

FLEX APPEAL . . .

SMC: The versatile automotive material for body and structural components

Webster's dictionary defines the word flexible as "being characterized by a ready capability to adapt to new, different, or changing requirements." That's also a great description of sheet molding composite (SMC), one of the most versatile of all automotive materials. It's lightweight and cost-effective in high volumes and low, in structural applications AND body panels requiring a Class A surface finish. It's recyclable. And it offers corrosion- and dent-resistant body panels.

In fact there are lots of recent SMC technology advancements driving new applications. In addition to flexible SMC, there's ultra lightweight low-density SMC, low-pressure SMC that makes big parts easier to mold, and pigmented SMC that eliminates costly painting operations.

Besides being high-tech, cost-effective and low weight, SMC also deserves an award for getting along well with other materials. It happily goes through hot ELPO dips and paint bake ovens. Thanks to its excellent heat resistance and dimensional stability, SMC is very compatible with other materials on new-vehicle designs — and on the production line — whether it's steel on high-volume trucks such as the Ford F-150, or aluminum on low-volume cars such as the Plymouth Prowler.

With so many potential applications, it's no wonder SMC has enjoyed tremendous growth in automotive for nearly 40 years, with its steepest increase achieved over the past 10 years.

Preliminary reports from the SMC Automotive Alliance (SMCAA) show that 50 new SMC components will debut on 1998-model cars and light-, medium- and heavy-duty trucks, a 50% increase in the number of new

achieve the progressive styling desired by Ford while maintaining a tough, durable image," says Don Kossak, chairman of the SMCAA and sales director at Cambridge Industries.

"SMC was chosen for the Flareside fenders on all of the F-Series trucks because the composite allows a 75% investment reduction and a 22% weight reduction compared to traditional materials," he says. SMC also affords the ability to achieve the tight radii that are so critical to the truck's styling. And composite panels are inherently corrosion-resistant and provide a good paint match at assembly plants."

The move from steel to an SMC grille opening reinforcement was driven by cost reduction, strength-to-weight ratio and styling flexibility. "SMC provides a 60% investment savings over steel," Mr. Kossak says.

SMC also is widely used for valve covers such as those on the F-150 4.6L and 5.4L engines. The driving force here for using composite parts is cost and function. "The cost savings over aluminum comes from the lack of machining and paint and the energy required to produce aluminum castings combined with improved sealing and noise reduction with SMC," Mr. Kossak says.

It pays to be flexible. ■



1998 Ford F-150
 SMC Components



components introduced since 1993.

SMC's versatility is demonstrated in a variety of components on the Ford F-150 truck — the best selling vehicle in the U.S. The composite material is used for the Flareside box fenders, sunshade and rear window surround; structural applications such as the grille opening reinforcement; and underhood parts like the valve covers on the 4.6L and 5.4L engines.

"SMC's flexibility helped

SMC: Stretches value, adds muscle to structural components

While many engineers still think SMC is primarily a body panel material, the composite's versatility and technology advancements make it ideal for structures and underhood components as well as hoods, fenders and decklids.

SMC structural parts are used on many of the highest-volume cars and trucks in the U.S., including Ford Motor Co.'s Explorer and Ranger (cross-vehicle beam and grille opening reinforcement (GOR)), F-Series pickups (GOR, valve covers and fenders) and Windstar minivan (GOR and cowl plenum); plus Chrysler Corp.'s NS minivans (cowl plenum).

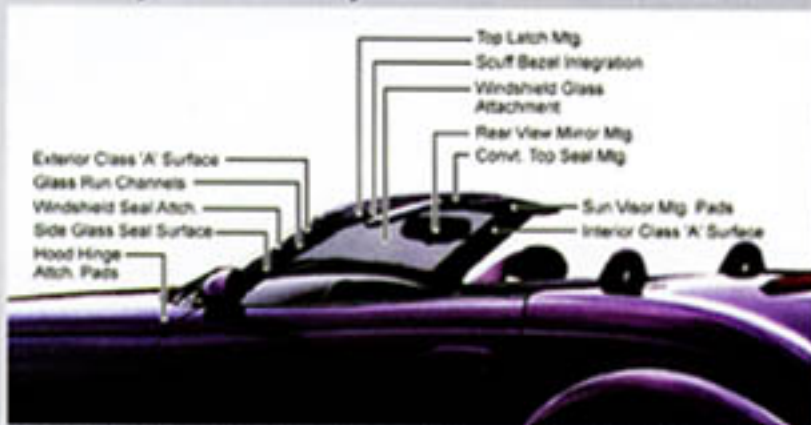
Among the most significant structural applications for the '98 model year — on a volume basis — are fuel tank heat shields made from SMC. This SMC component is used on over a dozen cars and trucks in 1998, including the Ford Contour/Mystique, Windstar and F-250 light truck; and the Lincoln Navigator, Continental and Jaguar. SMC is ideal for this application because of its good NVH (noise, vibration, harshness) properties and its heat resistance.

