World Thermoplastic Elastomers, a new study from The Freedonia Group, provides you with an in-depth analysis of the major trends in the world market for thermoplastic elastomers and the outlook for product segments and major markets -- critical information to help you with strategic planning.

This brochure gives you an indication of the scope, depth and value of Freedonia’s new study, World Thermoplastic Elastomers. Ordering information is included on the back page of the brochure.

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World demand for thermoplastic elastomers (TPEs) is forecast to expand 6.4 percent per year to 2.15 million metric tons in 2006, valued at more than US$10 billion.

TPEs will continue to find the majority of their use as replacements for natural and synthetic rubber, as well as rigid thermoplastics and metals.

The global TPE market will remain concentrated in developed countries such as the US, Western Europe and Japan, particularly for higher performance materials such as copolyester elastomers (COPES) and thermoplastic vulcanizates (TPVs).

Through 2006, China’s TPE market will expand and diversify based on the country’s significant positions in the production of many of the key products manufactured with TPE parts and components: footwear, housewares, appliances, sporting goods, recreational products, hand and power tools, motor vehicles and industrial machinery, among numerous others.

Motor vehicles will account for the largest market for TPEs, with demand exceeding 600,000 metric tons in 2006.

In 2001, the global TPE market was valued at $7 billion, and the top seven suppliers -- Kraton Polymers (US), DuPont (US), Advanced Elastomer Systems (US), Atofina (Total Fina Elf - France), BASF (Germany), Polimeri Europa (Eni - Italy) and Noveon (US) -- accounted for 32 percent of total sales.
**Study Highlights**

**World Thermoplastic Elastomer Demand**  
(Thousand metric tons)

<table>
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<tr>
<th>Item</th>
<th>1996</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
<th>01/96</th>
<th>06/01</th>
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<tr>
<td>Gross Domestic Product (bil 98 US$)</td>
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<td>43420</td>
<td>52250</td>
<td>63810</td>
<td>3.5</td>
<td>3.8</td>
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<tr>
<td>kg/mil $GDP</td>
<td>31.9</td>
<td>36.4</td>
<td>41.1</td>
<td>46.2</td>
<td>--</td>
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<tr>
<td>Thermoplastic Elastomer Demand</td>
<td>1170</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>By Type:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Styrenic Block Copolymers (SBCs)</td>
<td>557</td>
<td>733</td>
<td>970</td>
<td>1300</td>
<td>5.6</td>
<td>5.8</td>
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<tr>
<td>Thermoplastic Polyolefins (TPOs)</td>
<td>249</td>
<td>343</td>
<td>470</td>
<td>640</td>
<td>6.6</td>
<td>6.5</td>
</tr>
<tr>
<td>Thermoplastic Polyurethanes (TPUs)</td>
<td>144</td>
<td>192</td>
<td>260</td>
<td>355</td>
<td>5.9</td>
<td>6.3</td>
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<tr>
<td>TPVs, COPEs &amp; Other TPEs</td>
<td>220</td>
<td>312</td>
<td>450</td>
<td>655</td>
<td>7.2</td>
<td>7.6</td>
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<td>By Region:</td>
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<td></td>
<td></td>
<td>6.1</td>
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<tr>
<td>Western Europe</td>
<td>359</td>
<td>455</td>
<td>565</td>
<td>700</td>
<td>4.9</td>
<td>4.4</td>
</tr>
<tr>
<td>China</td>
<td>129</td>
<td>222</td>
<td>358</td>
<td>581</td>
<td>11.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Japan</td>
<td>107</td>
<td>126</td>
<td>153</td>
<td>186</td>
<td>3.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Other Asia/Pacific</td>
<td>93</td>
<td>132</td>
<td>209</td>
<td>324</td>
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<td>9.6</td>
</tr>
<tr>
<td>Rest of World</td>
<td>56</td>
<td>72</td>
<td>110</td>
<td>164</td>
<td>5.2</td>
<td>8.8</td>
</tr>
</tbody>
</table>

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**Sample Table**

**World Thermoplastic Elastomers #1553**

Order form on last page
Table of Contents

Tables and Charts are featured for each region and country. Historical data and forecasts are presented for 1996, 2001, 2006 and 2011.

