

water tank market e-book

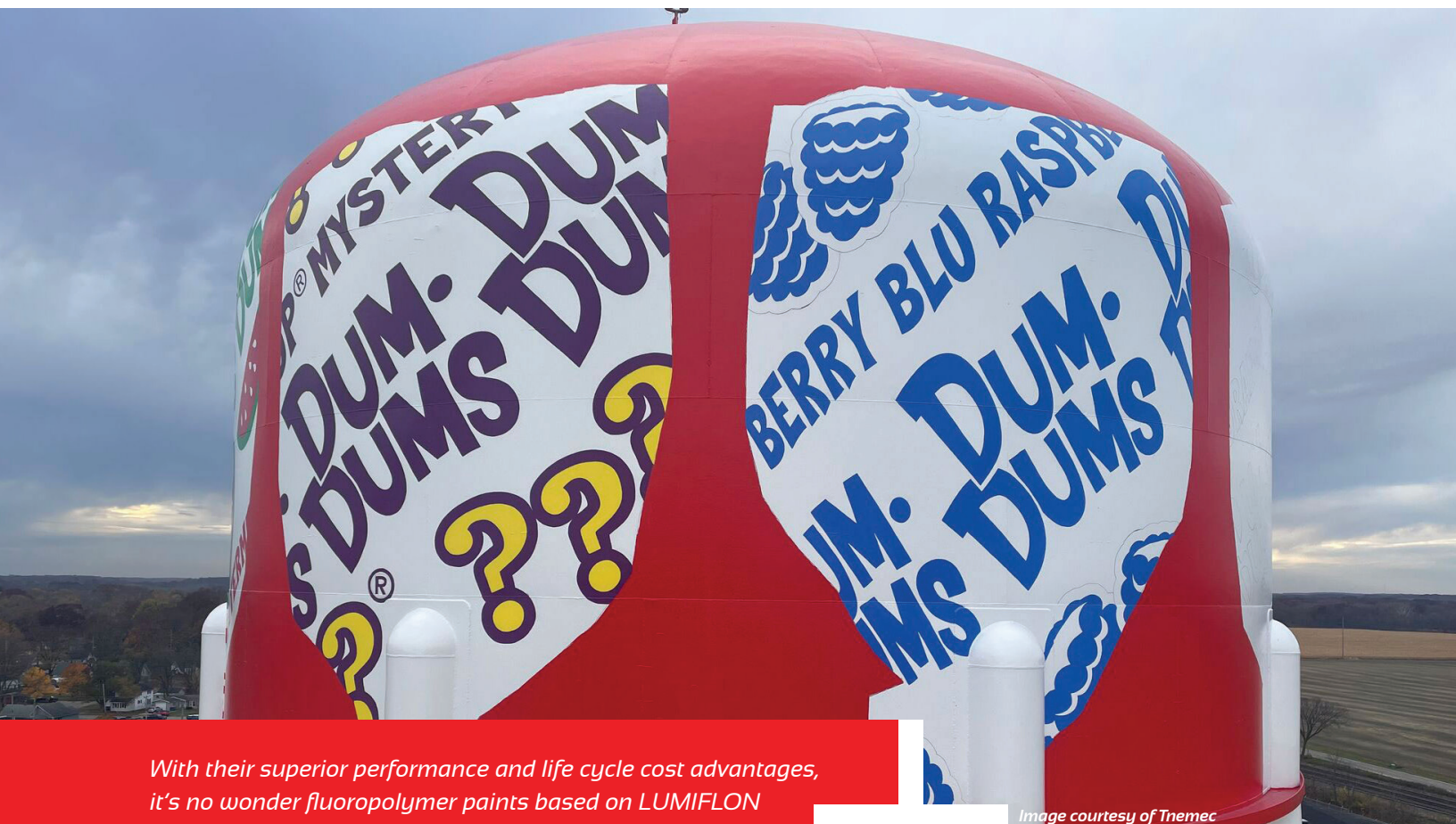
Image Courtesy of Tnemec



Table of Contents

4	What is LUMIFLON®?
5	Why LUMIFLON® for Water Tanks?
6	Aesthetics
7	Corrosion Resistance
9	Sustainability
10	Performance
12	Lower Life-Cycle Costs
15	Case Studies





With their superior performance and life cycle cost advantages, it's no wonder fluoropolymer paints based on LUMIFLON FEVE have been applied to more than 150,000 industrial and architectural structures worldwide.

