



Sand + Snow Makes Pretreatment Essential

ATV AND SNOWMOBILE MAKER POLARIS SWITCHES UP PRETREATMENT, SAVES GREEN.

By Tim Pennington
Editor

Neither snow, sleet, salt, sand nor sloppy mud will stop Polaris' recreational and outdoor vehicles in any type of weather conditions its owners throw at them.

That's why it was imperative that the finishing department at the company's Roseau, Minn., manufacturing plant made sure its cleaning and pretreatment process was doing the job right before they electrocoated and powder coated Polaris' popular off-road vehicles, snowmobiles, motorcycles and military vehicles.

So when Polaris Roseau began searching for a more cost-effective pretreatment solution, the company didn't want to risk losing the corrosion resistance and adhesion quality

it had come to rely on.

"We're always looking at ways to cut costs in our manufacturing process to stay competitive in the market, but we knew we had to maintain the superior pretreatment we've always had in the past," says Polaris' finishing engineer, Renee Senechal-Jorgense.

Costs and reduced waste treatment were just two of Polaris' concerns when it began talking with chemical suppliers in 2009.

ENVIRONMENTALLY FRIENDLY

Polaris was using a heated alkaline cleaner, a cleaner-coater iron phosphate heated to 140°F and a final seal rinse in its cleaning and pretreatment cycle when it started searching for a more environmentally

friendly process. That's when Chemetall's technical sales manager in the Minnesota area, Ladd Ojala, got the chance to showcase his company's Gardobond process to the Polaris staff.

Gardobond is part of Chemetall's enhanced performance pretreatment (EPP) product line, which helps improve paint adhesion and corrosion resistance while also being environmentally friendly.

"It contains no hazardous heavy metals, and has only a few ppm of phosphonate," says Ojala, who tested Gardobond along with a competitor in Polaris' facility for a few months before eventually winning over the Polaris team.

The result: about \$78,000 in annual

energy savings and a 40 percent reduction in the waste treatment sludge, along with corrosion resistance and coating adhesion the Polaris folks are thrilled about.

“Snowmobiles have to withstand harsh environments, from cold snowy weather to high-speed driving on wet salty roads,” says Jim Kvidt, paint department supervisor for Polaris. “Gardobond helps us to improve paint adhesion and corrosion resistance while being environmentally friendly.”

HARSH MINNESOTA WINTERS

All too familiar with harsh Minnesota winters, Ojala knows plenty about the rough conditions that many of Polaris’ products have to endure.

The snowmobile finish needed to be durable not only for the harshest conditions, constantly wet and salty, but also rugged for those adventurous owners who like to run them at full throttle on hills and bumps in the northern regions.

The Polaris ATVs also take a beating during winter months, rainy seasons and in hot climates where riders have been known to try to “rough it” when the opportunity presents itself.

The off-road vehicles—which make up about 70 percent of all products sold by Polaris—are usually ridden by owners exactly as their name implies: off road,

through creeks and streams, and often bouncing and banging over rocks and boulders at every chance.

Ojala and Chemetall knew that durability—both in performance and aesthetics—is a hallmark of Polaris’ popularity with the public, pushing company sales up an astonishing 33 percent in 2011 to more than \$2.6 billion.

And with company execs predicting 5-8 percent annual organic growth, sales of Polaris’ vehicles are expected to top more than \$5 billion by 2018.

MILITARY VEHICLES PROGRAM

On top of that, Polaris has ramped up its military vehicles program, receiving in late 2011 a \$54-million, three-year contract to provide ATVs, spare parts and trailers to Afghan and Iraqi security forces, the U.S. government and other allied governments. It includes options to extend the contract two additional years.

So Senechal-Jorgensen and her staff knew they had a lot of vehicles, ATVs and snowmobiles to build and coat in the coming years, and they also needed to do it the most cost-effective way possible.

One issue was that Polaris uses many different substrates (cold- and hot-rolled steel, cast iron and aluminum), and the task to find an effective pretreatment for all was a tad daunting.

Ojala began testing the Polaris substrates with Gardobond, which is formulated for use on steel, iron, aluminum, zinc and magnesium substrates, and works well on many metals.

“The working bath of Gardobond has a very low phosphorous content, and is designed to yield results similar to a premium iron phosphate with a high-performance final seal rinse,” Ojala says. “It is a titanium phosphonate coating that runs at ambient temperature and does not sludge.”

Compared with an iron phosphate, Ojala says the Gardobond process has fewer process steps and complies with the increasingly demanding environmental requirements, meaning no hazardous heavy metals and fewer phosphates to treat at the manufacturing plant.

