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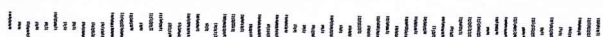
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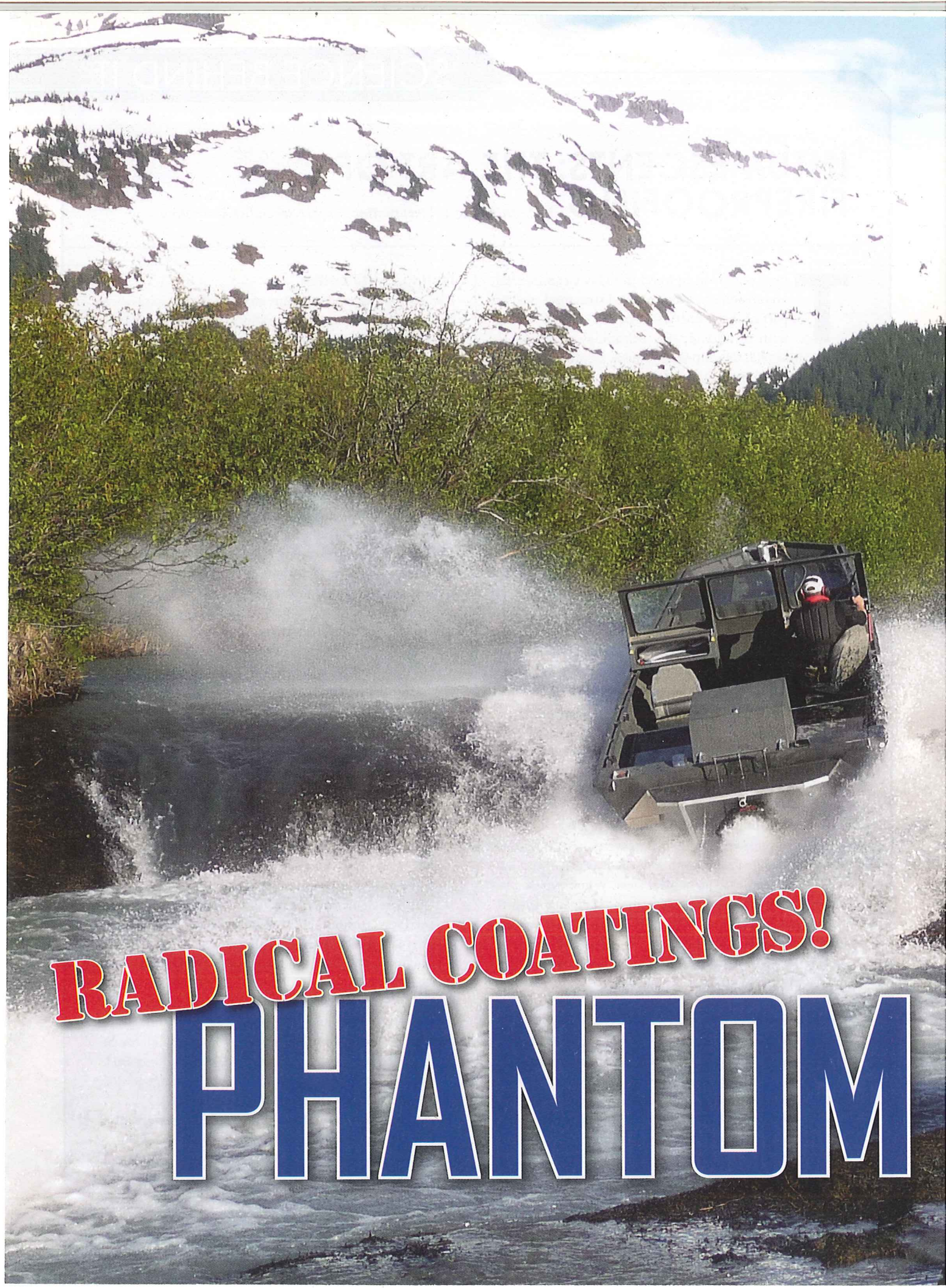
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COATING BOAT HULLS

