Food Processing

Market Segments:	Food Processing Tanks
Composite Application:	Potable water rinse tank
Resin:	Vipel® F737 isophthalic polyester
Manufacturing Process:	Filament winding
Capacity:	350,000 gallons (1.3 million liters)
Diameter:	32 feet, 10 inches (10.03 meters)
Height:	55 feet, 4 inches (16.85 meters)
Installed:	2003
Location:	Casa Grande, Arizona

For a nutritional products manufacturing plant, resilient Vipel F737 isophthalic polyester from AOC helped Plasticos Industriales of Tampico, S.A. (PITSA) put an extraordinary squeeze play on a 350,000-gallon (1.3 million-liter) composite tank. The vessel is believed to be the largest composite tank ever built for U.S. FDA-approved food contact purposes.

The squeeze is technically called an "oblation" and refers to the procedure of compressing wall sections of the cylindrical tank to give them a narrower footprint for shipping. Oblation was one of several challenges that were overcome by the versatility of composite made with Vipel resins.

"The decision to use composite instead other construction materials was based on the understanding that the complete vessel would be made of non-corrosive materials," said Roger Beman International Sales Manager for PITSA. "There would be no potential of contamination by rust as would be the case in coated mild steel ves-

To reduce shipping costs, wall ring sections were oblated into narrow profiles at the composite fabrication plant.

Tank sections were assembled and bonded to each other at the nutritional products manufacturing plant.

The completed 350,000-gallon tank withstands three potable water rinse cycles a day.

sels, and the cost of a composite vessel was less than that of a stainless steel vessel while still providing the FDA compliance required."

The Vipel resin provides excellent corrosion resistance and has high mechanical properties that have been proven in thousands of composite grating applications. Vipel F737 resin's high tensile elongation of 4% was especially beneficial for the critical oblation procedure.

Composite design specialist Al Newberry of FEMech Engineering used Mathcad software to design the fiberglass-reinforced tank. The vessel's top and bottom designs were each divided into three open-molded pieces. The cylinder was divided into six filament-wound sectional "rings."

How Oblation Works

Molded sections were post-cured with dry heat at 200°F (93°C) for two hours. Then, using power-pulls, chains and come-alongs, each ring was meticulously oblated from a round to a narrow racetrack profile for easier highway shipping. The ring profiles and tri-sections for the tank's top and bottom pieces were shipped 1,500 miles (2,410 kilometers) from the PITSA plant in Tampico, Mexico, to the Abbott Laboratories' Ross Products Division plant in Casa Grande, AZ, USA. In Casa Grande, Ross Products uses the rinse tank in the nutritional product manufacturing process.

Attention to Details

Detailed design calculations were made so the tank would:

- handle three rinse cycles, or more than 1,000,000 gallons (3.8 million liters), of potable water each day,
- meet requirements for seismic zone 2A construction
- conform to the standards of ASME RTP-1 and AWWA D120-02,
- comply with FDA regulation 21CFR177.2420, and
- be tough enough for the laminate to be oblated.

"The first step was to select a resin system that would provide the FDA compliance, be flexible enough to withstand the compression of the rings for shipping, and meet the constant demands of processing a million gallons a day," Beman said. "The specification for the structural laminate that supports the tank's inner vinyl ester liner went to an FDA-approved grade of Vipel F737 isopolyester."

At the installation site, oblation of the ring sections was reversed. The rings and sections for the tank's top and bottom were then assembled and bonded together using fiberglass/resin composite lamination.

The corrosion liner on the interior surface was finished off with C-veil in an FDA-approved vinyl ester. Field assembly was accomplished by C&E Industrial Services under the supervision of PITSA personnel.

The tank is 32 feet, 10 inches in diameter by 55 feet, 4 inches high (10.03 by 16.85meters). Composite design freedom allows the sidewalls to be thicker at the bottom where stresses are higher. Wall thickness tapers from 2.11 inches (53.6 millimeters) near the bottom knuckle to 0.39-inches (9.9 millimeters) at the top. The thickness at the finished bottom knuckleis 4.25 inches (108 millimeters), including the laminate used to bond the knuckle to the wall.

After complete assembly, the vessel was steam-heated at 160º to 180ºF (71° to 82°C) for 16 hours to effect final cure and extract monomer. The composite structure was hydrotested to ensure its integrity, and stored water samples were tested to ensure there were no unwanted contaminants. Having passed both tests, the tank was put into service.

"This application stands as a testament to what can be accomplished with Vipel technology," states AOC Business Manager Emilio Oramas. "Vipel F737 has the resiliency to allow oblation that lowers the cost of shipping. The resin performs to all the required codes and standards, especially FDA food contact. The material has the strength and durability to withstand three rinse cycles a day for years to come."

About PITSA

Located in Tampico, Mexico, Plasticos Industriales de Tampico (PITSA) has been building industrial corrosion-resistant composite equipment since 1965. The company has extensive experience in making vessels for food grade service and in oblating tanks

for shipping. The Abbott Laboratories project was the largest fabrication and oblation tank in PITSA history. For more information about the project or PITSA products and services, contact Roger Beman, International Sales Manager. Phone (520) 574-8350, or e-mail rbeman@pitsausa.com.

About AOC

AOC is a leading global supplier of resins, gel coats, colorants, additives and synergistic material systems for composites and cast polymers. For more information on AOC technology, quality and service, e-mail corrosionresins@aoc-resins.com, phone (866) 319-8827, or go to AOC-RESINS.com.

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