# Any Way You Spell it, Composites are Hot


## BMC, LCM, RRIM, RTM, SMC and SRIM; Our alphabet soup is a lightweight low-cost diet!

Going on a diet always is a challenge, but having plenty of ways to lose weight without spending a lot of money makes it easier. That's why automakers have been using many types of composites to lighten up and cut program costs for the past 30 years — and why new applications are soaring. Being easy on the environment helps, too: Composites are recyclable and require much less energy to manufacture than steel or aluminum. That means composites save energy throughout the entire vehicle life cycle — not just part of it.

The most broadly accepted reinforced thermoset composites used by automakers today include: SMC (sheet molding composite); BMC (bulk molding composite); RRIM (reinforced reaction injection molding); SRIM (structural reaction injection molding); RTM (resin transfer molding) and LCM (liquid composite molding). While each has its own benefits, all are strong, lightweight and reduce overall program costs.

The Automotive Composites Alliance (formerly the SMC Automotive Alliance), a Troy, MI-based association that assists automakers in the use of composites, reports that more than 10 million cars and trucks produced annually have composite components — on the exterior, as structural parts, or under the hood. Many more will appear during the next five years.

"We expect all reinforced thermoset composites to benefit from increased acceptance by OEMs," says Don Kossak, ACA chairman and vice president of development at Cambridge Industries, headquartered in Madison Heights, MI. "This is the first year we're tallying volumes for all thermoset reinforced composites, and we expect to see growth in all segments. "Our calculations are not yet complete, but initial projections indicate approximately 300 million lbs. (136 million kg) will be used by automakers in 1999. By 2003, conservative estimates predict 380 million lbs. (172 million kg) will be used by automakers, representing a 27% rise," Mr. Kossak says.

Why? Styling flexibility, technology developments, and part consolidation combined with weight savings and composites' ability to help automakers make frequent styling changes at low program costs, he says. All these factors make thermoset composites an attractive alternative to steel and aluminum in many instances.

WARD'S AutoWorld SPECIAL SPONSORED SUPPLEMENT

# Composites are

## New technologies and applications debut in the '99 model year

*Automakers increasingly have turned to reinforced thermoset composites as an alternative to metals for more design freedom and to save investment costs on exterior parts such as hoods, decklids and fenders, especially on low-and mid-volume cars and trucks. That's especially true this year as new applications pop up on a variety of hot new products.*

Making the switch shaved 30% off the weight of the original steel decklid, consolidating several stampings into a three-piece SMC component that significantly reduces program cost. "The Mustang joins the Lincoln Continental in second-generation use of these composite components," says Ken Rusch, technical programs manager at Budd Plastics Div. in Troy, MI.

### Ford Mustang Decklid

Following the successful use of SMC for the hood, rear quarter scoops and spoiler introduced on the 1994 Mustang, Ford Motor Co. is adding an SMC decklid on the 1999 model. Volumes are expected to hit 140,000 annually.

### Toyota Sienna Cowl

Overseas automakers also are adopting a steady diet of composites. Toyota Motor Corp.'s new Sienna minivan has an SMC cowl, a one-piece structural

Toyota Sienna

module that houses the windshield wipers and attaching mechanisms. "SMC's strength-to-weight ratio is superior to many competing materials," says ACA's Mr. Kossak.

"The Sienna's cab-forward design necessitates this cowl design which bridges the gap between the firewall and the engine. SMC also offers a lower tooling investment and consolidates several parts, meeting all of Toyota's design and cost requirements", he says. DaimlerChrysler Voyager and Caravan minivans, the Ford Windstar and the Lincoln Town Car also have SMC cowl panels.

### RRIM GMT800 Chevrolet Silverado and Ford F-350 Dual Wheel Fenders

The GMT800 fenders are the first ELPO-compatible RRIM application and the first polyurea body panels processed through an entire assembly plant paint system. The unique styling of these GMT800 fenders wouldn't have been possible in steel. Each fender is one piece, which means a significant reduction in the number of fasteners and easy disassembly and aftermarket repair. The new General Motors Corp. fenders also are lighter and require less tooling investment.

Ford's redesigned F-350 and DaimlerChrysler's Dodge Ram also have RRIM fenders. The material was chosen because it offers better durability, lower costs and weighs less.

