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NOVEMBER 2006

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# A DIFFERENT KIND OF SPRAY-ON PROTECTION



Hovercraft in the Bering Sea rely upon coatings to perform a variety of tasks beyond corrosion control, including thermal insulation, acoustic attenuation, and condensation control. A coatings professional from West Coast Insulation (*above*) tackles thermal insulation and condensation control with an application of Mascoat Delta T Marine, a single-component, high-grade acrylic laden with hollow ceramic particles and beads, on a new hovercraft (*right*) in the final phases of construction. Ice floes and rough conditions in the rugged Aleutian Islands chain (*far right*) at times make conventional transportation impossible — hence the increasing reliance upon hovercraft and specialty coatings.



# HELPS TAME THE COLD BERING SEA

By Jack Innis

**E**xtrême weather makes it difficult to provide maritime transportation between the various islands in the Aleutian Chain. In summer, the Bering Sea can be relatively calm and workboats serve splendidly to connect harbors such as Cold Bay, False Pass, and Akutan. But in winter, jagged ice floes often envelop vast stretches of ocean, clogging harbors and paralyzing shipping.

In recent years — as the Aleutian Islands continued to develop fisheries, oil exploration, and tourism—state and local officials recognized the need to provide transportation on a 24-hour-a-day, 365-days-per-year basis.

Officials from the Aleutian Island's East Borough commissioned Kvichak Marine Industries in Seattle to build a hovercraft to solve their transportation woes. Hovercraft, also called air-cushioned vehicles, have been utilized for

commercial transportation since the mid 1990s. They rely on downward-directed fan power to lift them above land, water, or ice and rearward-directed fan power to propel them forward. East Borough opted for a 90-foot-long, 47-passenger BHT-130 hovercraft designed by Hoverwork of Great Britain. Like airplanes, hovercraft builders typically utilize lightweight, rugged aluminum.

## Noise, Heat, and Water Weight

But Kvichak (pronounced *kwee-jack*) quickly realized that while aluminum possesses strength, it also has weaknesses. It transmits heat more rapidly than fiberglass or wood. Noise travels easily from engine rooms to passenger and crew areas. Condensation forms on cold metal surfaces.



www.aleutianseast.org



But to keep weight down, the boat builder could not utilize traditional thermal and acoustic insulation.

Kvichak contacted Mike Heckinger, owner of West Coast Insulation. Heckinger's six- to 12-man crews have been providing marine insulation in the Seattle area since 1972. For the past three years, Heckinger has been immersed in the world of acoustic and thermal coatings. His role during the final construction phase of the BHT-130 was to knock down the noise, heat, and condensation as much as possible.

"One of our main goals was to get the noise levels in the passenger compartments below 84 decibels," Heckinger said. Anything above 84 dB, and all passengers would have to wear hearing protection as mandated by the Alaska Department of Transportation. Additional goals included keeping engine room heat from reaching passengers and preventing condensation from collecting on the vessel's interior surfaces.

"The difficulty of assessing the acoustical performance of any material on board a boat is that usually you're getting a spec on a boat that's never been built," Heckinger said. "You don't have 12 identical boats that you can compare results on; basically you're trying to predict performance from line drawings."

## Actions Speak Louder Than Words

The coatings specs called for approximately 1,900 square feet of thermal insulation at 60 mils inside the passenger compartment and 1,700 square feet of acoustical insulation at 40 mils inside the engine rooms. While Heckinger couldn't promise

Kvichak that their goal of 84 dB would be met, he was able to assure them that his coatings would provide an approximate 12 dB reduction at a fraction of traditional insulation's weight. Heckinger knows that in the tight-knit Pacific Northwest boat- and ship-building community, a man is judged not by what he says but by the promises he keeps. It is this knowledge that helped him a few years ago to connect with his supplier for the project, Richard Stratton from Mascoat Products.

"I first heard about Mascoat's Delta dB through Dick Stratton," Heckinger said. Delta dB is a single-component, lightweight, no VOC formulation with anti-vibration fillers incorporated into a sound-absorptive resin. "I had been using a competitor's product, but was so dissatisfied that when Dick walked in one day, I almost hugged him."

Stratton was having struggles of his own. As Mascoat's Pacific Northwest independent distributor and technical support provider, he had been working hard to introduce the product. But in a land where actions speak louder than words, he was having trouble finding traction. It was the age-old conundrum: How can you prove yourself without a chance to prove yourself?

Heckinger wanted to team up with Stratton, but first he needed to make sure the product worked as advertised. He tried Mascoat's Delta dB on his work van, a 1990 Grumman step van with a 16-foot bed. Heckinger had bought the van used and heavily customized it for coatings. It was loud!



## JOB at a GLANCE

### HOVERCRAFT INSULATION

#### PROJECT:

Install lightweight, spray-on acoustic and thermal insulation on key areas aboard a hovercraft destined for Arctic duty.

