



LIGHTNING... AND THUNDERBIRD



COMPOSITES STRIKE WITH A FLASH IN FORD'S HOT 2002 THUNDERBIRD

Let the storm begin! The torrent of excitement surrounding the Ford Motor Co.'s 2002 Thunderbird has not been seen since the original '55 two-seater flew on to become an American icon. And for the fourth time in its storied history, T-Bird wins *Motor Trend's* Car of the Year honors. Described by Nancy Gioia, Thunderbird chief program engineer, as "a completely contemporary expression of the essence" of the T-Bird's intrinsic styling cues, the '02 rendition marks another major milestone: 60 percent of the car's exterior body panels are made of thermoset composites. The hood, front fenders, grille opening reinforcement (GOR), decklid, removable top and CHMSL panel, located between the trunk lid are made of sheet molding composites (SMC). The Budd Co. supplies the body panels. Venture Industries fabricates the removable top. Meridian Automotive molds the CHMSL. First-year production is scheduled at 30,000 units.



In addition to weight reduction, Ms. Gioia says tooling costs were slashed by approximately 50 percent by choosing SMC for most key exterior panels. It also gained styling advantages -- such as the integral scoops in the hood -- that were not possible in steel, says Mike Dorney, vice president of sales and marketing for Budd's Plastics Division and chairman of the Automotive Composites Alliance (ACA). Frank Bradish, Venture's technical director of materials-Advanced Composites Development, says the selection of SMC for the T-Bird's roof module is a first for the material in production volume. The module integrates the SMC inner and outer panels, headliner, package shelf, framework for the car's distinctive porthole windows, and all seals, lighting, hatches and hinges. "We integrate 51 pieces and top-coat the roof in seven colors to exactly match the body," he says. Now that the '02 T-Bird is storming onto the market, no lull is in sight. On the contrary.

COMPOSITES STRIKE BIG IN 2002 TRUCKS

Composites are making big inroads in 2002 models, and nowhere is this more evident than in trucks, SUVs and "crossovers" that now account for half of all U.S. light-vehicle sales. New and expanded applications of composites in trucks are largely responsible for a projected 9 percent rise in volume in 2002 -- to 370 million lbs. compared to 342.8 million lbs. in 2001 models, based on Automotive Composite Alliance forecasts. ACA sees composites climbing to nearly 500 million lbs. by 2005. Why are automakers turning increasingly to composites? Because they have advantages, particularly in niche-vehicle and medium-volume applications, that competing materials can't match: Rust-free durability, lower tooling costs, lighter weight and styling freedom to quickly customize vehicles - often using the same platform to develop aesthetically distinctive models. And composites also are finding new territory in under-hood and structural applications, where they've proven to be tough competitors to steel, aluminum and other materials.

The composites industry has a broad menu to choose from:

SMC - Sheet Molding Composite • BMC - Bulk Molding Composite • RRIM - Reinforced Reaction Injection Molding • SRIM - Structural Reaction Injection Molding • RTM - Resin Transfer Molding • LCM - Liquid Compression Molding

Playing the Percentages

Composites save weight-up to 35 percent versus steel in many applications. And that translates into better fuel economy and lower exhaust emissions, both critical factors these days - especially in trucks. With money tight and everyone seeking lower investment outlays, composites typically reduce tooling costs by 40 to 50 percent. And composites stretch dollars in numerous other ways. They help automakers to consolidate components, for example, and to quickly create niches in a crowded market by providing the flexibility to develop unique designs such as unique front-end treatments, hoods with molded-in features such as scoops and rugged composite pickup boxes and tonneau covers.

What's New for 2002?

The list of new or expanded composites applications in 2002-model light trucks is long. The next-generation Ford Expedition, Lincoln Navigator and all-new Lincoln Blackwood luxury pickups coming in March are prime examples of how composites can add differentiation in vehicles built off the same platform. "By using SMC for the hood in the Blackwood and Navigator, Ford was able to give each a distinctive look vs. Expedition (steel hood and fenders) at a lower tooling cost than would have been required in steel," says Budd's Mr. Dorney. The Blackwood's sleek tonneau cover for the pickup box is also SMC, as are its unique swing-out "dutch" doors that replace the traditional one-piece tailgate in traditional pickups.

Also new for 2002

* Chevrolet's Silverado optional composite box boasts a 25-30% percent weight savings compared to steel. The RRIM outer rear fenders and tailgate outer panels are molded by Budd. These components are mated to the SRIM box inner and tailgate inner supplied by Meridian Automotive, which also supplies SMC tailgate reinforcements.

* Chevrolet's Avalanche, a hybrid pickup/SUV featuring a tailgate and midgate made from an SMC/SRIM sandwich molded by Meridian Automotive. The tailgate weighs 15 lbs. less than if stamped from steel and adds durability to the equation.

