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The Beet Goes On! Tank Insulation Coating

BY JACK INNIS, CONTRIBUTING EDITOR

PHOTOS COURTESY ERIC REICHERT INSULATION & CONSTRUCTION, INC. AND MASCOAT

The United States ranks among the world's top sugar producing nations. Roughly 55 percent of that production comes from sugar beets, large underground tubers that weigh between 2 and 5 pounds (0.9–2.3 kg) each at harvest, according to the U.S. Department of Agriculture (USDA). Globally, nearly three billion dollars worth of American beet sugar finds its way into baked goods, ice cream, beverages, drink mixes, and candies each year.

Western Sugar Cooperative (WSC) represents 850 beet producers and operates five processing plants in Montana, Colorado, Nebraska, and Wyoming, where they have two. Turning tubers into crystalline sugar is no easy job. The six-week-long harvest comes late summer, and the processing plants become busy places as automated equipment turns tubers into beet juice, which is subsequently dried to become granulated sugar. But no matter how hectic things become, plant operators know they need to keep beet juice hot to ward off bacteria and make filtering easier. Hot beet juice — about 185° F to 275° F (85–135° C) — is stored in huge steel tanks, some inside the plant and some outside.

At WSC's Scottsbluff, Nebraska facility, steel beet juice tanks historically relied upon fiberglass insulation held in place with aluminum cladding and banding. The system left a lot to be desired. Condensation, humidity, and moisture from other sources inevitably got underneath the aluminum cladding, creating a petri dish for corrosion on tank exteriors. Soggy fiberglass underperformed, leading to higher energy costs. Annual inspections sometimes revealed wet fiberglass sagging between cladding and tank walls, creating gaps in insulation.

WSC recently decided to increase capacity at Scottsbluff by adding nine new steel processing tanks. After careful deliberation, the co-op opted to kick the fiberglass habit. This time around, they'd beat the heat with Mascoat Industrial-DTI, a composite ceramic- and silica-based coating designed to insulate and block corrosion.



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Tank Insulation Coating



For Eric Reichert Insulation & Construction, Inc. (ERIC), the coating of nine tanks for a beet sugar processing facility was sweet! To start, the crew blasted the tanks using a Graco EcoQuip and HOLD*BLAST.



The project crossed eight weeks and ~28,500 square feet (2,647.7 m²) of new carbon steel with mill scale and surface rust. And the project was only two blocks from the crew's shop!

Unbeatable Jobsite Access

When Scottsbluff-based Eric Reichert Insulation & Construction, Incorporated (ERIC) won the bid for this ~28,500-square-foot (2,647.7 m²) project, supervisor Andrew Rein could barely contain himself. ERIC had previously performed construction work at the Scottsbluff plant, and Rein was eager to demonstrate his crew's insulated-coatings prowess.

"We always give our best on every job but definitely treated this one as a 'foot in the door' insulation project," said Rein.

Rein had another reason to like this project: WSC's facility sits two short blocks from the ERIC shop. Hey, who wants to see a competitor's work truck at a jobsite so close to your shop you could reach it with a three wood and a sand wedge?

To make the best of this unbeatable jobsite access, ERIC



JOB AT A GLANCE

organized its workshop to accommodate material storage and equipment cleaning. Then the crew stationed a 16-foot (4.9 m) spray rig trailer on site. With most non-spraying work accomplished offsite, Rein felt his six-man crew could concentrate better on blasting and coating. It turns out his crew would need every advantage possible, because a major hurdle loomed that would threaten the eight-week deadline.

Completely Beet

Just before the project began, WSC was forced to assemble, weld, and move several of the new tanks. The original idea was to have 26-foot-tall (7.9 m) tank sections staged in the yard away from the buildings. But upon arriving on the jobsite on day one, the ERIC crew was surprised to find some tank sections assembled, towering 52- to 78-feet (15.8–23.8 m) high, and positioned beside the building.