But, not all SMC applications are tucked away out of sight.

The "all-aluminum" Plymouth Prowler actually uses significant amounts of SMC. About 30% of its body panels are actually compos-



The GOR of the Ford Explorer (above) now is SMC. Prowler's SMC windshield frame (below) surrounds the glass and is a structurally loaded assembly.



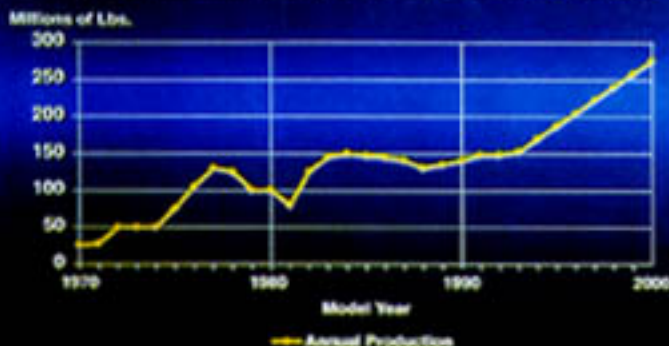
ite, including the rear quarter panels, front fenders, front quarter extensions, and rear valance panels. And right up top is

the unique SMC windshield frame, the first composite structure of its type ever introduced on a convertible vehicle. It consolidates 10 to 14 stamped steel parts into two adhesive-bonded composite parts that form a structurally loaded assembly with Class A finish on both sides. It also provides significant tooling and part cost savings, and reduces weight. This part is molded by Budd Plastics Div., Troy, MI.

Over all, SMC consumption increased at an annual rate of 13% from 1992 to 1997. Much of this growth can be attributed to the industry's improved production efficiency and to its successful efforts in reducing scrap and defective part rates, according to a recent study by the highly respected consulting firm IBIS Associates Inc. of Wellesley, MA. ■

ANNUAL PRODUCTION OF SMC FOR AUTOMOTIVE

- Currently 300 Automotive Components On 110 Different Vehicle Models



SMC: Helps shape beautiful bodies

SMC still is the light weight, cost-effective, easily styled alternative to steel body panels. Now available in flexible and pigmented varieties — and lighter than ever — SMC continues to break new ground, and is specified on some of the most advanced, innovative — and luxurious — vehicles in the automotive industry.

In the future, U.S. OEMs are eyeing composites like SMC for pickup truck beds and tailgates. The potential market could reach \$100 million annually, according to one report. Composites have inherent advantages compared to metal, proponents argue. They don't rust, are at least 20% lighter than steel and can be molded with special features designed to hold extra cargo.

Lincoln Navigator

Ford's phenomenally popular sport/utility is defining a new luxury niche — and SMC is along for the ride in a very conspicuous location: the hood. The Navigator hood joins more than 25 others made from SMC on current production cars and trucks, including the Lincoln Continental and Ford Econoline van. SMC was chosen for this specific application because the composite provides the surface finish and design flexibility required, has lower tooling costs than steel and is up to 30% lighter than a comparable hood made of steel. The parts are molded by Budd Plastics Div., Troy, MI.

Chevrolet Corvette

The Chevrolet Corvette's entire body has been made almost entirely of SMC since 1972. Dramatically restyled for the first time in 13 years, the convertible version of SMC's flagship car now adds an SMC decklid and tonneau cover to its repertoire of components for the '98 model year. The parts are molded by Cambridge Industries, Madison Heights, MI.

Lincoln Continental

SMC is helping Lincoln Continental offer its second distinct new look in four model years. By

changing the hood, front fenders and decklid, stylists updated the design theme to entice new buyers and encourage existing buyers to upgrade.

"The tooling costs for producing a hood, two fenders and a



decklid in SMC are less than half the tooling costs for producing these parts in steel," says Mike Dorney, sales manager of The Budd Co.'s Plastics Div. Compared to steel, these parts — on the hood, front fenders and decklid — of the '98 Continental weigh 25 lbs. (11.4 kg) less.