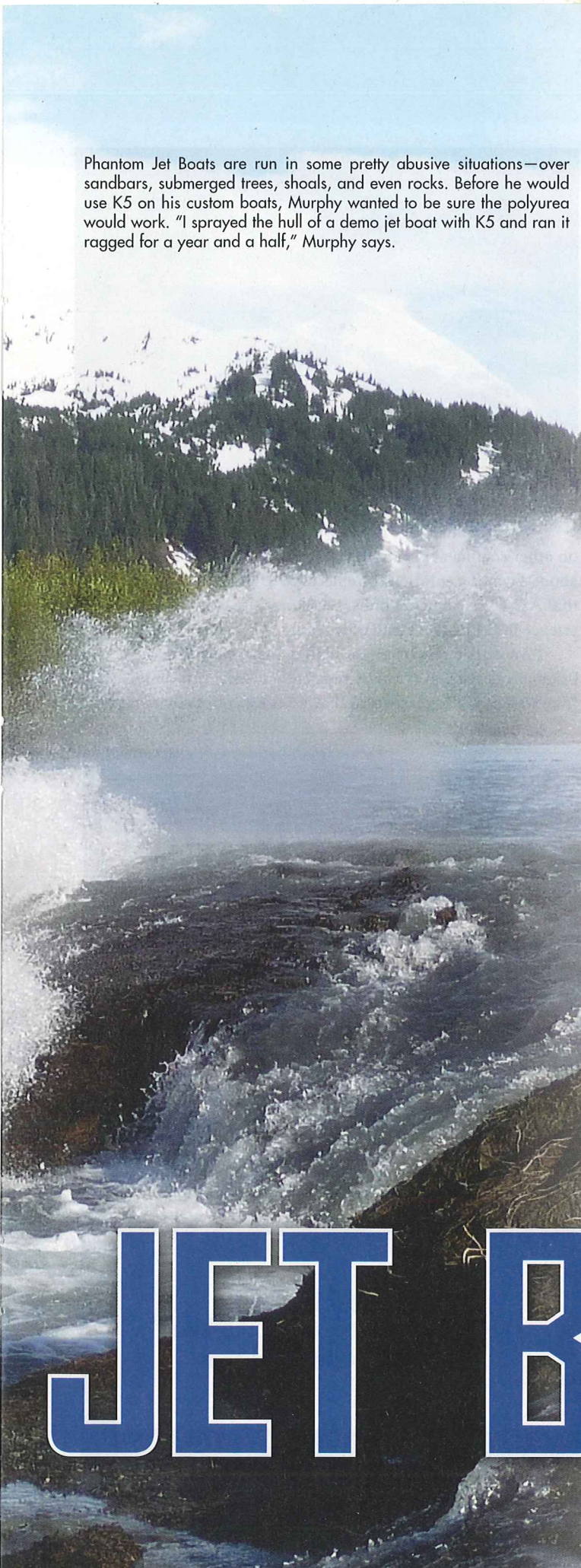
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PHANTOM



Phantom Jet Boats are run in some pretty abusive situations—over sandbars, submerged trees, shoals, and even rocks. Before he would use K5 on his custom boats, Murphy wanted to be sure the polyurea would work. “I sprayed the hull of a demo jet boat with K5 and ran it ragged for a year and a half,” Murphy says.

BY JEN KRAMER

PHOTOS COURTESY OF AZTEC FABRICATION AND SPI

For every outdoor sport, there are “super fans” so devoted to a certain brand that for them, brand and sport seem intertwined. Often the brand seems to define the genre. For bikers, it is nothing less than a Harley. For hunters, Winchester has set the standard for generations. Think baseball? Think Louisville Slugger.

Hemingway wrote of it as “aficion” and said that for “one who had aficion he could forgive anything.” In the world of shallow water boating, that aficion is being defined by Phantom Jet Boats. And as for forgiveness? Well that comes, too, courtesy of the high-tech coatings that are applied to the Jet Boat hulls.

For those of you yet to become Phantom Jet Boat aficionados, here’s a brief description of the boats and their myriad uses. The shallow water aluminum boats are used by military, law enforcement, State Departments of Parks and Fish and Game, sport fishermen, and pleasure crafters. These boats are designed to go where no other boat can—including over sandbars, submerged trees, weeds, and shoals—and at high speeds. As Don Murphy, vice president and owner of Aztec Fabrication, the manufacturer/coatings contractor crafting these vessels, says, “Our Alaska customers refer to us as ‘the Harley-Davidson of jet boats’—a comparison we are profoundly proud of.”