Image courtesy of Themec

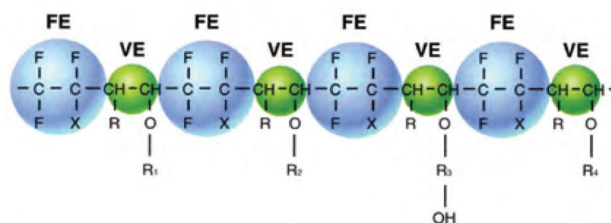
What Is Lumiflon

+ *LUMIFLON is just one of the many innovative products and materials created by AGC, a company that's driven to excel in a high-tech world. But what a difference it makes for manufacturers, designers, and builders who demand the combination of quality and value that only LUMIFLON delivers.*

LUMIFLON resins consist of alternating segments of fluoroethylene and vinyl ether, or FEVE. This regularly alternating structure, combined with the chemical stability of the carbon-fluorine bond is responsible for LUMIFLON's durability, weatherability, and corrosion resistance. The fluorinated segments protect the vinyl ether segments from degradation by UV light and chemicals, while the vinyl ether segments impart solubility, gloss, pigment compatibility, adhesion, and reactivity.

Unique Fluoropolymer Chemistry

FEVE, Fluoroethylene vinyl ether chemistry offers solubility



Fluoro Ethylene
Weatherability
Durability
Chemical Resistance

Vinyl Ether
Gloss
Solubility
Crosslinking

Why Lumiflon for Water Tanks

High performance coatings can extend the lifetime of water tanks and reduce the frequency of maintenance. FEVE resin technology provides the necessary durability for these coatings. LUMIFLON FEVE resin provides protection to water tanks, helping to prevent coating degradation at the hands of UV radiation, salt, and water. FEVE-based coatings contain anti-corrosive properties that help maintain the coating's structural integrity for decades.

LUMIFLON's low permeability to oxygen, water and chloride is unchanged after years of exposure to the elements, significantly reducing the opportunity for corrosion to begin on water tank surfaces. In addition, the flexibility and toughness of these coatings also remain unchanged, again reducing corrosion and limiting the risk of damage to the surfaces over time.

LUMIFLON resins have outperformed such common coatings as alkyds, chlorinated rubber, acrylics, urethanes and even siloxanes on steel significantly reducing total life cycle maintenance costs on water tank projects. When coatings made from LUMIFLON have been subjected to accelerated weathering tests, they show five times the lifespan of acrylic urethanes and over eight times the life of alkyd coatings.

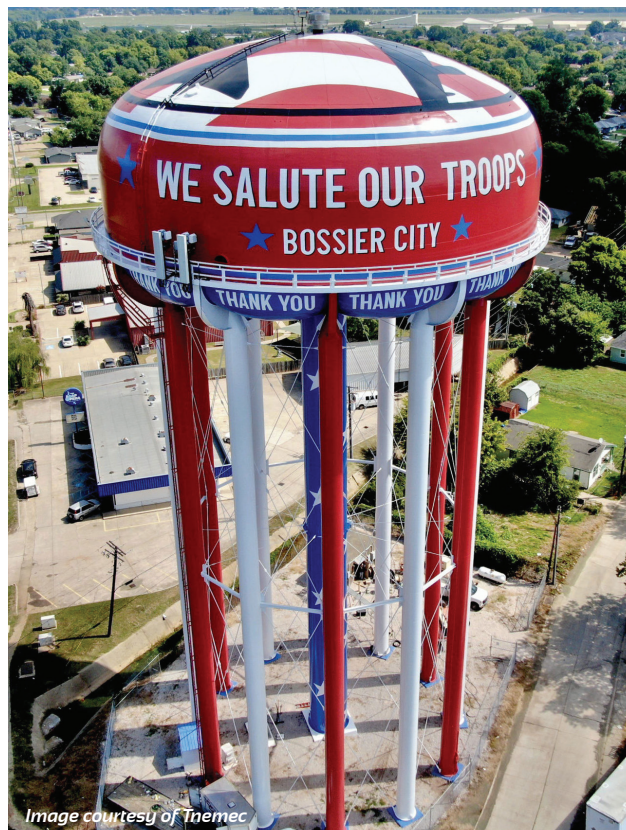


Image courtesy of Tnemec

WATER TANK GRADES

		Typical Properties		
Grade	LF200	LF200F	LF910LM	LF916F
Features	moderate mw	solid resin for low voc/haps-free coatings	low mw	solid resin for low voc/haps-free coatings
Tg (°C/°F)	35/95	35/95	37/99	34/93
Solids by Weight, %	60	>98	66	>99
OH Value, mg KOH/g polymer	52	52	102	101
Specifc Gravity, 25°C	1.12	–	1.16	–
Solvent	xylene	none	xylene	none

