# 60 Second Cycle Time for Carbon Fiber Automotive Front Ends

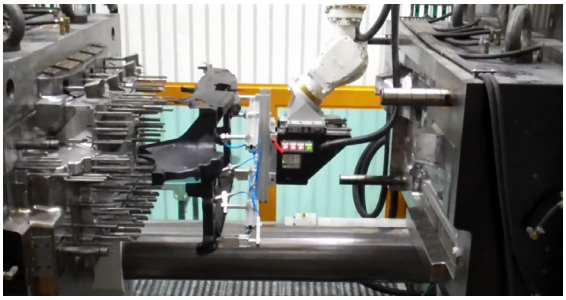
## THE TEAM

Zoltek™, KraussMaffei Technologies, and Lanxess have developed carbon fiber vehicle parts that outperform glass in Impact Strength, Tensile Strength, Tensile Modulus, and Density.

KraussMaffei Technologies has successfully demonstrated direct compounding injection molding using ZOLTEK™ PX35 Commercial Carbon Fiber with Lanxess Durethan® Polyamide 6 polymer. The molding process was demonstrated using a complex front end module tool.

## THE PROCESS

Thirty-six parametric variations were evaluated to optimize fiber sizing chemistry, tow versus pellet product forms, and a wide variety of process and machine parameters. Direct feeding of the Zoltek™ fiber into the extruder worked extremely well. The innovative twin screw design of KraussMaffei Technologies easily chopped the fibers creating excellent fiber length retention in the extrudate.



*Part being removed from front end module tool*

*Carbon Fiber Front End Module*

## THE RESULTS

Approximately 400 parts were molded with 10%, 30%, and 40% fiber loadings to validate continuous operation and reproducibility of process. Molding cycle time was approximately 60 seconds for this large complex part.

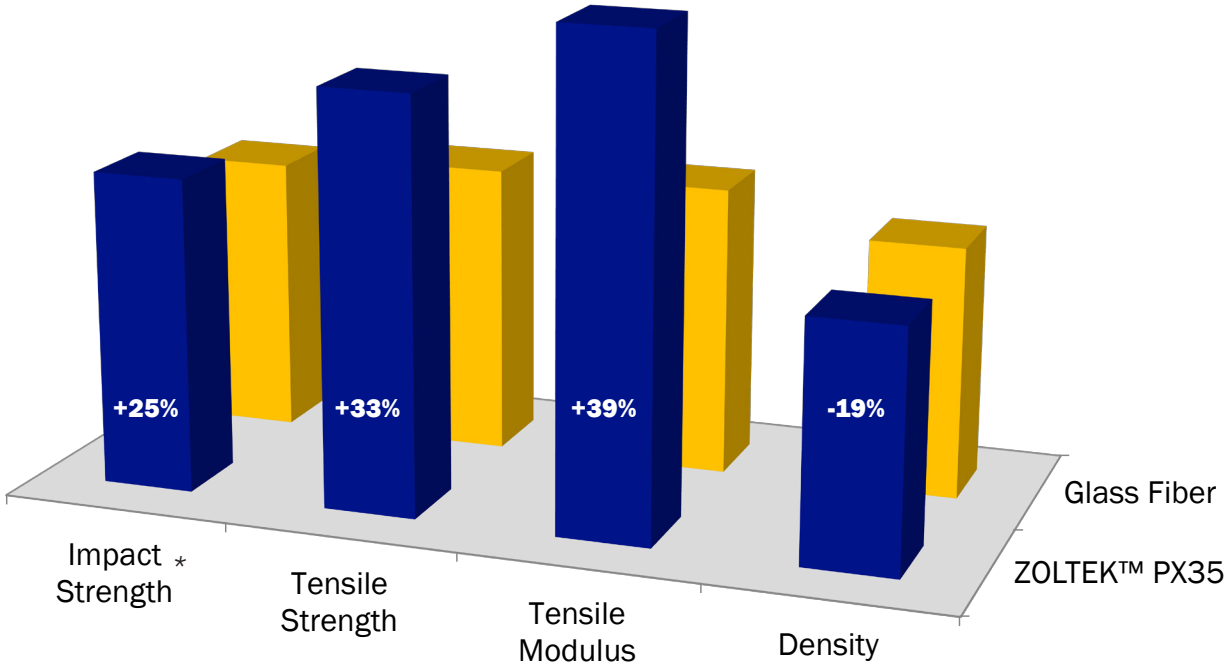
*See reverse side for comparison of carbon fiber vs. glass fiber molded parts.*

ZOLTEK Toray Group  KraussMaffei  LANXESS Energizing Chemistry

# Direct Comparison of Molded Parts

## 30% ZOLTEK™ PX35 Carbon Fiber vs. 30% Glass Fiber

This materials technology break through has resulted in significant part weight savings, better vehicle performance, and better fuel efficiency. Designing to equal mechanical properties results in reduced carbon fiber content and even greater weight savings.




**Note:** these results are direct comparison of molded parts with 30% glass fiber and 30% ZOLTEK™ PX35. Mechanical property improvements will be even greater with tooling designed for carbon fiber.

**unnotched charpy impact strength*

## ABOUT ZOLTEK

Zoltek and its partners are developing process machines and new intermediate products which are specifically designed to suit high-volume automotive manufacturing. Our technology and advancements with ZOLTEK™ PX35 will significantly accelerate the incorporation of carbon fiber products into automotive applications.

Zoltek's new product lines and processing technologies are reducing cycle times and cost: RTM, SMC, Compounding, Composites Molding.

## ABOUT ZOLTEK™ PX35

ZOLTEK™ PX35 is the low-cost commerical carbon fiber that has revolutionized the carbon fiber industry. ZOLTEK™ PX35 is made from our abundant textile-based precursor and manufactured in a proprietary high-throughput process that allows it to be the lowest cost commercial carbon fiber on the market.

ZOLTEK™ PX35 carbon fibers are available in the following product forms: Continuous Tow, Pultruded Profiles, Chopped Fiber, Milled Fiber, Fabrics, and Felts.