#### COATINGS CONTRACTOR:

West Coast Insulation  
5350 30th Ave NW # B  
Seattle, WA 98107  
(206) 459-2233

#### SIZE OF CONTRACTOR:

Between four and six full-time employees

#### PRIME CLIENT:

Kvichak Marine Industries  
469 NW Bowdoin Place  
Seattle, WA 98107  
(206) 545-8485  
www.kvichak.com

#### SUBSTRATE:

Bare aluminum

#### SUBSTRATE CONDITION:

New construction

#### SIZE:

Thermal insulation, 1,900 sq. ft.  
Acoustic insulation, 1,700 sq. ft.

#### DURATION:

Four-day project over one-week period. West Coast estimates it would have taken two days if a straight start-to-finish approach had been possible.

#### UNUSUAL FACTORS:

- Working with a relatively new vendor and product
- Curing problems caused by cold and high humidity

- Cold climate required diligence in coating shipping and storage

#### MATERIALS/PROCESS:

- Prep aluminum with vinegar wash
- Apply thin "mist coat" of Mascoat Delta dB or Delta T
- Apply two passes of 20 mils Delta dB, three passes 20 mils Delta T

#### SAFETY CONSIDERATIONS:

- Working indoors required exhausting all fumes outside of boat and building
- Full face respirators required while spraying interior spaces
- Boatyard required steel-toed boots, hard hats, and long-sleeved shirts



"It was so noisy driving down the freeway that I would have to wear earplugs!" he said. "You couldn't hear a thing over the roar. You couldn't even talk in it. It drove me nuts!"

Two passes totaling 40 mils of Mascoat's Delta dB cured the Grumman van's noise problem. "I wouldn't call it quiet, but now you can talk or hear the radio, and I don't have to wear earplugs anymore."

After seeing with his own eyes (and hearing with his own ears) how well the product worked, Heckinger teamed with Stratton on a few initial coatings projects. Trust built and their relationship grew.

"I grew up commercial fishing and have a great appreciation of how heat and sound can affect boaters. It's terrible," Stratton said. "I was looking for someone who could embrace ceramic latex coatings. Mike Heckinger is an engineer by training. He's an innovator and problem solver who is well trusted in the region."

Knowing he had a good product and representative, Heckinger decided to team with Stratton on the hovercraft project. "Kvichak is a long-term customer of mine," Heckinger said. "Together, as a contractor and salesman, Stratton and I have had some good success. I do a lot of work for the Kvichak crew. I knew if I blew it, I'd be risking other business as well."



West Coast Insulation and Mascoat use ordinary white vinegar to prep the new aluminum (above). Vinegar is readily available, inexpensive, environmentally friendly, and its slight acidity cleans while removing welding residue. With proper prep, Delta T Marine adheres readily to mullions (window frames, inset, opposite page), which, if left uncoated, would create constant condensation problems.



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## Watching Paint Dry Doesn't Pay

The BHT-130 was being built indoors. Heckinger and his West Coast Insulation crew were able to drive their van right into the building and set up equipment underneath the blocked-up vessel. "Because we're mobile and can't always rely on air supplied at each job site, we use a Graco Ultra Max II 1595. It's the biggest electrical unit they have," Heckinger said.

The single-component Ultra Max II 1595, with a maximum rating of 3,300 psi, is Graco's highest output

airless sprayer and is designed to handle multiple spray guns and hose lengths longer than 50 feet. "We couple the 1595 with 100 feet of three-eighths-inch hose and use a Graco Contractor II gun with a #619 tip," he said.

Beginning in the crew compartment, West Coast prepped the new aluminum with a wash of white vinegar, which is slightly acid-based. White vinegar is readily available, cheap, non-toxic, and gets welding residue off the surface. They rigged up a small propane heater and a 12-inch ventilation fan with plastic duct to move the air. Since this project was inside the manufacturer's plant, West Coast was required to exhaust all fumes out of the building, not just out of the boat. In addition to moving fumes, it's important to move moist air out of the confined spaces and off coated surfaces to allow the polymer molecules to interlink and bond together.

"If you don't move the air out, you can really feel the humidity start to rise in the space you're working in," said Heckinger.

Once the surfaces were dry and the masking in place, West Coast suited up: Tyvek coveralls, North-brand full-face mask respirators with charcoal canisters, eye protection, and Majestic Glove's M-Safe 8-mil nitrile gloves. They cleaned the pump of its storage fluid, primed it with Mascoat Delta dB, and started spraying a very thin coat to help the first pass adhere.

"First, we applied a mist coat to all vertical surfaces on the boat," said Heckinger. "Generally, in about a half hour, you can come back and hang about 20 mils of coat in one pass." At 72°F and normal humidity, 20 mils of Mascoat Delta dB dries to the touch in about 25 minutes and is ready for recoat in 30 to 120 minutes. A thinner coat should dry more quickly, but Puget Sound weather worked against that approach.

With the ambient air temperature at 50°F, relative humidity at 80 percent, and the propane heater emitting moisture as a byproduct, the mist coat was taking a long time to dry. Too long!