Aesthetics

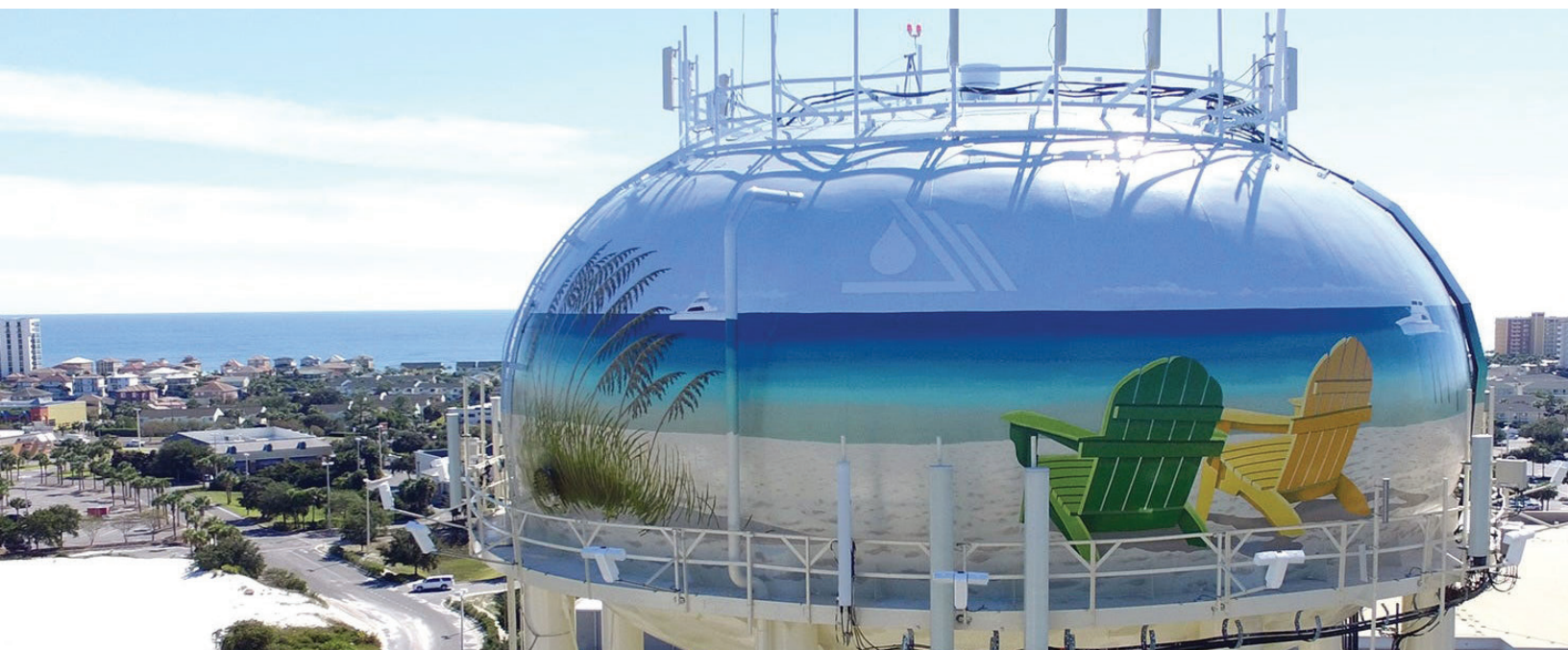


When choosing a water tank coating, it is paramount to specify a material with a coating system that contains a variety of weatherability and aesthetics properties to ensure a long-lasting design.



*projects using
LUMIFLON continue
looking good with
little to no
maintenance
required, up to
60 years!*

Because LUMIFLON-based coatings offer crisp, clean colors and a wide range of gloss, designers and builders choose them to achieve a superior look from day one. And with LUMIFLON's ability to resist UV degradation, corrosion, and the ill effects of chemical exposure, projects using LUMIFLON continue looking good for years with little or no maintenance required. That means markedly less fading, discoloration and chalking for the life of the coating – estimated at up to 60 years! Meanwhile, AGC's research and development team continues to press LUMIFLON's aesthetic advantage with new FEVE resin formulations that add even more improvements, like the ability to resist dirt and grime. FEVE resin technology has an unparalleled gloss range which allows for brighter color palettes. With a long life-cycle, projects with fluoropolymer technology have reduced recoating needs which could be an expensive and disruptive potential cost.