For each country/region, the following are provided:

- Population (million)
- GDP per capita
- Gross Domestic Product (bil US $98)
- $ per mil $ GDP
- kg per capita
- kg per mil $ GDP
- TPE Demand (mil $)
- $/kg
- TPE Demand (000 mil tons)
- Styrenic Block Copolymers (SBCs)
- Thermoplastic Polyolefins (TPOs)
- Thermoplastic Polyurethanes (TPUs)
- Thermoplastic Vulcanizates (TPVs)
- Copolyester Elastomers (COPEs)
- Other TPEs

+ net exports/stockpiles

Thermoplastic Elastomer Production

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The Market Environment Section discusses key indicators that drive demand for world thermoplastic elastomers, including motor vehicle trends, the outlook for manufacturing, and Freedonia’s uniquely developed macroeconomic indicators.

This information provides you with an understanding and an analysis of the climate in which the global thermoplastic elastomers industry operates and helps you build your market strategy to sustain long-term growth.

Per Capita Demand for Thermoplastic Elastomers

Thermoplastic elastomers, which were developed to bridge the performance gap between synthetic rubber and thermoplastics, are often described as “next generation” rubbers. This means that the use of TPEs tends to be restricted to economies that have developed advanced positions in the manufacture and compounding of synthetic rubber and thermoplastics. Further, use of TPEs is concentrated in major durables, particularly automobiles, industrial machinery, appliances and related items (i.e., lawn care equipment), which tends to limit demand to countries with major positions in the design of these equipment types. The design element is crucial, as it is product designers, prototypers and engineers that often determine the material composition of TPE-containing items. For this reason, TPE demand does not necessarily rise commensurately with output of consumer goods, since many low wage countries are used simply as low-wage assembly centers for labor-intensive products, with the product design, planning and testing aspects remaining in major developed countries.

As is apparent from the following chart, there is a strong positive correlation between income levels (represented here by real gross domestic product per capita) and TPE demand per capita (presented in kilograms). In 2001, global TPE demand was equivalent to 0.26 kilograms per capita, or about one-quarter of a kilogram per person. The higher per capita TPE demand levels occur in the US, Canada, the major economies of Western Europe (particularly Belgium, Germany and the UK), and the export-oriented economies of Asia (particularly Japan, South Korea and Taiwan). China’s per capita TPE demand remains below the global average, though the country’s domestic market for these materials grew at double-digit rates throughout the 1990s. Demand for TPEs remains negligible throughout most of Latin America (with the exception of Brazil), Eastern Europe and Africa/Mideast. In most cases, countries in these regions are still focused on developing
Supply & Demand by Region & Country

The Supply and Demand Section highlights the key issues that have affected the global thermoplastic elastomers market over the past ten years and summarizes contributing growth factors.

This information helps you:

- Focus your sales and marketing efforts on high growth areas.
- Propose new areas for development.

South Korea

Demand for thermoplastic elastomers in South Korea is forecast to increase 8.6 percent per year to 92,000 metric tons in 2006, with market value expanding at double digit rates during the same period to reach $415 million. As South Korea is the second largest motor vehicle producer in Asia behind Japan, a major share of the country’s TPE demand is related to the motor vehicle industry. Vehicle output is forecast to post moderate gains after a weak showing in the second half of the 1990s, and this factor, along with continued supplantation of rubber parts, will promote favorable gains in TPEs.

With the motor vehicle market leveling off, TPEs are finding their strongest opportunities in smaller sectors, particularly the industrial and manufacturing sectors, where TPEs are used in a wide range of parts and components -- e.g., belts, hoses, bumpers and vibration dampening elements. TPEs also are widely used in consumer goods such as housewares, sporting goods, hand and power tools, and small appliances. Additionally, although lower wage nations such as China are offering intense competition for South Korea’s footwear industry, the use of styrenic block copolymers and TPUs in footwear-related applications will remain a major factor in the South Korean TPE market.

South Korean TPE production is forecast to reach 25,000 metric tons in 2006. LG Chemical is the leading producer, with an SBS unit located in Yeochon. LG Chemical also is active through an agreement with Advanced Elastomer Systems. As part of the alliance, AES allows LG Chemical to market the company’s SANTOPRENE TPVs, as well as produce and distribute compounds based on AES’ TPVs in South Korea and other countries in the Asia/Pacific region.

US-based Crompton expanded its position in South Korea in April 2001, when it acquired the DB Casthanes business of HST&C (South Korea). The DB Casthanes...
These Sections analyze demand trends and consider the threats and opportunities for each type and market.