Coating a hovercraft being built indoors (top) requires fumes to be vented completely outside the building via ductwork. Normal space heaters used to promote curing in the winter didn't do the job (above left). Overly slow curing put West Coast Insulation in the business of watching paint dry (right) — which we all know doesn't pay!

By bringing in a monster 350,000 BTU heater and more duct work (left and opposite page), West Coast was able to shorten the recoat window to get the job done in a timely fashion.

## Canada Dry

Although originally planned as a one- or two-visit project, this job was beginning to seem like a long-term relationship. Weighing the pros and cons — and his bankbook — Heckinger decided to invest in a Canadian-built FrostFighter diesel indirect-fire heater. The 350,000 BTU heater quickly threw out plenty of dry, hot air. "We can really cook a space with that," Heckinger said. "Without a good heater in Puget Sound in the winter, you're paying yourself to watch paint dry."

With the mist coat now drying close to normal spec times, West Coast decided to play catch-up. They increased from a two- to three-man crew. One crewman worked ahead prepping; another stayed in the van tending pumps and keeping five-gallon batches of the single-component Delta dB mixed. "It's easier just to stage everything under the boat," Heckinger said. "You really don't need a lot of communication between the nozzle guy and bucket guy — just keep filling the bucket."



Actually, the bucket guy does a bit more than that. Delta dB is mixed with a standard Jiffy mixer blade, and the material should be applied shortly after mixing. If the Delta dB is allowed to sit for a sustained period of time prior to application, remixing is advised. But under no circumstances should the material be mixed for more than five minutes.

## Can't Take the Heat?

Those who wonder why a hovercraft — destined for duty in the Arctic — should receive a thermal barrier coat need only think about the enormous amount of heat generated by diesel engines. On a normal boat, one or two diesel power plants are housed in a below-decks engine room. The BHT-130 has four diesels spread throughout the vessel: two to provide upward lift and two to provide forward motion. Although hot exhaust gases are discharged, residual heat readily transfers through the aluminum structure and penetrates passenger, crew, and navigation areas.

Delta T Marine (a single-component, high-grade acrylic laden with hollow ceramic particles and beads) is commonly found on oil rigs in hotter climates. A mere 40 mils provides an insulation value of R-12, making it ideal for weight



**“Without a good heater in Puget Sound in the winter, you’re paying yourself to watch paint dry.”**

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A West Coast Insulation coatings professional checks coatings thickness. With two passes totaling 40 mils (DFT), Mascoat Delta dB provided enough acoustic insulation to ensure hovercraft passengers and crew would not be forced to wear earplugs while underway.

## VENDOR TEAM

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conscious hovercraft manufacturers. A U.S. gallon of Delta T weighs only 5.2 pounds, compared to Delta dB's whopping 13.35 pounds per gallon.

"There's a demonstration we do with an electric fry pan," said Heckinger. "We coat half of the pan with Delta T. With the pan on, my laser thermometer shows 440 degrees on the uncoated side. On the Delta T side, it's showing 289 degrees."

Heckinger is convinced the coating works even better than shown during the demonstration. More than once he has touched the coated portion of the frying pan with his bare hand and not been burned. "I happen to know that metal will burn you at about 160 degrees. I put my hand down on the insulated side for a full 10 count, and guess what? I wasn't burned!"

Heckinger's engineering training tells him that simply taking an item's surface temperature can be misleading. "When we use a thermometer, we're only reading a single element of heat. Like electricity, which is measured in volts, amps, and watts, heat is more complex than just temperature."

## Unfiltered Is Better

With the diesel heater cranking out BTUs, West Coast had an easier time laying down three coats of Delta T to total 60 mils. West Coast spot checked coating thicknesses with a QuaNix 1500 DFT gauge. Heckinger offers a few been-there, done-that pointers to those using Delta T for the first time:

"The biggest 'tribal knowledge' tip I have to offer is to remove every filter you have from your pump and gun system. If you leave them in, you'll start separating your micro beads from the base. Some painters just shake their heads when you tell them that, but it's true."

Heckinger also cautions against mixing Delta T too rigorously: technique is everything! Just stir with a paddle until a consistent color and texture is achieved. Mascoat advises running the Jiffy's drill motor in reverse to minimize scratching the inside of the paint can, which may deposit metal flakes in the coating. "If you whip it up, you'll break up all the micro beads. Also, if you're in a cold climate, ask Mascoat to ship the coating with thermometers that burst if they freeze. That way you'll know if your product's been compromised."

## Sounds of Silence

After a series of on-water tests, noise levels in the BHT-130 turned out lower than the 84 dB target—a full 12 dB drop from anticipated non-insulated levels. The thermal coating does the trick to keep passengers and crew comfortable and also prevents condensation from forming on several problem areas.

As the hovercraft approaches its first winter challenges, Heckinger and his West Coast Insulation crew are satisfied in the knowledge that their lightweight insulation has helped tame the Bering Sea. **CP**