Destin Water Tank, Florida

LUMIFLON FEVE resin topcoat allows for unparalleled gloss, brightness and color retention and also prevents against both chalking and fading.

Image courtesy of AGI Coatings

Corrosion Resistance

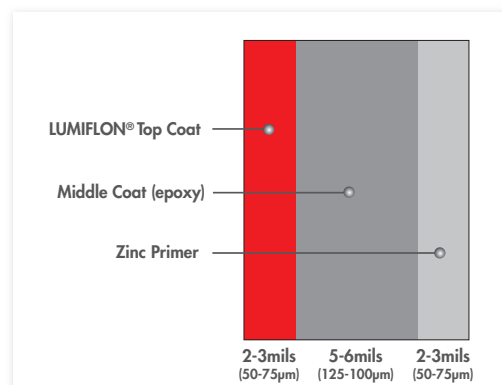


Corrosion is a major problem that can dramatically add to a project's life cycle costs, especially for water towers and other metal structures.

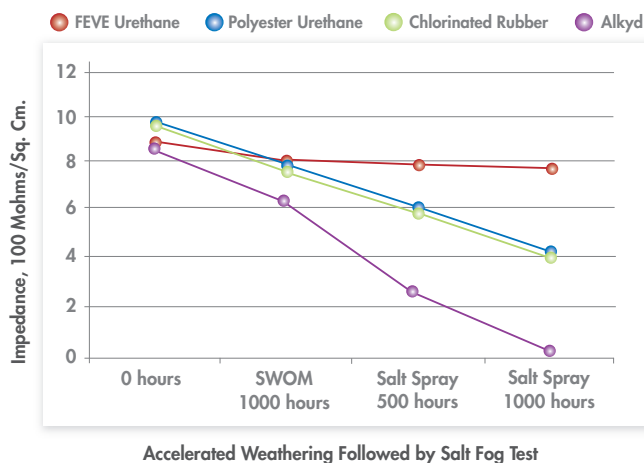
A LUMIFLON-based coating:

- Resists degradation due to weathering and exposure to chemicals
- Over the course of many years, loses little of its thickness
- Keeps corrosion initiators from penetrating the topcoat and degrading the zinc-rich primer underneath
- Has an estimated coating life of 60 years or more
- Passes all ISO 12944-9 CX Im4 and C5 Corrosion Tests

Cross Section of Coating System



Electrochemical Impedance Spectroscopy



Corrosion resistance is directly related to the slope of the line. The lower the angle difference from horizontal, the better the corrosion resistance.

Corrosion Resistance of LUMIFLON FD-1000: Salt Fog Test			
Product (NCO index)	LUMIFLON FD-1000 (1.0)	Polyurethane Dispersion ¹	
		(1.0)	(1.5)
Coating System	primer ² /topcoat/topcoat		
Salt Spray, 1000 hours	good (rating 0)	good (rating 0)	very slight blisters 1mm (rating 1)
Salt Spray, 1500 hours	good (rating 0)	slight blisters, 1mm (rating 2)	slight blisters 2mm (rating 2)

¹Bayhydrol 145 (Bayer Corp.) ²Waterborne 2K epoxy primer



Roswell Water Tank, New Mexico

*Roswell, New Mexico Water Tank Showcases Town's
Illustrious UFO History*

Image courtesy of Roswell Daily Record



*formulation and type of resin
are the most impactful variables
on carbon footprint*

Sustainability



The use of a LUMIFLON FEVE powder coating system decreases the carbon footprint compared to a PVDF liquid coating by anywhere from 23% to 46% depending on which formulations are compared. This means using an FEVE powder coating in a 100,000 square foot project could reduce CO2 emissions as much as 14,700 kg, or about 16 tons of CO2.

“Create healthy, productive environments”

There are four types of LUMIFLON resins, three of which – solid, powder, and emulsion grades contain either zero volatile organic compounds (VOCs) or can be formulated to contain less than 50 g/L of VOCs, meeting the most stringent green building criteria in the US. Due to its longevity, LUMIFLON reduces the environmental impact associated with production, transportation (energy consumed, greenhouse gases emitted), and VOCs off-gassed during the repainting/recoating process.

“Minimize waste”

LUMIFLON topcoats reduce waste created from removal of chipped paint; avoid energy consumption in the production, transportation and installation of new systems; and maintain energy and equipment savings from continued high-performance of the building envelope. In addition, the energy consumed in removing a coating from a structure can be avoided through the use of a new paint product containing a LUMIFLON clearcoat with excellent durability and weatherability.