**Demand by Market & Type**

**Thermoplastic Polyurethanes**

World demand for thermoplastic polyurethane elastomers (TPUs) is forecast to increase from 191,000 metric tons in 2006, outpacing inflation-adjusted gains in the global economy and tracking aggregate growth in the overall TPE industry. Market value is forecast to expand nine percent per year over the same period to $1.9 billion. These elastomers were the first thermoplastic elastomers to find widespread commercial use, which makes this a relatively mature segment of the TPE industry, and these elastomers continue to face strong competition from other thermoplastic elastomers, particularly reactor thermoplastic polyolefins (TPOs) in film and sheet applications. However, TPUs are seeing increased use in blends with TPOs, a practice that is expanding the range of applications for both types of materials. TPUs are commonly used in motor vehicles, consumer products, as well as a variety of miscellaneous markets.

**Table:**

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<tbody>
<tr>
<td>Pers Consump Exp (bil US $98) kg/mil PCE</td>
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<td>22358</td>
<td>26493</td>
<td>31670</td>
<td>38470</td>
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<tr>
<td>Consumer &amp; Sporting Goods</td>
<td>49.5</td>
<td>78.0</td>
<td>148.0</td>
<td>245.0</td>
<td>390.0</td>
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<tr>
<td>By Type:</td>
<td></td>
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<tr>
<td>Thermoplastic Polyurethanes</td>
<td>11.0</td>
<td>18.0</td>
<td>36.0</td>
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<td>90.0</td>
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<tr>
<td>Styrenic Block Copolymers</td>
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<td>35.0</td>
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<td>Thermoplastic Polyolefins</td>
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<tr>
<td>Copolyester Elastomers</td>
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<td>Thermoplastic Vulcanizates</td>
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<tr>
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<tr>
<td>By Application:</td>
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<tr>
<td>Appliances &amp; Housewares</td>
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<td>36.0</td>
<td>59.0</td>
<td>90.0</td>
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</tbody>
</table>

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Gain a better global understanding of your competition and analyze your company’s position in the industry with information about:

- market share
- TPE compounders
- technology & manufacturing
- competitive strategies
- acquisitions & divestitures
- industry restructuring
- joint ventures
- cooperative agreements
- marketing & distribution

Marketing

Thermoplastic elastomers were initially introduced as replacements for rubber products, primarily for small molded or extruded parts. Thus, marketing efforts of TPE producers were concentrated on demonstrating the usefulness of these new materials, such as low switchover costs, reduced manufacturing costs and superior product performance characteristics. The industry has since evolved to the point where the advantages of TPEs are generally well known throughout user industries. Nevertheless, considerable marketing efforts are still required for the penetration of new markets and for new applications. Efforts are also heavily directed toward the replacement of materials such as plastics and metals, as well as their ability to augment certain materials. In this regard, TPE suppliers dedicate considerable resources to product development efforts, often working directly with product engineers in the target field, such as automotive designers.

Current marketing plans for TPEs need to address the potential for confusion posed by the relatively large number of TPEs on the market. This problem can deter customers from trying unfamiliar TPEs. Marketing plans must therefore educate users with the aim of aiding them in the selection of suitable products. As such, many suppliers provide charts and graphs contrasting their TPE with other types in addition to rubbers and plastics.

The marketing of thermoplastic elastomers requires a focused understanding of the customer’s needs, continual product improvement and a high degree of customer service. Sales calls are frequent and of a longer duration than those for many competing materials. Contacts with engineering, technical and cost-control personnel are utilized in addition to meeting with purchasing agents.

Many marketing departments generate customer inquiries through advertising in trade journals (such as Modern Plastics and Plastics Compounding) in order to...

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The Profiles Section analyzes 49 companies active in the world thermoplastic elastomers industry. These profiles represent a sampling or cross-section of the types of companies involved in the industry.

Divisions, subsidiaries, joint ventures, etc., are discussed under appropriate parent companies.

Sources for profiles included:

- Information provided by key staff members in the respective companies
- Annual reports
- 10-K reports
- Security analysts reports
- Corporate product literature

Noveon, formerly BF Goodrich Performance Materials, began operating as a privately-held firm when a US-based investor group consisting of AEA Investors Incorporated, DLJ Merchant Banking Partners and DB Capital Partners acquired the Performance Materials segment of BF Goodrich Company (Charlotte, North Carolina) for $1.4 billion in February 2001. Noveon is a leading global producer of performance polymer systems and additives with operations organized into three segments: Consumer Specialties, Polymer Solutions and Performance Coatings.