FIVE-STAGE PROCESS

Polaris uses a typical five-stage process sequence with the new process:

1. Clean with a phosphorous-free cleaner.
2. Rinse, overflowing.
3. Rinse, followed by a clean water exit halo.
4. Gardobond 871/872.
5. Rinse, followed by a fresh-water exit halo.

Gardobond is a two-package advanced pretreatment, using a secondary package depending upon the conductivity and hardness of the water.

“A unique quality of EPP is that it can



Polaris switched pretreatment to Chemetall’s Gardobond.



With the switch to pretreatment with Gardobond, Polaris uses 60 percent less energy and water, or roughly \$72,000 in energy savings alone with the lower temperatures, considering the pump rate and hours per day the washer is run.

run in hard water, unlike many advanced pretreatments or nano coatings offered on the market,” Ojala says. If the water has a conductivity of about 250 $\mu\text{S}/\text{cm}$ (180 ppm TDS) or less, Gardobond EPP 871 should be used. If the water is harder, then Gardobond EPP 870 is recommended. If the water is harder than about 500 $\mu\text{S}/\text{cm}$ (350 ppm TDS), a reverse osmosis or deionized water treatment is recommended.

Under normal Gardobond applications, titanium absorbance is 0.06 to 0.12 and phosphonate levels are 30 to 60 ppm; 20 to 30 ppm if the part is to be electrocoated. The pH levels are 4.8 to 5.2, and conductivity is about 1200 $\mu\text{S}/\text{cm}$.

More importantly, the temperature of the bath is just 70 to 80°F, which usually generates a significant cost savings to manufacturers than baths with higher temperatures.

\$72,000 IN ENERGY SAVINGS

In Polaris’ case, the company ended up using 60 percent less energy and water. Chemetall estimates roughly \$72,000 in energy savings alone with the lower temperatures, considering the pump rate and hours per day the washer is run.

In addition, the removal of silicate and sludging resulted in less nozzle maintenance, and therefore lower labor and maintenance costs for the Polaris system, says Ojala, who estimates a 35 percent savings on water treatment costs from reducing phosphate in the effluent.

Overall, Ojala says Polaris realized a 45 percent reduction in pretreatment costs per unit.

“Seeing the savings in energy was great, but we were also very pleased at the reduction in our waste treatment expenses,”

Senechal-Jorgensen says.

And just as important, Gardobond had passed the 500-hour ASTM B 117 neutral salt spray test, the cross hatch adhesion ASTM D 3359 test, and the impact ASTM D 2794 standard; and Senechal-Jorgensen says it has held up very well with the coatings applied, even given the rugged use of the vehicles.

All of which is good news for a manufacturing operation expected to do booming business coming years, especially with Polaris’ purchase of Indian Motorcycles, Goupil electric light duty haulers, and a minority ownership in GEM electric vehicles.

SALES UP 39 PERCENT

Sales are strong with 1,500 dealers in North America, but Polaris’ international business grew 39 percent just in the past year,

thanks to almost 1,000 dealers overseas.

The company is expected to go after even more of the \$1.5 billion "ultra-light military market" of all-terrain vehicles with products such as its Armadillo Unmanned MineRoller and its Special Operations Forces RZR (picture a tricked-out ATV used by G.I. Joe). And business seems to be doing very well for the company headquartered in one of the northern most regions of the U.S.

Additionally, Ojala says the Polaris plant in Roseau has a five-stage plastic prep washer that Chemetall helped successfully convert from a heavily phosphated, high-temperature cleaner to its Gardoprep 5543 brand, which has no phosphate, is run at ambient temperature, and is a General Motors-approved plastic cleaner for ATV and snowmobile fenders and hoods.

The result? Energy savings around \$31,000 annually, he says.

"The dramatic decrease in phosphate sludge on the burner tube has made maintenance of the washer much less timely, and the need for periodic descales of the sludge has been eliminated," Ojala says. "We are in the in the process of achieving a virtually phosphate free plant because the conversion of a three-stage aluminum washer is underway to a non-phosphated, low-temp cleaner."

Senechal-Jorgensen says the change in the pretreatment process was an undertaking, but well worth it. She advises others to seek cost savings whenever possible.

"The biggest thing is to do your homework, and know what is on the market," she says. "There is some very good technology out there, and we were able to work very well with Ladd and his team because they are very hands-on. It was a good partnership with excellent results." ■

For information on Polaris products, please visit Polarisindustries.com or call 888-704-5290. For information on Chemetall, please visit ChemetallAmericas.com or call 800-526-4473.

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F-18225 - 05/2012
Printed in the USA