“Reduce consumption of non-renewable resources”

LUMIFLON coatings can last more than 30 years without fading, reducing life cycle costs related to the maintenance, re-application and/or replacement of underlying surfaces. A LUMIFLON topcoat can stop the degradation of the underlying reflective coating, thus extending the life and solar reflectance capability and minimizing the use of raw materials derived from oil.



Image courtesy of Tnemec

Performance

+ *LUMIFLON based coatings maintain gloss and color when applied to water towers and other structures for well over 30 years.*

But they look even better when cold, hard data comparing LUMIFLON with high-performance polyesters and other competitors are collected from tests and studies conducted in laboratories, simulators and harsh, real-world environments.

Advantages of FEVE Based Coatings

- Ambient or elevated temperature cure – field or shop applied coatings
- Solvent soluble – clean crisp colors and a wide gloss range
- Versatile – solvent grade, solid, water based and powder coating resins offered
- OH functional – polyurethane chemistry, use standard paint equipment
- Fluoropolymer segments – ultra-weatherable and corrosion resistant
- Longer life cycle – up to 60 years

LUMIFLON FEVE vs. PVDF

	LUMIFLON	pvdf
Resin Type	solution	solvent dispersion
Curing Temperature	room temp. to 230°C	>250°C
60° Gloss	5 to 90	5 to 35
Color Range	>230 colors	color selection is limited
Recoatability	excellent	difficult



Alkyd coating is peeling



LUMIFLON coating: no chalking or peeling



Alkyd coating: chalking and color fade have occurred



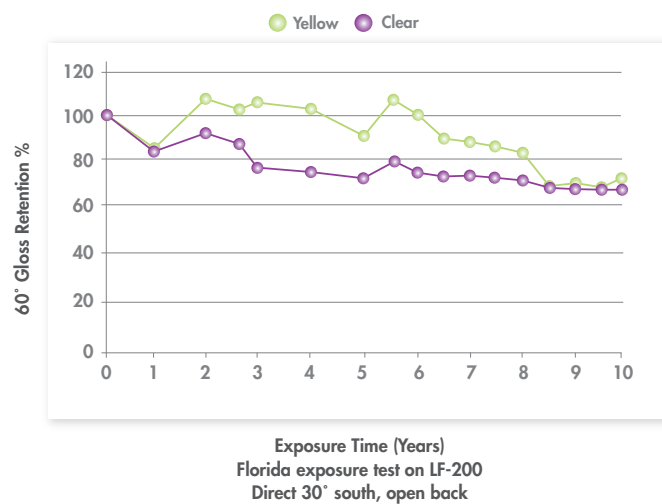
FEVE based coatings require no special or unusual surface preparation compared to conventional or traditional coatings systems.



Bossier City Water Tank, Louisiana
Colorful Water Tank Showcases The Patriotism Of Its Local Community

Image courtesy of Tnemec Company, Inc.

Natural Exposure Test on LUMIFLON Miami, Florida (ASTMG7)



Lower Life Cycle Costs



There are those who make buying decisions based on price – and then there are those who are more interested in value. With LUMIFLON, the difference is clear.



Color & Gloss

LUMIFLON-based coatings maintain gloss and color when applied to water towers, for between 20 and 60 years – significantly longer than other coating types.

Substrates

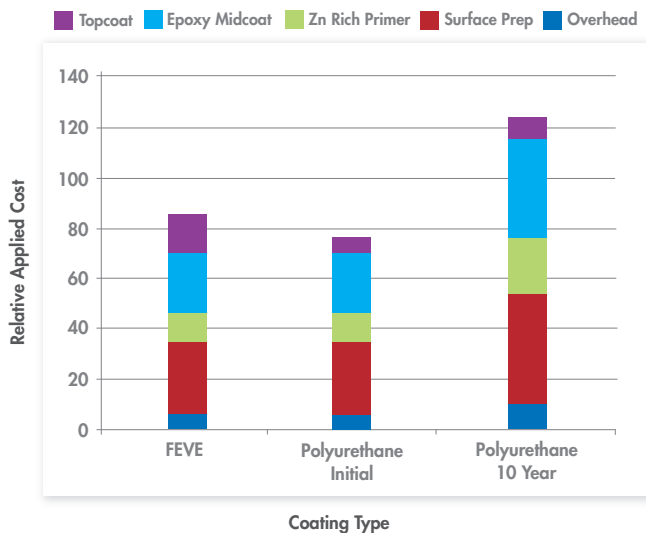
LUMIFLON resins protect steel, aluminum, fiberglass, concrete, and other materials from corrosion, sun, wind, rain and chemical exposure.