The Company is active in the world thermoplastic elastomers (TPEs) industry through the Polymer Solutions segment, which includes thermoplastic polyurethanes (TPUs). Noveon has production facilities in North America, Latin America, Europe and the Asia/Pacific region. Research and development centers are maintained in Brecksville, Ohio in the US, as well as in Belgium by Noveon Chemical Belgie NV, a subsidiary.

Among Noveon’s TPU products are ESTANE, ESTALOC and ESTAGRIP. These materials are produced at facilities in Avon Lake, Ohio in the US, as well as at a plant in Belgium. The TPUs are marketed worldwide. ESTANE polyester- and polyether-based TPUs are designed to offer toughness, durability, abrasion and

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Companies Profiled

Advanced Elastomer Systems LP
Asahi Kasei Corporation
Basell NV
BASF AG
  - Elastogran GmbH
  - Takeda Badische Urethane Industries
Bayer AG
  - DIC Bayer Polymer Limited
  - Sumitomo Bayer Urethane Company
Bridgestone Corporation
  - Firestone Polymers LLC
Celanese AG
  - Ticona AG
Chi Mei Corporation
China Petroleum and Chemical Corporation
  - Sinopec Corporation
Crompton Corporation
  - CK Witco Corporation
  - DB Casthanes
  - Rubicon
  - Uniroyal Chemical Company
Dexco Polymers
Dow Chemical Company
Dow Corning Corporation
  - Multibase SA
DSM NV
  - Alliance Alloys LLC
  - DuPont Dow Elastomers LLC
  - DuPont (EI) de Nemours
Eastman Chemical Company
EMS-Chemie Holding AG
Eni SpA
  - EniChem SpA
  - Polimeri Europa Srl
Equistar Chemicals LP
Exxon Mobil Corporation
  - Mytex Polymers
Ferro Corporation
  - Advanced Polymer Alloys LLC
General Electric Company
  - GE Polymerland
GLS Corporation
  - Alliance Alloys LLC
Goodrich Corporation
Huntsman Corporation
  - Rubicon
Kraiburg Gummiwerk GmbH & Company
  - EK Polymers
Kraton Polymers US LLC
Kuraray Company Limited
Mitsubishi Chemical Corporation
  - Mytex Polymers
  - Sunprene Company
Mitsui Chemicals Incorporated
  - Mitsui Takeda Chemicals
Nova Polymers Incorporated
Noveon Incorporated
  - Goodrich (BF) Performance Materials
PolyOne Corporation
  - Geon Company
  - Hanna (MA) Company
Repsol YPF SA
  - Dynasol Elastomerios SA
Rockwood Specialties Incorporated
  - AlphaGary Corporation
  - GES Company
Royal Dutch/Shell Group of Companies
  - Saint-Gobain
Schulman (A.) Incorporated
  - Sunprene Company
Solvay SA
Spartech Corporation
Sumitomo Chemical Company Limited
  - GES Company
  - Sumitomo Bayer Urethane Company
Takeda Chemical Industries Company
  - Mitsui Takeda Chemicals
Teknor Apex Company
  - Singapore Polymer Corporation
Total Fina Elf SA
  - Atofina SA
Toyooh Company Limited
TSRC Corporation
Washington Penn Plastic Company
Zeon Corporation
  - Nippon Zeon Company Limited

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Freedonia does not just collect and reprint data; Freedonia develops data. Our analysts thoroughly investigate an industry by extensively interviewing key industry participants and analyzing information from sources such as associations, government and trade literature. Once this research is complete, Freedonia establishes one set of forecasts. All writing, editing and forecasting is done in-house to assure quality and consistency. In cases where data does not exist, Freedonia develops the data based on input/output ratios, bills of materials and flow charts. The following chart summarizes Freedonia’s methodology.
The Freedonia Group, Inc. is a leading international industry study/database company.

Since 1985, Freedonia has published 1,800 titles covering areas such as plastics, chemicals, coatings and adhesives, building materials, industrial components and equipment, health care, packaging, household goods, security, and many other industries.

