Case Study: Five Star Race Car Bodies
OptiPLUS®

When a resin system appears in the marketplace that can make your product stronger, lighter, and faster to produce, the decision to switch materials is a classic no-brainer. It was the promise of those premium qualities that initially prompted Five Star Race Car Bodies to investigate putting *OptiPLUS*® to work in their operation.

Five Star is ***the*** major producer of aftermarket glass and carbon fiber reinforced body panels and thermoplastic products specifically designed for the auto racing industry. In business since 1984, the company is located in Twin Lakes, Wisconsin. They are the exclusive FRP parts supplier to the racing programs of the American Speed Association (ASA) and of Lexan® polycarbonate windshields to NASCAR. In addition, Five Star is a provider to such top of the line racing events as the NASCAR Winston Cup, the Busch Grand National, and the Indiana Late Model Series.

The company's modern, state-of-the-art plant and process technologies have been frequently featured on cable television's Speed Channel.

Revolution in Mold Making

It is the nature of the racing industry for Five Star, as a specialty producer of FRP parts, to be called upon to make rapid changes in production race car body parts. This need for rapid prototyping and long life production tooling led the company to investigate using low shrink unsaturated polyester tooling in the early 1990's. Use of these filled systems allowed Five Star to drop mold building time from weeks to days.

What is *OptiPlus*®*?*

Resins in the *OptiPLUS*® line have been designed for dramatic improvement in surface quality and cure while maintaining minimal shrinkage in mold-making tooling applications. They are shrink controlled, unsaturated polyester based, pre-promoted, pre-thixed laminating resins that utilize room temperature cure processes.

OptiPLUS® resins are available in multiple versions, including:

040-8077 – the original, 15-minute cure

040-8089 – MACT compliant, 15-minute cure

040-8094 – MACT compliant, 24-minute cure

All three versions can be used out of the drum and require only the addition of an MEKP catalyst and glass fiber (gun roving or CSM), woven roving, or stitched uni/bi-directional roll-good products.

In mid-2001 at Five Star, Operations Manager Jim Gooch initiated the evaluation of a new, zero shrink, unfilled, unsaturated polyester that had just been developed. This resin system – *OptiPLUS*® – outperformed the company's existing tool making system, while at the same time eliminated the need for special fillers and additives to be mixed into the resin prior to use.

And besides being substantially more user friendly, the *OptiPLUS*® system made possible the production of lighter weight, stronger molds in just a day or less!

Performance Plus Speed

Five Star first began forming and supplying Lexan® polycarbonate windshields for NASCAR on an exclusive basis in 1993.

Tooling for such thermoforming applications has varied from metal to epoxy at Five Star. Cost, performance and time to build these molds has always been a challenge.

Jim Katzenberg, Manager of R&D and Quality Control, and Dean Hanlin, Tooling Engineer at Five Star, wanted to try the easy-to-use *OptiPLUS*® tooling system in these higher temperature and highly demanding applications of thermoformed plastic molds. To test the performance of *OptiPLUS*® in this tough application, a prototype mold was manufactured in early 2003.

The mold was put into service and used to produce windshields on a continuous basis over a two-day period. Dimensional stability of a thermoforming mold is critical to maintain the required shape and contours of the finished windshield. To confirm dimensional stability, metal templates were made to cross check the dimensions of the mold and of the finished windshields.

During production, the surface temperature of the *OptiPLUS*® mold rose to 180°F within several hours due to heat from the polycarbonate (340°F) being formed. Template checks after every five parts indicated no movement or warpage of the fifteen layers of 1.5 oz chopped strand mat mold (38% glass to 62% *OptiPLUS*® ratio).

After a total of eighty Lexan® parts were produced, the templates showed NO mold warpage – either at the high operating temperature or when the mold returned to ambient conditions. The original eighty parts, more than 3,000 polycarbonate windshields, have been produced off the original mold over a six-month period with no discernible change in dimensions or surface. Five Star has produced in excess of 30 of these thermoforming molds with no plans to go back to the old methods of mold fabrication.

For literature and samples of *OptiPLUS*®, please contact your Polynt representative or Polynt Customer Service at 800-322-8103.

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