Over time, all that protection also protects your bottom line. Total life cycle costs, factoring in savings on maintenance, recoating and replacement, are much lower with LUMIFLON. Based on results from numerous projects, it's estimated that the life cycle cost of LUMIFLON coatings is only 40-80% of that of polyurethane. Price versus value. Over the course of a project's lifetime, the difference can be monumental.

Life Cycle Cost Advantages

- **Initial applied cost of FEVE-based topcoat:**
5-10% higher than standard polyurethane topcoat
- **FEVE-based topcoat life expectation:**
30-60+ years
- **Expected maintenance of standard polyurethane topcoat in this time frame:** 2-3 repainting cycles
- **Additional costs of repainting:**
 - Asset downtime
 - Staging costs
 - Environmental costs
 - Emissions and CO2 from equipment
- **Longer life cycle:** –up to 60 years

Life Cycle Cost Analysis





White Bear Lake Water Tank, Minnesota

*White Bear Lake Water Tower Revamped With High Performance
Hyper Durable Coatings System*

Image courtesy of White Bear Press

Comparative Life Cycle Costs: Lumiflon Coating And Chlorinated Rubber Coating					
Coating Type	Process	Cost, \$/m ²	Initial Cost Ratio	Coating Life, Years	Cost/Year, \$/m ²
Chlorinated Rubber	surface preparation	\$10.08	0.19		
	staging	\$27.48	0.52		
	coating	\$15.53	0.29		
	TOTAL	\$53.09	1.00	8	\$6.64
Lumiflon Coating	surface preparation	\$10.08	0.19		
	staging	\$35.08	0.66		
	coating	\$32.98	0.62		
	TOTAL	\$78.14	1.47	>21	\$3.72
	LCC Ratio				0.56



***Colorful Rose-Covered Water Tank Wins First Tank Of
The Year Competition in 2006***

Image courtesy of Journal Topics

Rosemont, IL Water Tower



The Rosemont, IL water tower was completed in late 2006 and was the first winner of Tnemec Company's coveted Tank of the Year Competition. The intricately-rose-painted tank has been a village landmark since its construction in 1982. Since then, the water tower has undergone two significant repaints utilizing an oil-based enamel paint in 1990 and 1998. When recoating was necessary again in 2006, Christopher Burke Engineering and the Village of Rosemont, Illinois, chose a long-lasting, durable tnemec coating.

Field Applicator Jetco, Ltd. Representative Kenneth Brend described, "The rose pattern required six different colors, so we had to apply them in two different layers. So we went around the whole tower once applying half the colors, then came back again and finished the design."

The project took six months to complete and required a specialty containment system to prevent dust from escaping the job site and disturbing nearby businesses. Representatives at Tnemec Company explained, "Brend duplicated the original rose design by sketching it in pencil directly onto the tower using photographs as a reference.

Then, he spent several weeks applying the finish coat of Series 700 hydroflon, a two-component, fluoropolymer polyurethane chosen for its superior long-term gloss and color retention as well as its life expectancy."

The exterior design took nearly 100 days to finish, with wind and rain causing delays throughout. However, Brend explained that when the project reached completion, the public was enthused with the result, describing, "The Rosemont public works department received numerous phone calls from people stating how beautiful it looked. Everybody loved it."

The HydroFlon fluoropolymer finish ensures long-lasting gloss and color retention. This next-generation, high-performance fluoropolymer contains Lumiflon FEVE technology, which is the main contributor to the coating system's hyper-durability. In addition, Lumiflon FEVE resin protects water tank surfaces, helping prevent coating degradation at the hands of UV radiation, salt, and water. FEVE-based coatings also offer superior color and gloss retention and anti-corrosion properties that maintain the coating's structural integrity.



Image courtesy of Epoch Times



*Ann Arbor Water Tank Wows With Stunning Mural By
University of Michigan Lecturer*

Images courtesy of Tnemec & MLive- Michigan News

Ann Arbor Water Tank, MI



City officials in Ann Arbor created a contest for the best tank design to adorn the water tower near the Stadium/Washtenaw split. The winning entry was from Bill Burgard, freelance illustrator and designer and University of Michigan Stamps School of art and Design lecturer. His design for the 500-gallon water tank features Huron River locals, the swan, sandhill crane, woodpecker, bird of prey, and bluegill fish.