But what is it that gives these “watery Harleys” their edge? It is the unique coating protecting their hulls. And the story of the coating is a story of aficion as well.

A PASSION FOR EXTREMES: SPEED AND COATINGS

Murphy is a serious, plain-spoken man. Not one that you’d easily imagine speeding over Alaska’s most unforgiving inlets or over the rocky shoals of Washington’s coastline, and yet he does. Behind his quiet demeanor lies the authority of a man at the peak of his craft. “We’ve been building this style of boat since 1998,” he says. “They are just starting to catch on now.”

As we speak, he has two vessels in his Washington-based shop: a 21’ (6.40m) boat for the Arizona Fish and Game Department and a 21’ (6.40m) boat for the Alaska Park Service. Both feature aluminum hulls. Both will be coated with K5 polyurea from Specialty Products, Inc. (SPI).

JET BOATS

RIGHT ▶ Working in his fabrication shop, Murphy first abrasive-blasts the boat's aluminum hull to a minimum 4-mil (0.10mm) anchor profile. Then the hull is masked off using sheets of plastic and masking tape.

And from the sound of it, this is a familiar scenario for him. It seems K5 is changing the Phantom Jet Boat industry – decreasing costs and turn-around time, while increasing coverage and protection. “Initially, we used to coat the hulls of our jet boats with ultra-high molecular weight (UHMW) polyethylene plastic or high-density polyethylene (HDPE) because it would withstand the abuse from the gravel bars in Alaska,” Murphy explains.

UHMW and HDPE allowed the boats to “slick over the sandbars and rocks, but they had to be welded if any repairs needed to be made.” This would ultimately represent lengthy down-time for the vessel – an inconvenience to a private owner, and a real problem for law enforcement and the military. Searching for alternatives, Murphy discovered SPI and K5.

The chemists at SPI share Murphy's inquisitive nature and a 20-year-long involvement in the marine industry. According to Cliff Haskins, vice president of marketing for SPI: “SPI undertook a three-year-long research and development process to bring the K5 polyurea to the market. It was discovered through a client field experiment that the coating also offered protection for vessel or boat



hulls against abrasion or impact damage.”

As luck would have it, SPI was already working with Murphy on other coating applications. “Murphy approached SPI and asked about a coating solution to replace the UHMW and HDPE liners that Aztec was using on hulls,” Haskins says. And thus, sport met science in the perfect blend of aficion.

“An ultra-high-strength, high elongation polyurea, K5 was originally developed as a blast-resistant polymer,” explains Haskins. “Soon after, it was discovered that K5 is exceptionally resistant to

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abrasion compared to other spray-applied coatings. And it can be spray-applied to virtually any surface configuration, to any thickness. So, it can be selectively applied to high-wear areas."

With a tensile strength greater than 5500 psi, the 100 percent solids, pure polyurea seemed like a perfect fit, but Murphy wanted to be sure. "I sprayed the hull of a demo jet boat with K5 and ran it ragged for a year and a half," he says. "From that test, we decided it was a good alternative to the UHMW and HDPE. So I bought a machine, and we haven't looked back."

Murphy says he enjoys the ease of the K5. "Customers can get more coverage for less money. The UHMW and HDPE may be a little slicker on the rocks, but the K5 can actually be repaired by the customer using the EPI9 patch kit whereas the UHMW or HDPE must be professionally welded. The K5 is actually stronger than the UHMW or the HDPE. It bonds like a glove to the aluminum. And it is more forgiving. Dents can literally be hammered out using a rubber mallet."

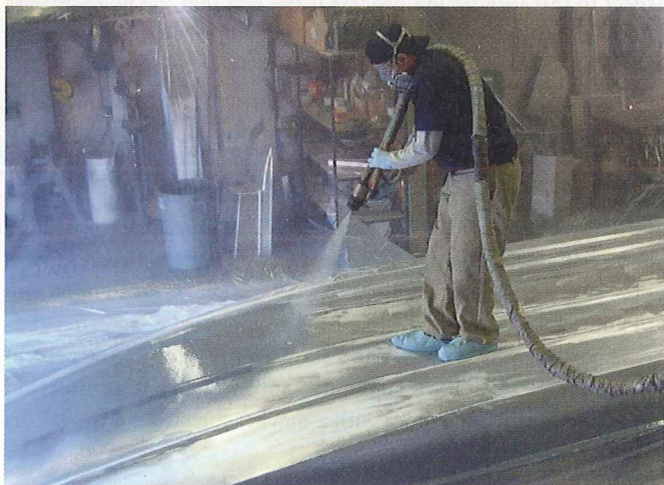
LIKE A RUBBER BAND

So just how is this high-tech coating applied? Is the process as finicky as the cured coating is tolerant? Not at all.