Ford F-350

### Composites and the Environment

Composites benefit the environment because they are energy efficient to manufacture and their inherent light weight results in fuel savings over the life of the vehicle.

Energy savings begin with the production of raw materials, processing and manufacturing of composites compared with similar steel parts. The weight savings to the vehicle provides the manufacturer an opportunity to add optional equipment without adversely affecting vehicle weight class. This means the consumer reaps the benefit of more creature comforts while spending less at the gas pump.

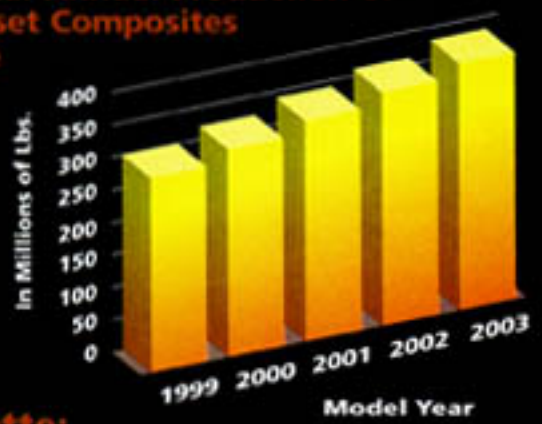
If all new cars and trucks used 100 lbs. (45 Kg.) of composite components, and drove 10,000 miles per year, the annual savings could equal 50 million gallons (227 million L) of fuel. An added benefit of this fuel efficiency is the attendant reduction of emissions.

WARD'S AutoWorld SPECIAL SPONSORED SUPPLEMENT

# Lighter, Stronger, More Versatile and Even More Cost-Efficient Composites Coming

*It's hush, hush, but in the 1999 1/2 model year, "Lite" SMC outer body panels will be specified by at least one North American OEM. The hood outer panel on the Dodge Viper currently is made from "Lite" SMC and will continue on in 1999. This new composite technology can reduce the weight of a hood by 35% compared with steel.*

## ACA Forecasted Total Annual Production of Reinforced Thermoset Composites for Automotive Use




## Chevrolet Corvette: Combining Composite Technologies

As most automotive buffs know, the 1954 Corvette was one of the first composite-skinned cars ever produced. It has remained a composites flagship for 45 years, through numerous changes. In 1997, the Corvette was dramatically restyled for the first time in 13 years, using some of the best technology composites have to offer, including SMC exterior panels, RRIM fenders, liquid composite structural components, and an underbody made with a new automated preform process.

"Among the technological innovations is the first use of mat-molded floor boards with encapsulated balsa that add to the torsional rigidity and ride that make the Corvette an American icon and a testbed for new technology," says Richard Morrison, president of Molded Fiber Glass Companies.

The Budd Plastics Division, Cambridge Industries, Venture Industries and MFG manufacture components supplied to GM for this composite intensive vehicle. Also new for '99 is the use of low-density SMC on the Corvette's roof inner panels. With a specific gravity of only 1.3, the panels weigh 45% less than steel. "All the Corvette inner panels now are made using low-density SMC," says the ACA's Mr. Kossak.

1999 Corvette

## Composites Keep on Truckin'

The new for 1999 Argosy from Freightliner has an RTM (resin transfer molded) Cab Over with a complete roof cap which includes built-in cabinets and amenities consistent with the expectations of the drivers.

The roof cap contains about 375 lbs. (170 kg) of composite, making it one of the largest truck components in production. Aerodynamic styling reduces drag, making the vehicle far more fuel efficient. Several makers are using this very popular assembly. In addition to the roof cap, the new Argosy features a sun visor produced using liquid composite molding (LCM) and automated preforms.

Another new composite technology, low-pressure SMC, is finding applications on heavy trucks. It requires less press tonnage to form very large components. That translates into lower machinery and tooling costs for the application.

The heavy truck segment represents about 20% to 25% of the total thermoset composite market.


1999 Freightliner Argosy

High-strength reinforced composites also are in development now that will be available for structural applications such as pickup boxes and skid plates in the very near future. These high-strength composites have a larger percentage of fiberglass reinforcement and lower level of filler material than conventional SMC. These new composites provide the strength needed to withstand high impacts and offer automakers an inexpensive method of differentiating vehicles on the same platform.