Burgard stated, "I felt what was up there should reflect what's local and what we think of when we think of our water system. Also, I really liked the idea that the water tower is up in the sky, where the birds are, and they hang out in the river, too, so I thought it was a nice kind of natural combination."

The water tank was primed with an advanced moisture-cured zinc-rich urethane, providing superior corrosion

resistance. The tank then received an intermediate coat and additional topcoat—each coating providing long-lasting performance with ultra-violet (UV) light absorbers. Lastly, the tank was finished with Themec's Series 700 Hydroflon coating.

Anthony Hartwig, a Coating Consultant with Themec, further explains, "Series 700 was the best choice for the tank's extensive design. This product is formulated specifically for water tank exteriors and will provide unsurpassed color and gloss retention."

Burgard's design was chosen out of nearly 600 entries. His award-winning design was also the recipient of Themec Company's 2016 Tank of the Year. Since 2006, the tank of the year competition "has celebrated the innovative and creative uses of its coatings on water tanks from across the U.S. and Canada."





Water Tanks Serve As A Source Of Local Pride To Communities Around The Country

Images courtesy of CoatingsPro Magazine

Water Tank Pride



While water tanks have historically provided clean treated water to a community, another essential function exists. Water tanks can serve as a source of local pride to the communities they serve. As the representatives at Tnemec Company describe, “Water tanks are functional, but they’re also iconic – emblematic of a community’s or district’s sense of camaraderie and self-expression.”

Water tanks with design intent have increased over time; showcasing a town’s logo or historical elements is now standard practice. To highlight innovative designs around the country, tnemec Company created the Tank of the Year competition that pits communities around the country for the glory of the best water tank design.

Specifiers utilize high-performance products to ensure durability and color retention over time to offset the cost of coating water tanks. Cory Brown, Vice President of Technical Services at Tnemec Company, describes, “A simple economic perspective is the best approach to

selecting a coating system for water tanks. Longevity in the system’s performance helps spread the project’s cost over a longer period. We formulate and recommend coating systems that offer the longest possible service life

yielding the lowest possible life cycle cost, which is also the most sustainable approach.” One such high-performance product is Tnemec’s hydroflon Series. This exterior finish coat was introduced for use on water tanks in 2001. Tnemec representatives further describe “[Hydroflon] has outstanding resistance to UV light degradation, unprecedented long-term color and gloss retention, and excellent resistance to abrasion and chalking.”

“HydroFlon’s advanced generation fluoropolymer technology vastly exceeds the life expectancy of traditional polyurethane topcoats and its low-VOC formulation compliant with even the most stringent air pollution regulations,” Tnemec reps explain.





*Ear of Corn Water Tower Undergoes Renovation To
Remain Historical Landmark*

Images courtesy of Tnemec

Ear of Corn Tower, MN



The Ear of Corn Water Tower in Rochester, MN, dates back to the early 1930s when the Reid, Murdoch, and Co. canning company was built. The tower has since become a local attraction, showing southern Minnesota's agricultural history. The tower was commissioned in 2018 to be added as a landmark by the city's historic preservation ordinance, protecting the tower from future demolition.

Noah Fish of Agweek describes, "Libby Foods purchased the 50,000-gallon water tower and cannery in 1948 and Seneca Foods in 1982. Seneca shut down the plant in 2018, and the tower was purchased by Olmsted County the year after." The restoration of the tank, initiated in 2019, was part of an over \$2 million development effort to prepare the site for purchase.