First, Murphy fabricates the aluminum boat hull, which is then brought into the well-ventilated spray room. Although the K5 has no VOCs or solvents, Murphy and his partner wear PPE, including respirators, Tyvek suits, goggles, and rubber gloves.

The hull's aluminum surface is then abrasive blasted to achieve a minimum 4-mil (0.10mm) anchor profile.

Next, the area to be coated is masked off using masking tape. And the pigment of choice is added to the B-side of the Graco HXP 2 drum proportioner. SPI's AE-4 adhesion enhancer is also added to the B-side of the drum and allowed to mix for approximately 30 minutes. The AE-4 admixture helps to form a chemical adhesive bond to a properly prepared substrate and eliminates the time consuming process of applying a primer. Haskins notes that the minimum processing parameters for the proportioner are 2500 psi



ABOVE ▲ K5 is typically applied at 100+ mils (2.54mm) in low and shallow areas on hulls. Areas prone to high abrasion receive 120+ mils (3.05mm). Murphy says, "The number of passes applied depends on the customer. We can spray it on as thick as they want."



JOB AT A GLANCE

PROJECT:

Apply ultra-high-strength polyurea to hulls of high-performance jet boats

COATINGS CONTRACTOR:

Aztec Fabrication
1495 Sycamore Street
Clarkston, WA 99403
(509) 751-1073
www.phantomjetboat.com

SIZE OF CONTRACTOR:

2-man crew

PRIME CLIENT:

Varied; including Arizona Department of Fish and Game and Alaska Park Services Department

SUBSTRATE:

Aluminum

SUBSTRATE CONDITION:

New and used (fairly good condition)

SIZE:

Phantom Jet Boats range from 18' to 24' (5.49m to 7.32m)

DURATION:

On-going

UNUSUAL FACTORS:

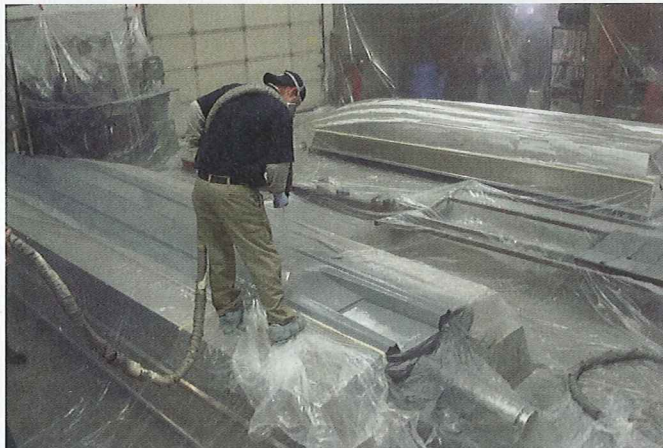
- Original test boat was field-tested for two years
- Small indentations can be pounded out using a rubber mallet without any damage to boat hull
- Once coated, boats can run over gravel, sandbars, logs, etc.

MATERIALS/PROCESS:

- Abrasive blast the aluminum surface
- Apply masking tape to hull
- AE-4 adhesion enhancer added to B-side drum and mixed for 30 minutes
- Using Graco mechanical Fusion with 27-27 mixing chamber with a flat tip, a Graco HXP 2 proportioner and 50' (15.24m) of high-pressure heated line, spray-apply the K5 polyurea onto hull at 100 mils (2.54mm) in shallow spots and 120 mils (3.05mm) in high abrasion areas

SAFETY CONSIDERATIONS:

- Crew works in a well-ventilated spray area
- Crew wears Tyvek suits, cartridge respirator masks, safety glasses, and rubber gloves



ABOVE ▲ Murphy creates a "rubber-band-like effect" in the hulls by spraying in "a cross-hatch pattern, spraying the hull lengthwise first, then across, then lengthwise again. We create a woven pattern, which makes the hull snap back into shape on impact."

and 160°F to 170°F (71°C to 76°C). "They use a Graco Mechanical Fusion gun with a 27-27 mixing chamber and a flat tip as well as 50' (15.24m) of heated hose."

