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Reinforced Plastics

US Industry Study with Forecasts to **2011 & 2016**

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Glass fibers will continue to be the dominant reinforcement material in plastic, but carbon fibers are expected to increase 9% annually and nanomaterials will emerge commercially.

US reinforced plastics demand to reach 4.2 billion pounds in 2011

Reinforced plastics demand is projected to increase 2.8 percent annually to 4.2 billion pounds in 2011, valued at \$8.1 billion. This will create a market for 2.8 billion pounds of resin and 1.4 billion pounds of reinforcements. Material substitution will remain the driving force behind advances. Higher performance requirements, combined with resin, reinforcement and processing improvements, will broaden applications and enhance competitiveness with steel and aluminum. Glass fibers, due to their low cost and good performance, will continue to be the dominant reinforcement material in 2011, but carbon fibers are expected to increase nine percent annually to 32 million pounds and nanomaterials will emerge commercially, with demand reaching almost five million pounds.

Reinforced thermosets to remain dominant type

Thermoset resins, primarily unsaturated polyester, will continue to account for over 60 percent of all reinforced plastics in 2011. Demand for reinforced thermosets is projected to expand 2.7 percent yearly to 2.5 billion pounds in 2011, driven by their low cost and performance attributes such as strength and corrosion resistance. Product innovations and improved sheet molding compounds and environmentally friendly low-styrene-con-

US Reinforced Plastics Demand (3.6 billion pounds, 2006)



tent formulations will also spur growth. Niche opportunities are expected in areas such as pedestrian and vehicular bridge decking and wind turbine blades. Unsaturated polyester will remain the leading resin, accounting for 91 percent of all thermosets in 2011. Opportunities for reinforced epoxy are anticipated in military and commercial aircraft and aerospace applications.

Reinforced thermoplastics to grow the fastest

Faster growth, however, is anticipated for thermoplastics due to their better aesthetics and easier processing. Reinforced thermoplastics demand is

forecast to grow 3.0 percent annually to 1.6 billion pounds in 2011 due to their competitive cost, high performance capabilities, processing advantages and better design capabilities. Polypropylene will remain the leading thermoplastic and present above average growth based on its low cost, stiffness and dimensional stability, particularly in motor vehicle uses. Reinforced polycarbonate will expand at the fastest pace due to its dimensional stability, impact strength and other properties, making it particularly amenable to motor vehicle and producer durable equipment uses. Thermoplastic polyester and nylon will also present good opportunities due to their high heat resistance, strength and durability.

Sample Text, Table & Chart

RESINS

Polyester

Demand for reinforced thermoset (unsaturated) polyester increased to 1.2 billion pounds in 2011, offering opportunities for manufacturers to produce durable equipment such as business machines, construction equipment, and polyester's high strength-to-weight ratios, good electrical properties, and resistance to heat and corrosion reinforced plastics. Applications include boat hulls, tanks, turbine casings, motor vehicle body components, electrical housings and other parts, tool handles, pump housings, cutting panels and pipe.

**SAMPLE
TEXT**

Types of unsaturated polyester include general purpose, isophthalic and vinyl esters. Vinyl esters are more expensive than other polyesters, but their performance surpasses other polyesters in chemically corrosive environments (e.g., filament wound glass/vinyl ester chemical tanks) and structural laminates requiring high moisture resistance (e.g., boat manufacturing). Vinyl ester resins are preferred in applications such as storage tanks, pipe and industrial grating where their greater chemical resistance, strength and stiffness are required.

A number of processing techniques are used in the production of reinforced thermoset polyester, including contact molding (using both hand lay-up or spray lay-up techniques), compression molding, injection molding, pultrusion, filament winding, laminating and resin transfer molding. Large recreational boat and vehicle parts are generally produced by hand lay-up and spray lay-up processes. The processes are also utilized for small-volume production runs, where metal tooling is not cost effective.

Pultrusion is a continuous processing method for producing lengths of reinforced plastics of a uniform cross section. Pultrusion is used to produce continuous cross-sectional items such as beams, rods, T-bars and

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TABLE III-3

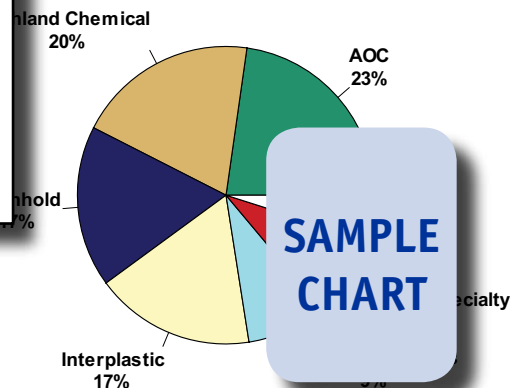
**CARBON FIBER & OTHER REINFORCEMENTS
DEMAND BY TYPE
(thousand pounds)**

Item	1996	2001	2006	2011	2016
Reinf Plastics Demand (mil lbs)	2823				
% carbon & other reinforced	1.2				
Carbon/Other Reinf Plastics (mil lbs)	35				
% carbon & other reinforcements	51.7				
Carbon & Other Reinforcements	18100				
Carbon	12000				
Aramid	6047				
Nanomaterials	neg				
Other	53				