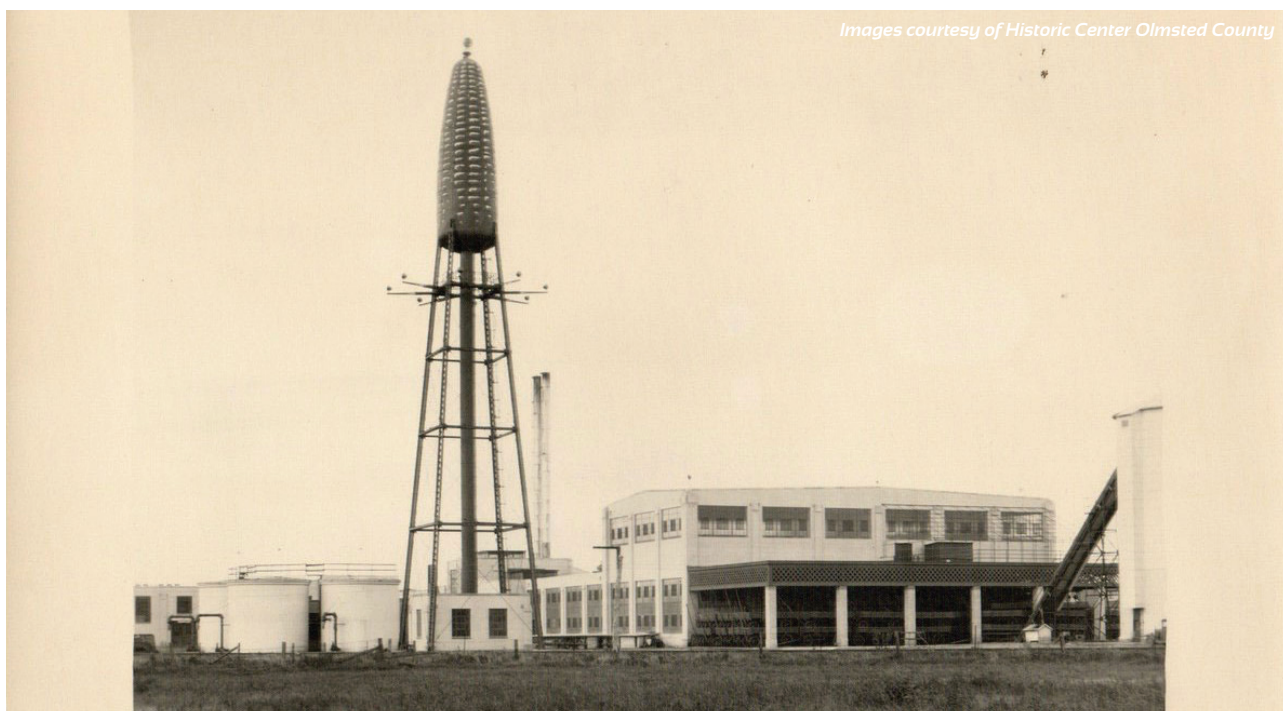
While the last significant restoration effort was two decades ago, the tank required repair. As county commissioner Jim Bier described to Agweek, "We've restored the water

tower to its previous glory. It's a kitschy icon that people like to see when they come into Rochester."

For the massive renovation, Olmsted County commissioned the coatings experts at Tnemec Company. The representatives at Tnemec explain, "To ensure the tank was protected for as long as possible, the County elected to use Tnemec coating systems, including a "dry-fall" aluminum coating, Series 43-236 Fast Dry Aluminum, on the tank's legs, and a high-performance fluoropolymer finish coat, Series 700 HydroFlon, to recoat the Corn itself."

The community entered the tank into Tnemec's coveted "Tank of the Year" competition. As a result, Ear of Corn was the winner of the 2021 People's Choice award, gaining the most votes of any submitted tank.

The Series 700 HydroFlon fluoropolymer finish ensures long-lasting gloss and color retention.





*High Performance Coating System Used To Recoat
Failing System Of Colossal Water Tank In Pennsylvania*

Lafayette Water Tank, PA



In Lancaster, PA, the 7.5 million-gallon steel potable Lafayette water tank was in desperate need of recoating. The contract was awarded to coating's contractor, U.S. Tank Painting (USTP) who had just four months to complete the massive project.

While the substrate was in good condition, the poor condition of the coatings system required the tank to be blasted prior to recoat. In order to address environmental concerns, the team at USTP installed a containment system to protect the surrounding area from the blasting debris and painting, this system was installed on both the interior and exterior.

In addition to the interior recoating and minor repairs of the interior steelwork, the exterior of the colossal tank was painted with a high performance, chemical and stain

resistant system. Induron Protective Coatings were specified for both the interior and exterior. The team at Induron explain, "For the standpipe's exterior surfaces, Tex Enoch [Induron Sales Representative] recommended a complete commercial blast (SSPC SP-6) and a four-coat exterior system including Induron's Perma-Gloss Fluorourethane. Perma-Gloss performs well in a variety of aggressive environments. In fact, it provides the longest lasting color and gloss retention of any readily available industrial coatings."

Induron's Perma-Gloss Fluorourethane employs Lumiflon FEVE resin advanced technology. Lumiflon FEVE resin provides protection to water tank surfaces, helping to prevent coating degradation at the hands of UV radiation, salt, and water. FEVE-based coatings contain anti-corrosive properties that help maintain the coating's structural integrity for decades.



Images courtesy of Induron Protective Coatings

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