Murphy says that the K5 is typically applied at 100+ mils (2.54mm) in low and shallow areas on hulls. High abrasion areas receive 120+ mils (3.05mm). "The number of passes applied depends on the customer. We can spray it on as thick as they want. The thickest I've ever applied is approximately ½" (1.27cm) and the thinnest is about ⅛" (0.32cm)."

When the Aztec crew spray-applies the K5, they "use a cross-hatch pattern, spraying the hull lengthwise first, then across, then lengthwise again," Murphy describes his technique. "We create a woven pattern, which makes the hull snap back into shape on impact, like a rubber band."

Haskins agrees. "Spraying north-south-east-west gives optimal product thickness control and coating uniformity."

Then Murphy waits approximately 45 minutes to one hour before de-masking the hull and returning the boat to the production process.



ABOVE ▲ In his Washington shop, Murphy inspects a scuffed hull. "The K5 is actually stronger than the UHMW or the HDPE. It bonds like a glove to the aluminum. And it is more forgiving. Dents can literally be hammered out using a rubber mallet."

BENEFITS OF SCIENCE

Both Murphy and Haskins are quick to agree that K5 extends the service life of the boats. But the coating does have other benefits as well when compared to the UHMW or HDPE liners.

First is weight savings. Overall weight is an essential factor for boat performance and speed. K5 polyurea weighs 8.8 pounds per gallon. The average application requires 15 gallons (56.78L), which means that K5 adds approximately 132 pounds (59.87kg) of material weight. Conversely, UHMW or HDPE polyethylene liners require two sheets weighing roughly 85 pounds (38.56kg) each for a total of 170 pounds (77.11kg) – a significant weight gain in a sport where speed is paramount.

Second is actual monetary savings. The polyethylene sheet liners cost anywhere from \$2500, \$5100, or \$8100 to install, depending on the size of the boat. It takes two people roughly 30 hours each (60 hours total) to install the liner. Haskins states, "One unpopular aspect to this installation process is the fact that the polyethylene liner requires putting multiple holes in the boat hull to properly secure the liner. The big downfall or risk to doing this is if the polyethylene liner ever becomes compromised, water will inevitably work its way through the holes and allow the corrosion process to begin and provide a potential source for leaks."

Third is labor savings. SPI's K5 polyurea requires considerably less labor to install than the sheet liners. This is because the coating is spray-applied, forming a truly seamless membrane that conforms to the shape of the boat hull. It takes two people only 10 hours each (20 hours total) to install the K5 polyurea at a cost of \$660 to \$760.

Fourth is time savings. The K5 can be installed 40 to 60 percent faster than the sheet liners, not only saving valuable labor time, but also providing the customer with a quicker turnaround time. This

LEFT ▲ Custom-coated for shallow-water sports, including duck hunting, the high-tech coatings are making a "splash" in the Phantom Jet Boat industry. "Customers can even make their own repairs using the patch kit," Murphy says.



ABOVE ▲ Can a coating help boats go where no other boats have gone? Yes. Do you still have to have common sense? Yes. As Murphy says, "You can still dent the boats. Nothing is indestructible. But the damage can now be significantly minimized."

means that the installed cost of the K5 is at least 40 percent lower.

Sound too good to be true? What about that original test boat? Almost a decade later, that boat is still running. Haskins notes, "The original test boat was field-tested for two years. The coating performed well and maintained great adhesion to the aluminum substrate. There is no coating delamination. There are scratches and scuff marks from abrasion from rocks and logs, etc., but the product is doing its job. There were small impact indentations that were pounded out with a rubber mallet. There has not been any structural damage to the coating or most importantly to the boat hull."

As Murphy says, "You can still dent the boats. Nothing is indestructible. But the damage can now be significantly minimized." Spoken like a true boating — and coating — aficionado.

To see the Phantom Jet Boats in action visit www.coating-promag.com, www.youtube.com/specialtyproductsinc, and www.specialty-products.com/resource-library/demo-videos-library/. CP

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