

# ON THE EDGE:

## Composite Applications for The New Millennium

Inside, you'll see advanced thinking that's putting composite technology to some remarkable uses...

VERSATILITY

WEIGHT SAVINGS

LOW TOOLING COSTS

MASS CUSTOMIZATION

STRUCTURAL INTEGRITY

BROAD APPLICATIONS

RECYCLABILITY

On the edge  
of technology:  
New vehicles that  
take full advantage of  
composites are making  
an appearance in 2001 . . .



Automotive  
Composites  
Alliance

If one word describes reinforced thermoset composites it's *versatility*. They save cost, weight and product development time. They don't rust. They're amazingly tough, and can be shaped into unique designs like no other material. "All automakers are focusing on trucks in 2001, where composites make sense for a variety of reasons," says Mike Dorney, vice president of marketing for The Budd Co.'s Plastics Division and chairman of the Automotive Composites Alliance (ACA).

Automakers have future programs underway right now that lend themselves to the many thermoset composites and processes available:

- 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

Now let's take a closer look.

#### TOOLING COSTS

"Capital is tight and interest rates are rising, so if our customers can save up to 40 percent on body panels compared to steel – as ACA member companies have demonstrated – they can cut costs up front," says Mr. Dorney. That's a key factor in material selections for numerous 2001 models. Take the composite pickup boxes on the Chevrolet Silverado and GMC Sierra pickups and dual rear wheel derivatives for 2001, for example. Or Ford Motor Co.'s versatile Explorer Sport Trac, an SUV with a one-piece cargo area. Both of these manufacturers cite much lower tooling cost as a major reason why they chose composites.

#### WEIGHT SAVINGS

In this "green" era where even a few pounds saved can help boost fuel economy and reduce exhaust emissions, total vehicle weight comes under tough scrutiny...and composites come to the rescue, coming in as much as 30 percent less than steel. Randy Scott of Dow Automotive estimates that GM saved 15 pounds on each fender of the 2001 GM "Dually," and 50 pounds on the full box.



GMC Yukon Denali switches in 2001 to composite "steps," or running boards molded by Meridian Automotive Systems.



Composite underhood components include cam covers, valve covers, fuel shields, oil pans and engine covers.

From just 50 million pounds in 1970, composites are projected to account for 350 million pounds in 2001 models and 467 million pounds in 2004, a hefty 44 percent increase.

#### MASS CUSTOMIZATION

Increasingly finicky buyers want more distinct cars and trucks. And no material can match composites in helping automakers design and develop styling niches. Chrysler found that out in 1970 when it added a trunk-mounted SMC wind deflector, an industry first, on the 300H performance model. The 300H hood was also unique. It featured an SMC skin complete with air scoop over a steel inner liner to achieve styling distinction. Chrysler engineers say these features would have been far



The 1970 Chrysler 300H Coupe

too expensive to tool in steel for the low-volume 300H.

Now composites literally are taking over to help automakers create niches of their own, from unique front-end treatments to slick factory-installed pickup tonneau covers with built-in security locks. "Mass customization" are the buzzwords," says Mr. Dorney, "and in many applications it's tough for other materials to compete with composites because we often create unique components faster and cheaper."

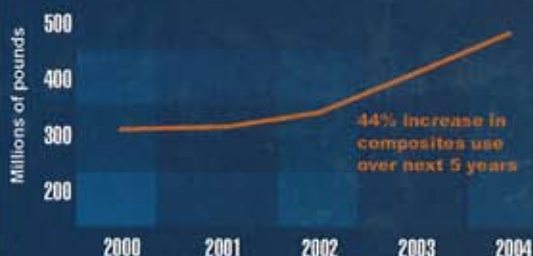
#### STRUCTURAL INTEGRITY

Composites now have a long history in grille opening reinforcements (GORs), as exemplified in the current Ford Taurus and Mercury Sable. GORs stretch between the headlights and support the car's front structure. Now this technology is crossing over to light trucks. The 2001 Pontiac Aztec (part minivan, part SUV) picks up from this SMC technology.



The Ford Explorer Sport Trac features the industry's first SMC cargo box – with an integrated liner, and side panels molded by Budd Plastics – made with Owens Corning's proprietary pre-form process. The ACA says the box meets 10-year, 150,000-mile durability tests. Coming soon: The Ford Super Crew Cab with four full-size doors and a composite box.

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



The front floorboards in Chevrolet's Corvette are stiffer and lighter than steel. Each weighs just 11 pounds and is only 15 millimeters thick. The central core is made of natural balsa wood from ACA member Baltek, Inc., compression-molded with an SMC skin.

### UNDERHOOD

Poundage of composites in underhood applications has soared by 80 percent to more than 30 million pounds annually just since 1996, and the list is growing. You'll find them in cam covers, valve covers, fuel shields, oil pans and engine covers, often adding aesthetics to the overall engine compartment.

"Thermosets offer the most cost-effective performance at elevated temperatures under load and pressure in automotive fluids compared to metal and engineered thermoplastics," says Wil Conner, manager of automotive development for ACA member BMC, Inc., a supplier of underhood composites. BMC's new 1840 SMC, for example, is used on Ford's 2001 4.6-liter V-8 engine covers. Mr. Conner says the material typically weighs 30 percent less than die-cast aluminum.

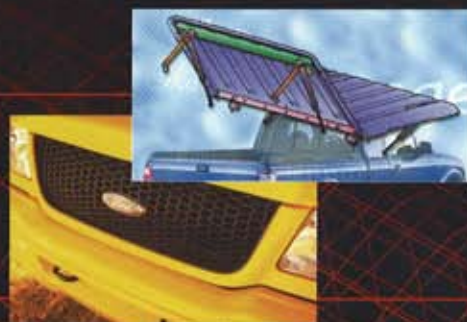
Renault's Espace, the best-selling minivan in Europe, features reinforced thermoset body panels molded by Venture Industries.



Chevrolet's 2001 Silverado has SRIM inner box and RRIM side panels and fenders from Meridian Automotive. The tailgate is a hybrid of SRIM, RRIM and SMC by Budd Plastics. GMC and Chevrolet dual-rear-wheel models, introduced for 2001, borrow cargo-box composite technology from Silverado and Sierra.



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The Ford Ranger XLT and 4x4 get distinctive front-end styling at an affordable price by using composites for the entire front assembly, including the grille and headlamp holders molded by Budd Plastics.



Pontiac's 2001 Aztec crossover vehicle uses Meridian Automotive's SMC composites up front to tie together the headlamp assemblies and other components just behind the grille.



Chevrolet's new Avalanche Ultimate Utility Vehicle features a combination of SMC and SRIM materials for the midgate and tailgate inner panels, molded by Meridian Automotive Systems.

## USING IT AGAIN...

The Automotive Composites Alliance and its member companies have fostered research and development in composites recycling for more than a decade. These activities are designed to establish cost- and material-saving processes for recycling disposable automotive composite parts and in-plant scrap.

And it's paying off.

Among the major gains is recycling this waste to form filler materials that can be used to mold new components for similar tasks. The process starts when parts and scrap are ground into small particles. Other materials like metals, rubber and wood are separated. When grinding is completed, the result is a material with an appearance similar to a fine powder, ready for molding into new components.

What's more, it takes far less energy to recycle composites compared to metals, making the process environmentally and economically efficient.



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