## Recycling moves ahead

Composites are recyclable at the end of their life cycles. What's more, new composites can contain substantial quantities of recycled material, including resin, filler and additives.

Currently, the best recycling approach for thermoset composites is to grind up scrap (end-of-life parts or in-plant scrap) to provide a material that can replace the filler in new formulations.

During the past 10 years the ACA has promoted the research and development activities necessary to establish economically viable processes for recycling. During this period, numerous automakers, including General Motors, Toyota, Ford and the former Chrysler Corp. have produced a variety of composite parts using composite filler.

Molders have successfully recycled many thermoset composite components because there is no need to remove paint and adhesive prior to processing into filler material. The filler doesn't weaken the engineering properties. There's another environmental plus as well: The resin used for making thermoset composites can be made using recycled PET plastic, which commonly is used for soda bottles.

The ease with which thermoset composites can be recycled as a filler, and the capability to incorporate a number of different recycled products into the formulation, without a cost penalty, are expected to make all composites even more competitive when compared to alternative materials. As the infrastructure develops to collect scrap composites, recyclability will become an even bigger advantage. ❑

## Automotive Composites Alliance Voting Representatives

### MOLDERS:

**The Budd Plastics Division**
Mike Dorney
Phone: 248-619-2233
Fax: 248-619-2412

**Cambridge Industries, Inc.**
Don Kossak
Phone: 248-586-2515
Fax: 248-586-3450

**Core Materials Corp.**
Ken Schmell
Phone: 614-870-5069
Fax: 614-870-5051

**Molded Fiber Glass Companies**
Al Trueman
Phone: 248-625-7243
Fax: 248-625-0919

**Venture Industries**
Phil Kusky
Phone: 810-294-1500
Fax: 810-296-8863

### SUPPLIERS:

**3M Company**
Don Robertson
Phone: 651-452-6315
Fax: 651-688-6117

**AOC**
Mike Dettre
Phone: 901-854-7272
Fax: 901-854-7277

**Ashland Chemical Company**
Gordon Miesel
Composites Polymers Division
Phone: 248-244-9120
Fax: 248-244-8756

**BYK-Chemie USA**
James Lemkie
Phone: 734-416-5240
Fax: 734-416-5282

**Dow Chemical**
Randy Scott
Phone: 248-351-5522
Fax: 248-948-1708

**Huber Engineered Materials**
Barry Dallum
Phone: 770-441-1301
Fax: 770-368-9908

**Henkel Surface Technologies, Inc.**
Al Piller
Phone/Fax: 513-741-3743

**Hexcel Industrial Structures**
Rick Warner
Phone: 253-395-4898
Fax: 253-395-6650

**Interplastic Corporation**
Sean McMullen
Phone: 219-234-1105
Fax: 219-234-6686

**Lord Corporation**
Ken Gross
Industrial Adhesives Division
Phone: 248-489-5800 ext. 616
Fax: 248-489-5853

**Owens Corning**
Peter Rohman
World Headquarters
Phone: 419-248-7746
Fax: 419-325-3746

**Plasticolors, Inc.**
Steve Walling
Phone: 440-997-5137 ext.221
Fax: 440-992-3613

**Premix, Inc.**
Warren Owens
Phone: 440-224-2181
Fax: 440-224-2766

**Reichhold Chemicals, Inc.**
Frank Doherty
Phone: 919-990-8059
Fax: 919-990-7749

**Seibert-Oxidermo (U.S.), Inc.**
Douglas Church
Phone: 734-942-0110 ext. 101
Fax: 734-942-9630

**Union Carbide Corporation**
Dennis Finnegan
Phone: 734-416-5137
Fax: 734-416-9916

**Vetrotex CertainTeed Corp.**
Frank Smith
Phone: 419-868-7813
Fax: 419-868-7903

**Zoltek Corporation**
Phillip Johnson
Phone/Fax: 248-276-2418

### TOOLMAKERS:

**Century Tool & Gage Company**
Dennis Cummings
Phone: 810-629-0784
Fax: 810-629-9284

**Regal International Tool & Mould, Inc.**
James Leboeuf
Phone: 519-737-1258
Phone (US): 313-961-7035
Fax: 519-737-6178

Automotive Composites Alliance

*Serving the car and truck industries*