PERSONAL WATERCRAFT CASE STUDY

How Star Plastics Met a Unique Light-Transparency Requirement On-Time

SUMMARY:

A watersports OEM had a material failure while developing a next-generation hood deflector cover design. This product challenged our team to meet precise specifications to maintain color, transparency and property requirements while under extreme environmental conditions. After Xenon Arc Testing and more than 2,000 hours of UV testing, Star Plastics was able to create a product prototype in a potential new color in time for the summer launch.

CHALLENGE:

A competitive material for the application failed, and with the launch deadline quickly approaching, the OEM needed a quick replacement that would satisfy their requirements. Star Plastics was recommended by a resin distributor due to our established reputation for providing quick, reliable service and outstanding, high-quality custom color solutions.

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The end-user, a prominent OEM in the watersports industry, needed a watercraft deflector, commonly known as the nose or the hood cover. To satisfy the end-user, there were three specific challenges to overcome:

- The custom color and material solution was required to meet and preserve the light transparency requirement, ensuring that it would not shift under long-term UV exposure
- Ability to maintain good impact and durability qualities to withstand the usage of the product
- Deliver promptly to meet the lead time

Formulating a custom color solution with 45% light transparency that would maintain its transparency throughout the product life proved to be the challenge. It is uncommon for there to be an exact goal for the percentage of light transparency for applications. Star Plastics offers translucent color materials, but colors with specific ranged transparencies are not a standard product offering.

> "Having the 45% light transparency requirement, was not only a visual match, but we also had to watch the loading of pigment for the specific transparency—this match had an extra step."
>
> **James Holland, Color Expert - Star Plastics**

The final challenge to overcome was delivering the solution with a quick turnaround. Star Plastics' typical color match is completed with a one-week turnaround but staying within our timeline and completing the additional non-typical material specifications was the true test. With our expertise in material formulation, understanding behavior and color matching, we were able to provide a solution within a week that met the requirements and passed our client's testing.

As a watersport product, environmental factors had to be considered when completing testing. These factors have the potential to not only negatively affect color and transparency levels but also deteriorate the performance quality of the material. The material needed to withstand heat, solar radiation and active usage. It had to prevent color shift and specification degradation.

The time frame was an underlying obstacle to overcome. When the original material failed testing, Star Plastics was hand-selected because of our reputation for service, quality and speed. Our team had to get the color and transparency levels right the first time internally, deliver the precise solution to them quickly for their product testing, and pass their testing in order for the customer to produce prototypes in the new color for marketplace testing. Keeping a short timeline was critical, as this application was a seasonal product.

THE STAR PLASTICS SOLUTION:

The Star Plastics team dove into the challenge to formulate a custom compound with specifications that met strict physical properties for performance as well as color. Our team obtained the exact color and transparency from the original material, allowing us to discover the properties required to resist the stressors of an outdoor sporting application. Using this as a starting point, we formulated the new material with targeted pigments and additives to achieve a combination of color, gloss and hardness.

Polycarbonate was selected because it is a stiff, hard, tough and transparent engineering-grade thermoplastic. This material can hold up its rigidity and toughness in extreme conditions, ideal for this application. Polycarbonate gets its strength from being flexible, allowing it to give a little when impacted without shattering.

After the material selection, our team of color matching experts was put to the task of matching the custom transparent green color needed for the part. Our team received an actual part from the OEM to match, allowing our color lab to formulate the color, including the transparency level, on the first try.

To ensure that the material would hold up, there were two key tests that the material had to successfully pass at the OEM: Xenon Arc Testing and 2,000 hours of UV testing.

XENON ARC TESTING

Xenon-Arc testing with Weather-Ometers, a device that replicates weathering, uses high-powered light sources and water to replicate the effects that heat, moisture and sunlight have on a material. This form of testing provides a way to expedite material degradation and years of outdoor exposure in a controlled setting in order to measure a sample and how it responds to light, oxidation and moisture. Xenon Arc Testing features several cycles that measure the material against various factors including lighting only, lighting and water, irradiance, humidity, and high and low temperatures. These tests are used to understand how durable the product will be against real-world applications and is completed in a significantly reduced amount of time.

Example of the type of testing equipment used.
Not the actual machine used in testing of the product mentioned.

UV TESTING

The second way they measured the material was through 2,000 hours of ultraviolet testing. This test was created to measure how well a material can hold up and endure against the effects of long-term ultraviolet exposure. UV exposure can cause significant changes to the properties, color, and useful life of a material. In this application, this test was specifically used to measure any shift in color transparency against UV.

RESULTS:

Star Plastics supported the customer's unique needs by developing a PC material that met their unique performance, color and transparency specifications in a short period of time for their product launch deadline. Star's expertise in color and formulation allowed us to not only complete the custom material within a short turnaround, but to also make it durable enough to maintain its performance and transparency qualities when faced with extreme UV exposure and weathering testing. The material passed the OEM's external testing on the first attempt, allowing the customer to put parts into production immediately. The successful results with this customer were driven by Star's technical lab team, our consistent, responsive communications with the customer, and our on-time delivery.

Do you have a custom compounding need? At Star Plastics, color matching is our specialty. We match your exact color and create pre-colored, custom plastic materials to meet your specification needs with lot-to-lot consistency. When you're ready for the Star Plastics Solution, give us a call at **(304) 273-0352** or visit **starplastics.com**.

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