The front fenders are molded from Budd's special "Hi-Flex" SMC, designed as a tough, lightweight alternative for vertical body panels that experience a higher number of impacts.

Heavy Trucks

Nobody understands the importance of longevity and durability like heavy truck producers. That's why



Ford's HN 177 heavy truck.

they're moving to SMC in a big way. For 1998, the Ford HN 177, which features a hood, fenders, grille and accent bar made of SMC, totalling nearly 200 lbs. (91



**Lincoln Navigator (top)
Chevrolet Corvette (left)
Continental (above)
Renault Espace (below)**



kg) per truck; Ford's H-190 has an SMC hood and fenders. All these parts are molded by Cambridge Industries. Savings in weight and tooling costs, and SMC's inherent design flexibility have driven the recent growth of SMC in heavy trucks. Use of SMC in heavy trucks has nearly tripled the number of pounds used during the past five years — from 20 million lbs. (9 million kg) of SMC in 1993 to more than 60 million lbs. (27 million kg) projected in 1998.

Growing Global Presence

Marketed by Renault but built by Matra Automobile, the Renault Espace Version 3 is skinned almost completely in SMC. Production rates reach 150,000 annually. The first models used primarily resin transfer molding (RTM) processes, which required a 4-minute cycle time. Now SMC does the job with cycle times of about a minute. ■

SMC: Using it again and again . . .

Numerous components have been produced using filler made from recycled SMC. Called composite filler, the material is used in production automotive parts in the U.S., Europe and Japan. The latest production parts with recycled SMC content — 25% by weight — are the hood and decklid inner panels on the '98 Lincoln Continental, made by The Budd Co. Plastics Div.

Toyota Motor Corp. used parts containing composite filler for its Sprinter Caribe model beginning in 1991. The material was first used in the U.S. for inner panels on the 1993 Chevrolet Corvette.

Since then, numerous other

high-volume auto parts have been made using composite filler, including interior trim panels on the Chrysler Ram Van, engine covers for Ford Econoline vans and spoilers on Neon subcompacts.

The addition of composite filler doesn't weaken the engineering properties of SMC parts, and there's no need to remove paint and adhesives from SMC prior to recycling. Another

environmental plus: the resin used for making SMC can be made using recycled PET plastic, which commonly is used for soda bottles. ■



SMC Automotive Alliance Member Companies

Molders

Applied Molded Products
Mr. Victor Klein
Phone: 920-262-5201

Budd Plastics Div.
Mr. Mike Dorney
Phone: 248-619-2233

Cambridge Industries, Inc.
Mr. Don Kossak
Phone: 248-586-2515

Core Materials Corporation
Mr. Ken Schmell
Phone: 614-870-5069

Molded Fiber Glass Companies
Mr. Dave Denny
Phone: 216-994-5220

Suppliers

Alpha/Owens Corning
Mr. Mike Dettre
Phone: 901-854-2872

Ashland Chemical Company
Mr. Gordon Miesel
Phone: 248-244-9120

BYK-Chemie USA
Mr. James Lemkie
Phone: 313-981-5988

Century Tool & Gage Company
Mr. Mike Cummings
Phone: 810-629-0784

Dow Chemical
Mr. Travis Sessions
Phone: 248-351-5572

J.M. Huber Corporation
Mr. Mark Corbin
Phone: 770-441-1301 ext. 2850

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

Interplastic Corporation
Mr. Sean McMullen
Phone: 219-234-1105

Lord Corporation
Mr. Daniel Adam
Phone: 248-489-5800 ext. 624

Modern Tooling Systems
Mr. Tom Hamstreet
Phone: 419-729-9776

3M Company
Mr. Don Robertson
Phone: 612-452-6315

Owens Corning
Mr. Peter Rohman
Phone: 419-248-7746

Plasticolors, Inc.
Mr. Steve Walling
Phone: 216-997-5137 ext. 221

PPG Industries, Inc.
Mr. Kevin F. Sullivan
Phone: 412-434-2541

Premix, Inc.
Mr. Warren Owens
Phone: 216-224-2181

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

Reichhold Chemicals, Inc.
Mr. Frank Doherty
Phone: 919-990-8059

Selbert-Oxiderno (U.S.), Inc.
Mr. Douglas Church
Phone: 313-942-0110 ext. 101

Union Carbide Corporation
Mr. Dennis Finnegan
Phone: 313-416-5137

Vetrotex CertainTeed Corporation
Mr. Frank Smith
Phone: 419-868-7813

For more information, contact the SMCAA at 248-649-4888



**SMC
Automotive
Alliance**