“Due to WSC’s schedule, we were faced with working on taller-than-anticipated tanks right next to the building where everyone worked,” said Rein. “The co-op’s biggest concern was having everything up and running in time for harvest. We understand that. It’s just one of those things.”

Faced with a setback that could easily escalate into a major delay, Rein countered by renting an extra telescoping boom lift, switching the blast crew start time to 5:50 p.m., and working Sundays when plant employees were off duty. To guard against overspray, ERIC crew members hung 4-mil (101.6 microns) plastic sheeting on the processing plant walls.

All of a sudden, eight weeks didn’t seem like enough time for this project.

The crew’s first task was to remove mill scale and surface rust by abrasive blasting tank exteriors. Specs called for NACE No. 3/Society for Protective Coatings (SSPC) Surface Preparation (SP) 6: Commercial Blast Cleaning, so the crew members busted out Graco EcoQuip vapor blasters. The EcoQuip vapor blaster eliminates more than 90 percent of airborne dust while using less water than wet or slurry technologies, according to manufacturer’s spec sheets. The low-dust blast allowed the crew to forgo

The project had to work around beet harvest, and the crew had to work around safety parameters. They watched for thunderstorms, wore fall protection, and any personal protective equipment (PPE) as required.



PROJECT:

Spray apply composite ceramic- and silica-based insulating coating to the exterior of nine tanks at a Nebraska sugar beet processing facility

COATINGS CONTRACTOR:

Eric Reichert Insulation & Construction, Inc. (ERIC)
1502 19th Ave.
Scottsbluff, NE 69361
(308) 633-3595
www.eric-inc.com

SIZE OF CONTRACTOR:

12 employees

SIZE OF CREW:

6 crew members

PRIME CLIENT:

Western Sugar Cooperative (WSC)
7555 East Hampden Avenue, Ste. 600
Denver, CO 80231
(303) 830-3939
www.westernsugar.com

SUBSTRATE:

Carbon steel

CONDITION OF SUBSTRATE:

New tanks with mill scale and surface rust

SIZE OF JOB:

~28,500 sq. ft. (2,647.7 m²)

DURATION:

8 weeks

UNUSUAL FACTORS/CHALLENGES:

- » The coatings project was only two blocks from ERIC’s shop.
- » Beet harvest was the main driver for the deadline.
- » The lightweight nature of the insulating coating meant no spray when wind exceeded 10 mph (16.1 kph).

MATERIALS/PROCESSES:

- » Added HOLD*BLAST at 50:1 ratio to water tank in Graco EcoQuip vapor blaster
- » Vapor blasted using 150- to 200-mesh abrasive media called Star Bright to NACE No. 3/Society for Protective Coatings (SSPC) Surface Preparation (SP) 6: Commercial Blast Cleaning
- » Spray applied a single coat of International Intertherm 228 epoxy phenolic primer at 4–6 mils (101.6–152.4 microns) dry film thickness (DFT)
- » Spray applied three to eight coats of Mascoat Industrial-DTI at 15–20 mils (381.0–508.0 microns) DFT per coat to achieve 60, 90, and 150 mils (1,524; 2,286; and 3,810 microns) total DFT

SAFETY CONSIDERATIONS:

- » Watched for frequent thunderstorms, which caused shut downs to prevent lightning strikes
- » Wore fall protection when working from telescoping boom lifts
- » Wore personal protective equipment (PPE) as required

VENDOR TEAM

Capital Safety

Safety equipment manufacturer
3833 Sala Way
Red Wing, MN 55066
(800) 328-6146
www.capitalsafety.com

CHLOR*RID International, Inc.

Material manufacturer
P.O. Box 908
Chandler, AZ 85244
(800) 422-3217
www.chlor-rid.com

General Tools & Instruments

Equipment manufacturer
75 Seaview Dr.
Secaucus, NJ 07094
(800) 697-8665
www.generaltools.com

Genie

Equipment manufacturer
18340 NE 76th St.
Redmond, WA 98052
(800) 536-1800
www.genielift.com

Graco Inc.

