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## Painting Plastics at Harley-Davidson

*The plastic parts finished here must be as tough as the motorcycles they adorn...*

By [Beverly A. Graves](#), Editor

Rarely do you see a lone Harley-Davidson motorcyclist roaring down the road. More often there are three or four riders cruising together. They are allied by their devotion to riding Harley-Davidson motorcycles.

This attitude pervades the Harley-Davidson facility in Tomahawk, Wisconsin. Employees work as a team. They are joined by their desire to produce the best plastic parts possible for Harley-Davidson motorcycles. These parts include saddle bags, sidecars and fairings, among other parts.

Any problems with molding, prepping, buffing, painting, detailing and packing are handled by teams. These teams also work with all the other teams at Tomahawk to make sure everyone is pursuing the same end result, a quality, defect-free product.

When Harley decided to put in new paint lines, it worked with its suppliers as a team. Because this particular facility is not large, some of the "big" suppliers were not interested in working with them, noted Chuck Statz, project engineer. Three paint lines, manufactured by [F Systems](#), Lynn, Indiana, were installed by a local company, Stainless Specialists, Wausau, Wisconsin.

One paint line is dedicated to finishing parts and accessories, particularly for the aftermarket. Two other lines are assigned to production parts earmarked for final assembly. The fourth line is for clear coating. Although the paint lines are basically devoted to specific models, any part in the facility can be run on any line. This gives the Harley-Davidson Tomahawk facility the flexibility it needs.

Three types of plastics are used for the parts. SMC is supplied as plastic sheet. Harley purchases parts made from ABS and GTX 902, a thermoset plastic, from Windsor Plastics, Evansville, Indiana. The sheets of SMC are cut, rolled, weighed and placed in the 500-ton press. Specific temperatures and pressures are maintained when molding the parts, because this can affect part quality and subsequent painting processes.

After molding, SMC parts are trimmed and scuff sanded. Visible pin-holes are filled with putty and wet sanded. The parts are then drilled for any hardware (hinges, latches etc.) that will be added. GTX 902 parts are not sanded. But, because this type of plastic holds more static electricity charge than the others, it is wiped with a destat cloth immediately as it is unpacked. ABS blanks are routed and sanded.

Parts are transported on carts. Unlike other Harley-Davidson facilities, where conveyors are king of the road, Tomahawk prefers to use carts (except for the finishing line). "This gives us flexibility and allows us to respond to changes more quickly," stated Mr. Statz.

At the finish line employees rack parts on fixtures specifically designed for each plastic Harley part. All fixtures, manufactured by Thermal Clean, Chilton, Wisconsin, are stainless steel. The fixtures mask off the interior of the parts to keep them free from overspray. Also, specially designed ABS inserts keep deep part recesses (like those on the saddle bags) free from overspray. Harley-Davidson customers are quite particular about the finish on their motorcycles. This has caused the company to be just as particular, if not more so.

### PF ONLINE TOOLS



Painting Zone



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The inverted continuous chain conveyor from [Rapid Industries](#) runs at eight fpm. The inverted conveyor helps keep down dirt that could fall on the parts from an overhead system.

Both primer and color coats are applied on the same line. On the first pass through the system, parts enter the first of two small booths preceding the main spray booth. In the first small booth workers manually wash the parts using lint-free cloths soaked in an isopropyl-water mixture. The solution also contains a one pct destat agent. In the second booth, parts are tacked off manually to remove any dust or dirt.

The entrance and exit to the tack-off booth have a deionized air blow-off to further eliminate any static charge on the plastic parts. Humidity in the paint room is maintained at 50 pct, and in the booths it is 65 pct to help eliminate static.

Employees use Mattson HVLP spray guns to apply a two-part epoxy primer from [PPG](#). Two spray painters each apply 0.5 mil of the primer.

After application, primer flashes for eight min. Primed parts then proceed through eight min of infrared to "skin over" the paint. The infrared system was purchased from [Fostoria Industries](#). This "skinning over" keeps out dust and other contaminants that may be present in the more turbulent air of the convection oven, where parts cure for 24 min at 195F.

The "skinning over" process is important because the high-solids paints (color coatings) tend to stay wet three-fourths of the way through the radiant-cure oven before developing a good "skin." The lower-solids urethane coatings flash quickly and, therefore, develop a "skin" quickly.

After the primer cures and cools, employees inspect the parts for pin holes or other imperfections. Together, Harley and PPG developed the primer color and gloss so it would show pinholes or other minor defects after curing. Usually the primer reveals about nine to 15 pct of additional pinholes in the substrate that were not visible during the initial sanding and prep. So parts are again filled with putty and wet sanded. Because the parts are still warm, the putty cures quickly.

Parts then enter the same wash and tack off booths in preparation for color coating. However, parts are washed only with water. Isopropyl alcohol would soften the epoxy primer because the paint is not completely cured. "An alcohol wash would make the primer too soft to paint over," noted Randy Christianson, paint line engineer. "But a week from now it will be cured enough that you could dip it in acetone and nothing would happen."

Employees use the same type of guns to apply the high-solids color or solvent-borne metallic coatings. There are separate guns and fluid handling systems for different paint chemistries. Color changes require one minute. Spray gun operators remove the primer hose, flush out the gun with a solvent hose and then hook up another gun to the color line. Each booth has six hose lines: one epoxy; one acrylic; two urethane, solid color; and two urethane, metallic.

Color coated parts cure at 195F under the same conditions and procedures as the primer. Cooled parts follow one of two routes.

Parts receiving a candy coat (a transparent color over a metallic base) remain on line. Finished parts are taken off line and loaded onto carts. Employees wheel the carts to the pin striping area. Here, workers hand detail the parts with color-coordinated stripes. Specific fixtures align the stripes. Special paint pens allow pinstripers to "roll on" the striping paint. All base colors and detailing colors are coordinated with the colors applied to metal parts at Harley's facility in York, Pennsylvania.

The Tomahawk facility also makes and finishes parts for models going back five years. It also has developed colors to match 25 to 30 police departments around the country. Mr. Christianson noted that the South often uses greens, while places such as Kansas and Virginia prefer gray and blue.

The detailing (pin stripe) paint air dries before workers cart parts to the clear coat line. Here solid color parts are wet sanded and wiped down with a 50:50 water, isopropyl alcohol wash. The alcohol helps evaporate the water, which could cause streaking in the finish.

On the clear coating line, a DeVilbiss P100 robot clear coats all the parts. A metal flag on each fixture "signals" the robot as parts enter the booth. This signal tells the robot what program to follow.

Following clear coating, parts flash off for seven min and cure for two and a half min in an infrared oven and then pass through six min of heated wall prior to entering the 195F convection oven for 22 min. The line runs at seven fpm.

All paints cure at 195F, no matter what the substrate is. The GTX 902 plastic can withstand temperatures to 312F and the SMC has a 270F ceiling, but the ABS can warp at about 190F. Special fixtures keep ABS parts from distorting at the 195F cure temperature.

To verify oven temperature consistency, Harley uses a [Datapaq](#) Oven Tracker system. The system records oven temperatures from start to finish, traveling with the parts. It shows Harley how long it takes parts to get up to temperature, as well as revealing any hot or cool spots in the oven.

Once clear-coated parts cool, employees transport them via cart to the buffing area. Here, buffers buff parts using a 3M Finesse system. Hardware is attached and parts are loaded and shipped to York, Pennsylvania, for final assembly.

Keeping the Tomahawk facility running smoothly revolves around plant flexibility and dedication. Dedication like you find among Harley-Davidson riders roaring down a stretch of country road, perhaps on their way to Tomahawk. **PF**

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