* GM's Hummer H2, built as a niche model on the GMT platform, features an SMC hood and front fenders supplied by Meridian Automotive. Parts consolidation, lower tooling costs and styling freedom are advantages gained in selecting SMC in this burly new SUV.



Lincoln Blackwood luxury pickup has four major SMC components: Hood, tonneau cover, rear swing-out "dutch" doors and grille opening reinforcement.



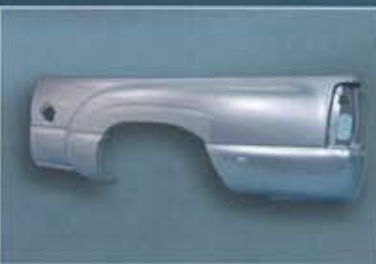
Chevrolet calls Avalanche the "Ultimate Utility Vehicle" because it converts easily from a four-door pickup to an SUV utilizing a unique composite "midgate." The midgate and tailgate inner panels, molded by Meridian Automotive, feature a combination of SMC and SRIM materials.



Ford Explorer Sport Trac features an SMC cargo box rear body side panels and tonneau covers, all molded by Budd using Owens-Corning glass fiber.



Chevrolet's Silverado pickups feature an SRIM inner box, SRIM tailgate inner panel made with preform technology developed by Owens Corning, and SMC tailgate reinforcement supplied by Meridian Automotive, with RRIM body side panels, rear fenders and tailgate outer panels molded by Budd Plastics Division.



GMT 800 (Silverado and Sierra) Sportside flare fenders are made of e-coat-capable RRIM supplied by Dow Automotive. The fenders are molded by Budd Plastics Division.

COMPOSITES: A RAINBOW OF PURPOSES

Renault's flashy Avantine represents a cornucopia of composites, including the complete body assembly, rear hatch assembly (upper photo) and rear load-floor module, all supplied by Venture Industries.



General Motors all-new Hummer H2 "super" SUV sports SMC hood and front fenders molded by Meridian Automotive Systems. First-year output is projected at 40,000 units.

The spectrum of composites applications in 2002 models built by North American and overseas automakers spreads widely. They range from the rear RRIM fenders on the GMT800 "Dually" to the SMC grille opening reinforcement on the Jaguar S-Type.

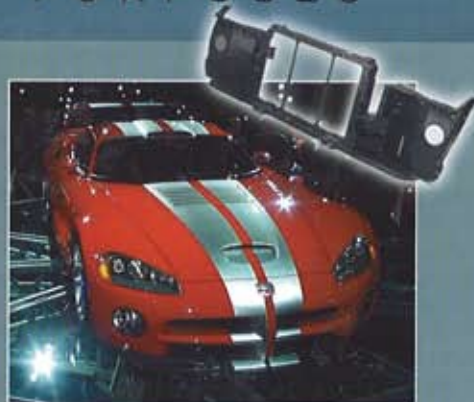
And they're gaining under the hood. Meridian, for example, supplies an innovative cam cover, with SMC supplied by Premix, on GM's 4200 in-line V-6 powering the 2002 Chevy Trailblazer and GMC Envoy. "The complexity of the cover made it a natural fit for compression molded vinyl ester SMC," says Premix Automotive Business Development Manager Steve McCormack. The SMC component reduces weight by 30% and also creates cost savings, he says.

Other Premix composites are found in headlight reflectors on the Honda Accord; the sunroof frame on Toyota's Avalon; Ford Explorer 4.0-liter SOHC cam covers; carbon fiber SMC for an upcoming DaimlerChrysler model; the underbody stone guard on the Dodge Dakota; and the high-strength structural canister bracket on the Lincoln LS and Jaguar S-Type. In many Premix applications, composites are replacing die cast aluminum and magnesium. "The main drivers are weight savings and, with our molded-in feature, less secondary machining (and thus) total overall cost reduction," says Mr. McCormack. Premix composites also are making big inroads in heavy-duty trucks for components such as oil pans, valve cover and front gear covers, where they not only help reduce noise and vibration but also cut costs. Manufacturers with new applications for 2002 include Hyundai, Cummins and John Deere, he points out.

Renault's 2002 sporty Avantine is a virtual composites showcase, says Venture President and ACA Board Chairman Warren Brown. Matra Venture, a French molder acquired in 1999, supplies the Avantine's SMC composite body panel assembly, rear hatch assembly and rear load-floor module directly to Renault. "Some 90 percent of the Avantine's body surfaces are SMC, and we estimate weight savings of 36 percent compared to steel," says Frank Bradish, Technical director materials-Advanced Composites Development.

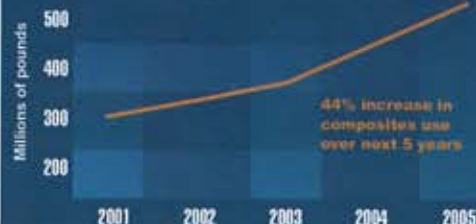
Among its many innovations, Avantine - with first-year production scheduled at 60,000 units - uses a two-hinge door design. The doors swing out at only a fraction of the space required in a typical vehicle, yet leave plenty of room to easily exit and enter without bumping other vehicles in close quarters.