Equipment manufacturer
88 11th Ave. NE
Minneapolis, MN 55413
(612) 623-6000
www.graco.com

Guardian Fall Protection

Safety equipment manufacturer
6305 S 231 St.
Kent, WA 98032
(800) 466-6385
www.guardianfall.com

International Paint

Coating manufacturer
6001 Antoine Dr.
Houston, TX 77091
(713) 683-1711
www.international-pc.com

JLG Industries, Inc.

Equipment manufacturer
1 JLG Dr.
McConnellsburg, PA 17233
(717) 485-5161
www.jlg.com

Mascoat

Coating manufacturer
4310 Campbell Rd.
Houston, TX 77041
(800) 769-0233
www.mascoat.com

Spray Tech Systems, Inc.

Equipment manufacturer
1025A Enterprise Ave.
Oklahoma City, OK 73128
(800) 777-7729
www.spraytechsys.com

UniWest

Material distributor
6201 E 42nd Ave.
Denver, CO 80216
(888) 728-9120
www.unitedwesterndenver.com

Beet Flash Rust

To help beat flash rust, the crew added HOLD*BLAST by CHLOR*RID to the EcoQuip's water tanks at a 50:1 ratio. Running the anti-rust agent through the vapor blasters saved time compared to spraying HOLD*BLAST onto each tank after blasting. It also gave the crew breathing room between the blast and the basecoat application.

"HOLD*BLAST gives us leeway on getting the primer down," said Rein. "If you don't use it, literally as soon as you're done blasting and the water evaporates, rust starts showing. Using it allowed us to apply the basecoat up to three days after the blast."

Mascoat's insulating coating self-primes over non-ferrous metals, such as aluminum and stainless steel, but these carbon steel tanks required International's Intertherm 228 HS basecoat. Intertherm 228 HS is a two-component, high-build epoxy specifically formulated for use beneath thermal insulation coatings (TIC). Working with afternoon air temperatures hovering around 100° F (38° C), 228 HS offered an operational pot life of about an hour, according to Rein, who did much of the spraying. His go-to rig for the 228 HS was a Spray Tech airless with 519 tip.

"We were aiming for 4 to 6 mils [101.6–152.4 microns]," Rein said. To achieve that dry film thickness (DFT), Reins and his crew crosshatched the spray using horizontal and vertical sweeps. "We weren't overly concerned about putting down too much material — 8 mils [203.2 microns] would have been okay — but we definitely didn't want any spots with just 3 mils [76.2 microns]."

For a thickness check on the fly, the coatings applicators found that when they applied enough 228 HS so that they couldn't see base metal, they were right around 4 mils (101.6 microns).

The crew settled into a productive routine with two men vapor blasting, two applying coatings, and two filling in. They were clawing their way to get back on track with the deadline. But the trickiest part of the application was still to come, and factors beyond their control threatened to give this crew a real beat down.

Since the tanks hold beet juice at a various temperatures, insulation needs varied. Therefore, the tanks were specified to receive three different total dry film thicknesses of 228 HS: approximately 60 mils (1,524.0 microns), 90 mils (2,286.0 microns), and 150 mils (3,810 microns). That meant on average between three and eight coats per tank at 15–20 mils (381–508 microns) DFT per coat. That also meant a great deal of time allotted for curing between coats. With no time to lose, the ERIC crew fired up their Graco GH 833 Big Rig sprayer.

"We sprayed the DTI just like the Intertherm, crosshatching, but unlike the primer where we didn't mind going a bit heavy, we didn't want to put down too much DTI," said Rein. "Any single coat over 30 mils [762.0 microns], we felt there might be a risk of trapping moisture inside and not getting a full cure."

With ambient air temperatures typically ranging between

bulky and heavy hooded air-fed respirators in favor of face shields and half-face respirators, which helped prevent fatigue. No one wants to feel completely beat at the end of the day.

Working from Genie and JLG Industries telescoping boom lifts, the crew attacked the tanks with 150- to 200-mesh abrasive media by UniWest called Star Bright. To maximize production rates, the blast men used #8 round tips and held the nozzles about 18 inches (457.2 mm) from the surfaces at 60- to 90-degree angles.

