
Zotek® F-30LS foam based on Kynar® PVDF fluoropolymer resin, passes the Surface Burning Characteristics of Building Materials ASTM E-84 burn test with a rating of 10/30, proving that this foam possesses exceptional flame retardant properties in addition to being durable, weatherable and chemically resistant. Kynar® PVDF resin-based foams also exhibit remarkable chemical, UV and radiation resistance, water repellency, stability at high temperatures and low smoke, heat release, ionic extractability and flame characteristics. Zotek® F-30LS foam is produced by ZOTEFOAMS plc without blowing agents to create very uniform closed-cell fluoropolymer foams with densities of 30kg/m3 (0.03 g/cc) and below (sixty times lower than the specific gravity of the solid resin).

Kynar® PVDF resin-based foams also have excellent insulation qualities and are buoyant due to their closed cell structure. Kynar® PVDF foams are available in blocks of controllable thickness and density depending on customer requirements, and are highly compatible with bromine, chlorine, strong acids, hydrocarbons and chemical mixtures. Foam longevity is thus increased, reducing the interval of replacement time in applications where retrofitting may be difficult or disruptive.

Chemical Processing

PVDF Tackles Bromine Corrosion

A challenge to design and fabricate, the largest-known PVDF-lined vessels now successfully serve at PTA plants



By Diane Dierking, senior editor

When BP, London, decided to expand its purified terephthalic acid (PTA) capabilities in the Far East, the company was faced with the prospect of building two large scrubbers that would be subject to bromine corrosion. BP, working in conjunction with CPF Dualam, Montreal, decided to fabricate these large vessels for bromine service using chemically inert Kynar polyvinylidene fluoride (PVDF), from Atofina Chemicals,* Philadelphia, as a primary corrosion barrier.

PTA, a key precursor to polyester, is made by the oxidation of paraxylene. This oxidation process can be catalyzed by highly corrosive bromine. Materials that are resistant to bromine are few: titanium, fiberglass reinforced plastic (FRP) and PVDF. PVDF was considered the best choice because vessels made of FRP have been known to blister and fail prematurely, whereas titanium is very expensive.

BP and Dualam selected Kynar PVDF because it also provides the chemical and permeation resistance necessary at the operating temperatures while being a cost-effective fluoropolymer. Predicting service lives for the vessels is difficult, but they are expected to last as long as titanium vessels, or more than 20 years, depending on service conditions.

Besides its resistance to a variety of chemicals, including halogens and halogenated acids, Kynar PVDF boasts relatively high tensile strength and low gas permeability in these environments. This minimizes the danger of the vessel lining collapsing under elevated temperature and pressure, positive or negative. Studies show Kynar PVDF permeability ratings to be substantially better than alternative fluoropolymers (Table 1).

The double challenge of building and shipping these large process vessels was laid on the shoulders of CPF Dualam because of its 50 years of experience in the design and fabrication of corrosion-resistant fluid handling equipment, its sophisticated, environmentally controlled shop and its direct access to the year-round Port of Montreal. Of equal importance, however, is the company's intimate knowledge and experience with Kynar fluoropolymer lining materials. The larger of the two scrubbers is the largest fluoropolymer-lined, dual-laminate vessel Dualam has ever built, and has expanded the company's boundaries of vessel fabrication.

Due to their size, the two scrubbers were built in sections inside Dualam's fabrication shop and assembled at the port. The larger of the two scrubbers is a dual-laminate vessel that is 27 ft. (8.2 m) in diameter, 70 ft. (21.3 m) tall and weighs more than 56,000 lb. The smaller scrubber is 22 ft. (6.7 m) in diameter and 68 ft. (20.7 m) tall.

The vessel linings are made entirely of Kynar PVDF

>> Gas Permeability of Fluoropolymers

	PTFE	PFA	FEP	ETFE	ECTFE	PVDF
Water vapor, g/m²/day/bar	5	8	1	2	2	2
Oxygen, cm³/m²/day/bar	1,500	—	2,900	350	100	20
Nitrogen, cm³/m²/day/bar	500	—	1,200	120	40	30
Helium, cm³/m²/day/bar	3,500	17,000	18,000	3,700	3,500	600

Note: Data are based on 100µ film thickness at 23°C.
Source: Data published in 1980 Kunstoffe paper titled "Fluorocarbon Films – Present Situation and Future Outlook."

Table 1. PVDF exhibits the best gas permeability properties for several common gases.

* Atofina Chemicals became Arkema Inc. in October 2004

liquor. At a pressure level of 38 inches, the scrubber would have to be shut down and repacked with new saddles to reduce the power costs and keep emissions within the allowable values. Something had to be done.

	With Saddles	With Q-Pac
Air Flow (cfm)	45,000	45,000
Packed Depth (ft)	60	60
Pressure change in water column	30	4
Fan (hp)	570	300
ClO_2 Emissions	Within Permit	Non-detectable

Figure 1

Enterprises of great pith and moment

Based on a series of discussions with specialists at Lantec Products, operators decided to substitute a completely different packing configuration. Experiences of other industries indicated that Q-PAC®, a patented tower packing design made from Kynar® PVDF, could more than double the air-white liquor surface interface.

The entire bottom area of the 30-foot packed bed as well as the first 4 feet of the upper packed bed was filled with the Kynar packing material. The remaining 26 feet of the top packed bed was filled with glass-filled polypropylene Q-PAC. Nearly 99.99 percent of the ClO_2 present in the air was absorbed in the first 30 feet of packing, precluding the necessity of additional Kynar material in the upper region of the top bed. This packing design decreased the pressure drop to the 4-inch mark on the water column with no incremental increase during the scrubbing operation (see **Figure 1**). Company management indicated an annual saving in power usage and packing replacements at $80,000.

Upon completion of the project, one more notable change in the plant's operation was observed. As the Kraft plant decreased its electric power consumption, the company's liability for carbon dioxide greenhouse gas emissions from generating that power was also reduced. One horsepower equals approximately 0.746 kWh and, according to the DOE and EPA, each kWh of power generated in the U.S. causes the release of 1.341 pounds of CO_2 into the atmosphere. Thus, the mill eliminated 2.2 million pounds of CO_2 emissions when the horsepower consumption of their scrubbing tower was reduced. **PE**

Kynar® PVDF Meets ASTM E-84 Standard

The 2006 International Building Code® specifies compliance with the ASTM E-84 standard for material exposed within plenums. Kynar® 740-02 grade PVDF, produced by Arkema Inc., meets the ASTM E-84 standard with a rating of 0/10 or 10/35, depending on final product thickness, and Kynar® 1000HD meets the standard with a rating of 0/10 for 1/4" or greater thickness. Kynar® PVDF is thermally stable up to 150°C (300°F), inert to most chemicals at room temperature, and resists many chemicals at temperatures up to 140°C. Kynar® PVDF is a performance polymer offering high chemical, abrasion and thermal resistance that is used in a multitude of applications including pipe, fittings, valves, cable ties, injection molded parts and coatings. Arkema Inc. produces Kynar® PVDF in Calvert City, Kentucky and in Pierre-Benite, France.

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The chemical, physical, and toxicological properties of these chemicals may not have been fully investigated. You must use due caution in handling of any such material and follow appropriate, good industrial hygiene and safety precautions to prevent human exposure. Carefully read and understand the information on the Material Safety Data Sheet (MSDS) before beginning work with the materials described in this brochure.

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