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FIRST GMT COMPOSITE BUMPER ON 1984 CORVETTE SPORTS CAR IS 2015 SPE[®] AUTOMOTIVE HALL OF FAME WINNER

TROY, (DETROIT) MICH. – The first use of glass-mat thermoplastic (GMT) composite on the front bumper of the 1984 model year (MY) *Chevrolet Corvette* sports car from then General Motors Corp. (GM) has been named the 2015 *Hall of Fame* winner by the ***Automotive Division of the Society of Plastics Engineers (SPE[®])*** for the group's 45th-annual ***Automotive Innovation Awards Competition***. To be considered for a *Hall of Fame* award, an automotive plastic or composite component must have been in continuous service in some form for at least 15 years and preferably have been broadly adopted within the automotive or ground-transportation industries. GMT bumpers meet this criteria having been in continuous use on a variety of passenger vehicles for more than three decades and having proliferated beyond GM to vehicles built by automakers in North America, Europe, and Asia. In fact, many of the different GMT bumper design variants over the years have been category or *Grand Award* winners of the ***Automotive Innovation Awards Competition***.

"The front bumper on the 1984 *Corvette* not only was the first in a long line of weight- and cost-saving front and rear bumper beams in GMT composites" explains Nippani Rao, president, RAO Associates, and co-chair of the SPE Automotive Division Hall of Fame committee, "but it also led to increased use of GMT as well as other thermoplastic composites in a broad range of interior and exterior automotive applications worldwide."

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2-2-2-2

"GM's first use of a GMT bumper on the 1984 *Corvette* involved a number of firsts," adds David Reed, General Motors Corp.-retired and also SPE *Hall of Fame* committee co-chair. "This two-piece, compression-molded, induction-welded, box-section design used Azdel® PM 400 40% continuous-strand, randomly oriented glass fiber in a polypropylene matrix from PPG Industries. The application, which was molded by LOF Plastics Inc., also represents the first use of EMA weld¹ welding."

Shortly after the *Corvette* bumper was commercialized, GM launched C-section GMT designs on the front bumper of the D-body platform, which included models like the *Cadillac DeVille*, *Fleetwood*, and *Brougham* sedans. The GMT beams were mounted to the car frame using ACDelco shock absorbers, which further increased the impact energy the beam could absorb. Another C-section design was used on *Cadillac Seville* sedan. This design incorporated a single in-turned upper flange, a development that later led to the creative use of a double in-turned flange on models from Oldsmobile.

By 1986, GMT bumpers had moved to Ford Motor Co. and were featured on the front bumper of the *Ford Mustang* sports car. These GMT beams were mounted using Ford's polygel mitigators (PGMs) Two years later, GMT bumpers were used for the first time on the rear of the *Ford Continental* DN9 sedan as well as the front of GM's N-body cars. The latter were notable for being the first compression-molded beams with two in-turned flanges, which were notoriously challenging to mold.

In 1989, Honda Motor Co. used C-section GMT bumpers on both the front and rear of the *Honda Accord* compact cars produced in North America and Japan. Not only were these the first non-Big 3 use of the material/application, but they also were the first GMT beams combining both unidirectional and randomly oriented continuous glass mats, and the first composite beams that were hard mounted to vehicles (fixed directly to the rail beams without the use of shock absorbers). By 1990, GM used GMT bumpers on the front of the *Buick LeSabre* sedans, which featured a "peekaboo" stainless steel, in-molded chrome strip. The Japanese automakers were back in 1991 with GMT bumpers on multiple mid-size models produced by Toyota Motor Corp., Suzuki Motor Corp., Nissan Motor Co. Ltd., and Mazda Motor Corp.

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¹ From EMABond Solutions LLC

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3-3-3-3

During the 1990s, over 16% of all passenger cars globally sported GMT bumper beams, consuming over 500-million pounds/226,796 tonnes of the material. Another design evolution occurred in 1998 with the development of the I-beam, which was the first GMT bumper to use a new discontinuous chopped-fiber mat because it was better at penetrating deep into the complex rib structures that distinguished this beam. So novel was the design that it won the 1998 **SPE Automotive Innovation Awards Competition's Grand Award** and it also was cited by the Insurance Institute for Highway Safety (IIHS). By 2000, South Korean GMT producer and AZDEL licensee Hanwha was developing GMT beams for all Korean passenger car models and the company still supplies to these OEMs.

GMT bumpers also proliferated on vehicles produced by European automakers. In France, PSA Peugeot Citroën Group used GMT with randomly oriented continuous glass and unidirectional continuous glass reinforcements on front bumpers of *Peugeot 309* sedans from 1986 to 1992. GMT combining mats of chopped glass and glass fabric (laid up 0°/90°) moved to rear bumpers from 1995-2002 on vans from PSA (*Peugeot 806 and Citroën Evasion*) and Italian automaker, Fiat Group (*Fiat Ulysse and Lancia Zeta*). Rear GMT beams moved to PSA cars in 2004 on the *Citroën C5* (random glass mat) and *Peugeot 407* sedans, and *Peugeot 407 SW* wagon (random plus fabric mats).

Versus steel, the incumbent bumper beam material at the time, GMT composite beams offered a number of benefits, including 30% lower weight, greater design flexibility, lower tooling costs (especially beneficial for low-volume specialty models), elimination of rust/corrosion, and better impact performance (less vehicle damage) during low-speed impacts.

On **Wednesday, November 11, 2015**, Ted Adamczyk, design release engineer at General Motors will accept the award on behalf of the original team that worked on the program at the 45th-annual **SPE Automotive Innovation Awards Gala** at Burton Manor (www.burtonmanor.net) in Livonia, Mich., where winning part nominations and the teams that developed them will be honored during an evening celebrating automotive plastics innovation.

SPE's Automotive Innovation Awards Program is the oldest and largest competition of its kind in the world. Dozens teams made up of OEMs, tier suppliers, and polymer producers submit nominations describing their part, system, or complete vehicle and why it merits the claim as the *Year's Most Innovative Use of Plastics*. This annual event typically draws over 700 OEM engineers, automotive and plastics industry executives, and media. As is customary, funds raised from this event are used to support SPE educational efforts and technical seminars, which help educate and secure the role of plastics in the advancement of the automobile.

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4-4-4-4

The mission of SPE is to promote scientific and engineering knowledge relating to plastics worldwide and to educate industry, academia, and the public about these advances. SPE's Automotive Division is active in educating, promoting, recognizing, and communicating technical accomplishments in all phases of plastics and plastic based-composite developments in the global transportation industry. Topic areas include applications, materials, processing, equipment, tooling, design, and development.

For more information about the ***SPE Automotive Innovation Awards Competition and Gala*** see <http://speautomotive.com/inno> and <http://speautomotive.com/awa>. For more information on the ***Society of Plastics Engineers***, see www.4spe.org.

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