"Star Bright is pretty fine stuff," said Rein. "We originally tried regular silica sand but needed more consistent-sized media to get better production. Star Bright's designed for mill scale and does the trick in a hurry."



The six-person crew spray applied one coat of International Paint's Intertherm 228 at 4–6 mils (101.6–152.4 microns) dry film thickness (DFT). Both this primer and the DTI were applied in a crosshatch strategy.

70° F and 100° F (21° C and 38° C) for this phase of the project, Rein knew he should be okay waiting six hours between coats. But to be 100 percent certain each coating cured, he used a General Tools & Instruments moisture meter and wouldn't recoat until the meter read zero. But all this waiting came at a price: exposure to the elements!

Beet It!

In western Nebraska, thunderstorms frequently sweep through on summer afternoons. When skies start sparking lightning and you're working near steel tanks or on metal telescoping lifts, the only option is to beat it!

"As soon as a storm starts rolling in, we shut down and find shelter," said Rein. "If we see lightning, even if it's 100 miles [160.9 km] away, we shut down. It wouldn't matter if we were three weeks behind on a job, we'd get off the lifts and find cover. There's absolutely no reason to think twice when someone could get hurt or killed."

But thunderstorms pack more than lightning. Rain can wreak havoc on yet-to-cure coatings, so the ERIC crew monitored weather predictions at all times. If rain was forecast within three hours, they'd stop spraying to give the DTI time to dry enough that rainfall wouldn't affect it.

"The last thing we want to do is to spray a coating, have it rain, and watch it run," said Rein. "It hasn't happened yet, but in my mind, if it did, we'd have to sandblast and start over. We make a point to not let that happen."

In addition to watching for storms, the crew was sure to wear proper personal protective equipment (PPE) when appropriate. That included fall protection from Capital Safety and Guardian.

Wind delays, also common occurrences on the Great Plains, forced the ERIC crew to shut down several times toward the end of the project. Rein noted that DTI is lightweight by design, and his crew needed to be careful not to let the wind misdirect it.

"Overspray was not a real problem but Industrial-DTI is so light that any wind above 10 mph [16.1 kph], you have trouble



The final step in the system was three to eight coats of Mascoat's Industrial-DTI at 15–20 mils (381.0–508.0 microns) DFT per coat. That couldn't happen when wind exceeded 10 mph (16.1 kph).

getting it down onto the substrate," Rein said. "There's no sense wasting product trying to do something that doesn't need to be done in those circumstances. Near the end, we lost a few days, but thankfully didn't need to push it. We finished just ahead of the deadline."

The Beet Goes On

By flexing their schedules, logging extra hours, working smart, and working hard, the ERIC crew wrapped up in time for the beet harvest. Mascoat territory manager Travis Creech delights in how well the ERIC crew performed.

"This is the first time we used them," Creech said. "They came highly recommended from WSC due to their past (construction) work. They've done a good job and are great to work with, too."

WSC supervisor Mike Maddaus believes the coatings system will work as advertised. Before deciding on DTI, he contacted a sugarcane refinery in Louisiana that has been using DTI for more than 20 years. The refinery manager sang high praises, which helped cement WSC's decision.

"Getting these new tanks online was crucial to our plans to double our production rate," Maddaus said. "Andrew Rein's crew is very knowledgeable, and they plan out work really well. I'm very confident this coating system will perform for a long time."

Rein couldn't be prouder of the way his crew stepped up to work extra shifts and hours to keep this project on track. They overcame changes in tank locations and configurations, worked around thunderstorms, and knew when to back off spraying when winds piped up. And despite all of those potential setbacks, they still finished on time.

"The project went very well," Rein said. "We treated it as a foot-in-the-door project, and it's already worked as such. WSC wants us to apply the same coating system at their Fort Morgan, Colorado facility."

Nice to know that for the coatings crew at ERIC, the beat goes on! **CP**