Freedonia has produced a wide variety of titles, including:

- Industrial Rubber Products
- Thermoplastic Compounding
- Thermoplastic Elastomers
- Thermoplastic Compounding by Independents

Because Freedonia is a reliable information source, our forecasts are cited in numerous publications such as The Wall Street Journal, The Financial Times, Chemical Market Reporter, Chemical Week and Plastics News.

### Advantages of Freedonia Reports

**In-house operations**
Because all of our staff work at the same location, interaction between analysts and departments provides a strong system of checks and balances.

**Consistency**
Our Economics Group develops indicators that are used by all analysts. Therefore, every Freedonia study is based on a consistent set of economic assumptions (GDP, motor vehicle production, resident population, etc.).

**Reliable forecasts**
Because all of our forecasts consider the environment in which a product or industry is operating, as well as threats and opportunities to the market, Freedonia forecasts are reliable indicators of future performance.

**One-on-one interviews**
All studies are produced by conducting interviews with key industry participants and end-users.

**Proprietary electronic database**
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• Corporate Planners
• Market Researchers
• Financial Analysts
• Information Centers
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**Industrial Rubber Products**
US industrial rubber product sales will benefit from accelerating durable goods production of such items as motor vehicles and industrial machinery. The market will also get a boost from steady aftermarket gains in motor vehicles, machinery, aerospace and off-road equipment. Construction markets will remain relatively weak. This study analyzes the $15 billion US industrial rubber product industry to 2006 and 2011 by type and market. It also presents market share data and profiles leading industry competitors.

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**Engineered Plastics**
US demand for engineered plastics will reach 5.7 billion pounds in 2006. Gains will result from performance and cost advantages over competitive materials, which will continue to spur new applications. Polycarbonate will outpace ABS and nylon. Smaller-volume resins (e.g., polyphenylene oxide, thermoplastic polyester) will grow even faster. This study analyzes the $8.1 billion US engineered plastics industry to 2006 and 2011 by resin and market. It also details market share and profiles major producers.

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**Foamed Plastics**
Demand for foamed plastics in the US will reach 7.8 billion pounds in 2005. Opportunities in insulation and cushioning will support demand for foamed urethane, while foamed polystyrene demand will be driven by advantages in packaging and insulation. Construction will remain the leading market based on heightened energy efficiency standards. This study analyzes the $13.7 billion US foamed plastics industry to 2005 and 2010 by type and market. It also evaluates market share and profiles key companies.

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**Thermoplastic Elastomers**
Demand for thermoplastic elastomers (TPEs) in the US will grow 5.7% annually through 2005. Gains will be driven by the displacement of natural and synthetic rubber, and rigid plastics and metals. TPEs are also being over-molded onto rigid components for ergonomic or “soft-touch” features. Thermoplastic vulcanizate (TPV) and polyolefins will grow the fastest. This study analyzes the $2.2 billion US TPE industry to 2005 and 2010 by market and by product. It also details market share and profiles key firms.

#1498. 12/01. $3,900

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**Injection Molded Plastics**
US demand for injection molded plastics will reach 16.1 billion pounds in 2005. Advances will result from the versatility and cost efficiency of injection molding coupled with broad opportunities in packaging, consumer, motor vehicle, electrical/electronic, and other uses. Thermoplastics will retain their dominance while polypropylene leads gains. This study analyzes the $7.5 billion US injection molded plastics industry to 2005 and 2010 by resin and market. It also evaluates market share and profiles key firms.

#1473. 9/01. $3,800

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**Industrial Rubber Products - Private Companies Report**
The majority of the approximately 1,000 companies in the US industrial rubber products market are privately held. At least ten private firms have $75 million or more in industrial rubber product sales. Several firms are also significant producers in individual markets such as belting, roofing and flooring. This report profiles over 150 companies (e.g., Day International, Quadion). It also forecasts industry demand, reviews acquisition trends, presents market share data, and lists firms by product and location.

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**Reinforced Plastics**
Growth in US reinforced plastics demand will be driven by cost and performance advantages over wood and metal in a variety of applications. Thermoset resins will continue to control over half the market, while reinforced thermoplastics grow faster because of needs for higher performing products with enhanced design capabilities. This study analyzes the $4.8 billion US reinforced plastics industry to 2005 and 2010 by reinforcement, resin and market. It also evaluates market share and profiles key firms.

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