MFG PRiME™ Delivers Superior Performance for Structural Applications

PRiME & SMC Contrasting Characteristics		
Property	**PRiME**	**SMC**
Strength		
*Minimum Value	Higher	
*Standard Deviation	Lower	
Local Tailoring	Yes	Limited
Density	Can be Lower	Limited
Toughness (Impact and Hot Strength)	Better	Good
Surface Quality (Waviness)	Better	Good
Part Details		
*Ribs	No	Yes
*Bosses	Limited	Yes
*Molded-in hardware	Yes	Limited
*Molded-in studs	No	Yes
*Molded-in cores	Yes	Limited
*Thickness	Limited	Yes
Process (Required Molding Pressure)	100–500 psig	700–1,000 psig

Introduced in 2007 by the Molded Fiber Glass Companies, PRiME has become a preferred molding process among OEM's for parts that require high mechanical strength.

PRiME is a proprietary LCM (liquid composite molding) approach that involves specific technologies for compression molding with pre-placed fiber reinforcement. It offers many of the same performance characteristics as compression molding with SMC, and similar cost and volume benefits. The key distinction is PRiME's superior structural efficiency that improves both mechanical and cosmetic properties of the molded part. This advantage makes it popular for high-volume automotive and truck parts that require greater structural integrity than SMC can provide.

Although PRiME has been in use for more than 5 years, the MFG Research team is constantly adding to the knowledge base of how and where it can deliver improved value to customers. Generally this comes about as a result of vetting PRiME against SMC with actual designs. Recently the team completed a study evaluating the mechanical property variations of Class A vehicle parts made with PRiME against SMC parts. The result: PRiME parts outperformed the SMC parts — stronger, lighter and smoother!

Because PRiME uses pre-placed reinforcements, the fibers are precisely aligned with the load set of the product, resulting in improved fiber efficiency and lower cost per weight. Use of advanced robotics minimizes the variation in fiber as well as the labor content, further enhancing performance. These factors have been found to expand design allowables and reduce energy costs by up to 50%.

Molded Fiber Glass Companies
2925 MFG Place
Ashtabula,OH 44004

Phone: 440-997-5851

www.moldedfiberglass.com

How does PRiME stack up against SMC?

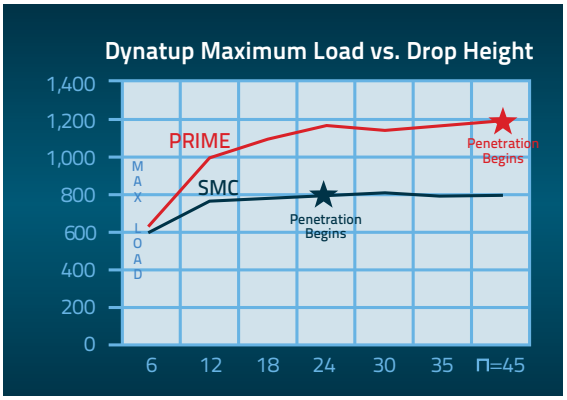

Figure 1

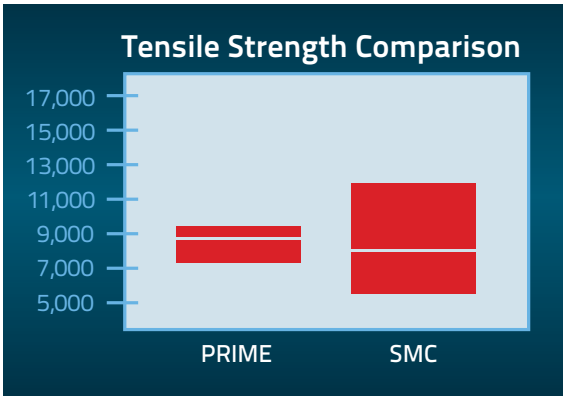

Figure 2

Figure 3

Figure 1 plots the impact energy of PRiME vs SMC. At the various stages of the impact event, PRiME absorbs much more energy than SMC.

When comparing the tensile strength of PRiME vs SMC (Figure 2), the averages are very close for both materials — but the range is much tighter for the PRiME part. This is due to more uniform distribution and orientation of the glass fibers. The lower variation allows product designers to use materials very close to their design limits — resulting in stronger, lighter and more efficient parts.

Chevrolet has been using PRiME for the Corvette since 2007 (Figure 3). The PRiME parts reliably meet the essential fiber content and mechanical specifications, yet contain less overall fiber. That makes for lighter,faster Corvettes!

To learn more about PRiME and see examples of it in use, visit the MFG website. There is a dedicated section on PRiME in the Processes section, and you will find short case studies in the Automotive section.

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