Avantine's roof is made of glass, which is bonded to an SMC "closeout" panel painted with a low-gloss back that surrounds the cabin. Introduced at the 2001 Frankfurt Motor Show, Avantine is powered by a V-6 engine mated to a 6-speed manual transmission and is priced at around \$35,000.



Dodge Viper's body is entirely fabricated of composites, and the hood, molded by Meridian Automotive Systems, is one of the largest one-piece composite body parts in the world with resins supplied by Ashland Specialty Chemical Company.

ACA Forecasted Total Annual Production Of Reinforced Thermoset Composites For Automotive And Heavy Truck Industries



**Automotive
Composites
Alliance**

Recycling Makes Gains

For more than a decade the Automotive Composites Alliance has promoted research and development aimed at creating economically viable processes for recycling. General Motors, Ford, Toyota and DaimlerChrysler already produce numerous composite parts using filler recovered from recycled components.

Both end-of-cycle and in-plant scrap currently are ground up to separate the resin, filler and additives, providing material to replace filler in new formulations, says the ACA.

Molders have successfully recycled composites because paint and adhesives do not have to be removed prior to processing them into filler material. And there's another environmental plus: Resins used to make thermoset composites can be recovered from recycled PET, which is commonly used in manufacturing soda bottles and other containers.



Automotive Composites Alliance Member Company's and Contacts

MOLDERS :

THE BUDD COMPANY - PLASTICS DIVISION
Mr. Mike Dorney
Ph: 248.619.2233
Fx: 248.619.2412
Email: Dorney@budd.thyssenkrupp.com

MERIDIAN AUTOMOTIVE SYSTEMS
Mr. David White
Ph: 313.336.4182
Fx: 313.336.4184
Email: dbwhite@meridianautosystems.com

VENTURE INDUSTRIES
Mr. Warren Brown
Ph: 810.296.8818
Fx: 810.296.8863
Email: wbrown@ventureindustries.com

SUPPLIERS :

AOC
Mr. Mike Dettre
Ph: 901.854.7272
Fx: 901.854.1183
Email: mdettre@aoc-resins.com

ASHLAND SPECIALTY CHEMICAL COMPANY
Mr. Gordon Miesel
Ph: 248.244.9120
Fx: 248.244.8756
Email: grmiesel@ashland.com

BALTEK CORPORATION
Ms. Jennifer Janson
Ph: 248.553.4146
Fx: 248.553.4264
Email: jjanson@baltek.com

BYK-CHEMIE USA, INC.
Mr. James Lemkle
Ph: 734.416.5240
Fx: 734.416.5282
Email: jlemkle@bykchemieusa.com

CENTURY TOOL & GAGE COMPANY
Mr. Mike Borg
Ph: 810.629.0784
Fx: 810.629.9284
century@centurytool.com

CYTEC FIBERITE ENGINEERING
Mr. Don Wantock
Ph: 507.452.8025
Fx: 507.452.8195
Email: don_wantock@fm.cytec.com

DOW AUTOMOTIVE
Mr. Randy Scott
Ph: 248.393.3851
Fx: 248.391.6417
Email: rscott@dow.com

FERRO CORPORATION
Mr. Ev Corcoran
Ph: 216.750.6584
Fx: 216.750.6308
Email: corcorane@ferro.com

HUBER ENGINEERED MATERIALS CORPORATION
Mr. Tom Cook
Ph/Fx: 770.622.0343
Email: notrc@huber.com

LORD CORPORATION
Mr. Ken Gross
Ph: 248.489.5800
Fx: 248.489.5853
Email: ken_gross@lord.com

MACLEAN-FOGG
Mr. Bill Hayes
Ph: 847.541.1616
Fx: 847.629.9284

OWENS CORNING
Mr. Bill Mellian
Ph: 734.459.9150
Fx: 734.459.3698
Email: bill.mellian@owenscorning.com

PLASTICOLORS, INC.
Mr. Mark Lodwick
Ph: 440.997.5137 x221
Fx: 440.992.3613
Email: mlodwick@plasticolors.com

PREMIX, INC.
Mr. Steve McCormack
Ph: 440.224.2181
Fx: 440.224.2766
Email: steve.mccormack@premix.com

REDSPOT
Mr. Reinhart Hasselbring
Ph: 734.729.2781
Fx: 734.729.6140

REICHHOLD, INC.
Mr. Vergil Demery
Ph: 800.448.3482 x8292
Fx: 919.990.7740
Email: vergil.demery@reichhold.com

SAINT-GOBAIN VETROTEx
Mr. Frank Smith
Ph: 419.868.7813
Fx: 419.868.7903
Email: frank.w.smith@va.sgcna.com

For additional information contact the ACA at 248-601-9960 or visit our website at: www.autocomposites.org