**SAMPLE
TABLE**

CHART VI-2

**THERMOSET POLYESTER CAPACITY, 2006
(2.3 billion pounds per year)**



**SAMPLE
CHART**

Sample Profile, Table & Forecast

TABLE V-2
MOTOR VEHICLE MARKET FOR REINFORCED PLASTICS BY RESIN
 (million pounds)

Item	1996	2001	2006	2011	2016
Motor Vehicle Production (000 units)	11860				
lbs plastic/vehicle	75				
Reinforced Plastics in Motor Vehicles	886				
Reinforced Thermosets:	293				
Polyester	285				
Other	8				
Reinforced Thermoplastics:	593				
Polypropylene	190				
Nylon	165				
Polyester	120				
Styrenics	72				
Polycarbonate	22				
Other	24				
% motor vehicles	31.4				
Reinforced Plastics Demand	2823				

**SAMPLE
TABLE**

COMPANY PROFILES

Bulk Molding Compounds Incorporated

1600 Powis Court
 West Chicago, IL
 630-377-1065
<http://www.bmci.com>

**SAMPLE
PROFILE**

Annual Sales: \$1.4 billion (2006)
 Employment: 1,400 (2007)

Key Products: fiberglass-reinforced thermoset unsaturated polyester and vinyl ester bulk molding compounds

Bulk Molding Compounds Incorporated (BMCI) is a manufacturer of thermoset unsaturated polyester and vinyl ester bulk molding compounds (BMCs). The Company is privately held.

BMCI is one of the world's leading producers of thermoset BMCs. Thermoset BMCs contain fiberglass-reinforced polyester and/or vinyl ester molding compounds that undergo irreversible crosslinking during the molding process, converting the material to an infusible, solid state. These materials offer heat, stain and chemical resistance, and are suitable for use in automotive, appliance, houseware, indoor/outdoor lighting, electrical, kitchen and bath, and other applications.

Specific products from BMCI include BMC 300, GRANITE-X, BMC 1000 and conductive BMCs. The Company's BMC 300 line consists of general-purpose, mineral-filled, glass fiber-reinforced polyester that can be used for transfer, compression and stuffer injection molding. Included in this range is the GRANITE-X series of molding compounds, which features high-strength, stain-resistant materials designed to look like stone. GRANITE-X BMCs, which are suitable for use in the production of grill shelves, outdoor lighting fixtures and sinks, offer

"The motor vehicle market for reinforced plastics is projected to increase nearly three percent per year to 1.4 billion pounds in 2011. Unsaturated polyester, polypropylene and nylon are expected to together account for 72 percent of all motor vehicle applications in 2011. Opportunities will be fueled by improved resin and processing developments, as well as needs for lighter weight and cost competitive materials. Advances will also be driven by the..."

--Section V, pg. 105

OTHER STUDIES

Extruded Plastics

US demand for extruded plastics will reach 40 billion pounds in 2011, driven by extrusion's cost efficiency, processing ease and high volume uses. PVC and LDPE will remain the dominant extruded resins while HDPE will grow the fastest. Construction and packaging uses will offer the best market prospects. This study analyzes the \$27 billion (resin content) US extruded plastic industry, with forecasts for 2011 and 2016 by resin and market. It also presents company market share data and profiles leading players.

#2241 09/2007..... \$4500

World Nanomaterials

The global market for nanomaterials will reach \$4.2 billion by 2011 and remain concentrated in the US, Western Europe and Japan. Products making the greatest initial commercial impact are nanoscale versions of conventional materials such as silica, titanium dioxide, alumina, iron oxide, and zinc oxide. This study analyzes the \$1 billion global nanomaterials industry, with forecasts for 2011, 2016 and 2025 by product, market, world region and for 15 countries. It also discusses R&D and profiles major participants.

#2215 08/2007..... \$5500

Glass Fibers

US glass fiber demand will reach \$7 billion in 2011. The dominant glass wool fiber sector will grow the fastest, driven by rebounding demand in office and commercial construction and increasing insulation use per structure to improve energy efficiency. Reinforced plastics will present the best opportunities for textile glass fiber. This study analyzes the US glass fiber industry, with forecasts for 2011 and 2016 presented by type and market. It also evaluates company market share and profiles leading competitors.

#2199 05/2007..... \$4400

Specialty Films

US specialty film demand will grow 4.8% annually through 2010. Gains will be driven by higher value materials, the rapid adoption of modified atmosphere packaging and improved film coating and metallization. Barrier films will remain dominant while biodegradable and water soluble films will grow the fastest from a small base. The study analyzes the \$5.8 billion US specialty film industry to 2010 and 2015 by product, function and market. It also evaluates company market share and profiles leading competitors.

#2158 02/2007..... \$4400

Engineering Plastics

US engineering plastic demand will grow 3.5% annually through 2010. Gains will be driven by a resurgent electrical and electronics market, the largest outlet for engineering resins, and by increasing per vehicle use in the large motor vehicle market. Polycarbonate and polyesters will offer the best growth prospects among higher-volume resins. This study analyzes the \$8.4 billion US engineering resin industry to 2010 and 2015 by product and market. It also evaluates market share and profiles major producers.

#2106 10/2006..... \$4300

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