US market growing nearly 20% annually

Demand for metallocene and single site polymers in the US totaled 1.8 billion pounds in 2001. The market is expanding nearly 20 percent per year, compared to less than four percent per year for the total US plastics market. By 2006, the US market for these polymers is forecast to reach nearly five billion pounds.

Recent developments in catalyst technology are revolutionizing the polyolefins industry. Specifically, INSITE single-site catalysts from Dow Chemical and EXXPOL metallocene catalysts from ExxonMobil, along with a host of other production technology innovations (particularly gas-phase process technology from companies such as BP and Chevron Phillips) are giving resin producers significantly greater control over the manufacturing process, resulting in higher performance, custom-engineered olefinic polymers.

Improved properties opening up new uses

Metallocene and single site polymers are displacing conventional grades of plastics, as well as glass, metal, paper and composite materials. The dramatically improved physical properties of these polymers are rapidly opening applications previously off limits to commodity thermoplastics, with a range of characteristics previously available only from high performance engineering resins. In particular, fibers and nonwoven fabrics based on mPP are expected to find a range of new uses in construction and industry, as well as home textiles and apparel.

Study coverage

Details on these and other findings are available in the new Freedonia study, *Metallocone & Single Site Polymers*, priced at $3900. The study provides historical data for 1996 and 2001 and forecasts to 2006 and 2011 by resin, application and market. It also presents market share data and profiles major producers and suppliers.

Suppliers adding metallocene grades

Current demand for metallocene and single site polymers is heavily dominated by film grades of LLDPE, which were the first resins to be produced using these new technologies. Suppliers also are rapidly expanding production capabilities for metallocene grades of HDPE and polypropylene, as well as elastomers such as EPDM, TPOs and plastomers. To date, the packaging industry has been the largest market for these resins, though all major applications for polyolefins will be affected over the next decade, including construction materials (such as nonwovens), motor vehicle components, and parts and components for consumer durables such as appliances and sporting goods.
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Other Metalloocene & Single Site Polymers

Metallocene polypropylene was introduced commercially in 1995 by ExxonMobil, which markets the product under the ACHIEVE tradename. Other leading producers of metallocene polypropylene include Atofina, the chemical business of Total Fina Elf, and Basell, which is the world’s leading producer of polypropylene. Basell was formed in 1999 when Shell and BASF merged a number of joint ventures (Elenac, Montell Polyolefins and Targor) into a single polyolefins business. In September 2001, Basell and ExxonMobil announced a new research and development agreement to accelerate development efforts for metallocene PP. Under the agreement, both Basell and ExxonMobil will separately manufacture, market and sell mPP resins, while Basell will license the developed mPP technology to interested parties.

Table VI-2
Metalloocene PP Demand by Application & Market (million dollars)

<table>
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<tbody>
<tr>
<td>Polypropylene Demand</td>
<td>7205</td>
<td>9800</td>
<td>13200</td>
<td>17000</td>
<td>21700</td>
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<tr>
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<td>By Application:</td>
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<tr>
<td>Film</td>
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<tr>
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<td>0</td>
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<tr>
<td>Other Markets</td>
<td>0</td>
<td>5</td>
<td></td>
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</tbody>
</table>

mPP Suppliers

Metallocene polypropylene was introduced commercially in 1995 by ExxonMobil, which markets the product under the ACHIEVE tradename. Other leading producers of metallocene polypropylene include Atofina, the chemical business of Total Fina Elf, and Basell, which is the world’s leading producer of polypropylene. Basell was formed in 1999 when Shell and BASF merged a number of joint ventures (Elenac, Montell Polyolefins and Targor) into a single polyolefins business. In September 2001, Basell and ExxonMobil announced a new research and development agreement to accelerate development efforts for metallocene PP. Under the agreement, both Basell and ExxonMobil will separately manufacture, market and sell mPP resins, while Basell will license the developed mPP technology to interested parties.

Applications & Markets

Elastomers -- Demand for elastomers based on metallocene and single-site catalysts is forecast to expand nearly 20 percent per year to more than 400 million pounds in 2006, when it will account for about five percent of US rubber demand. This segment encompasses EPDM (ethylene propylene diene monomer), as well as thermoplastic elastomers (specifically TPOs, or thermoplastic polyolefin elastomers) and plastomers. Of these, the largest segment is EPDM, but both TPEs and plastomers are seeing strong gains from smaller bases.

While much of the demand for metallocene-based polyethylene and polypropylene is arising in the packaging industry, the elastomer segment of the market is finding its greatest opportunities in durable goods, particularly the motor vehicle industry, as well as general industrial use for molded and extruded goods. These next generation polymers offer an extraordinarily high degree of uniformity and consistency on a lot by lot basis, which results in highly reproducible and predictable results. For automotive engineers and other product designers, this characteristic means that components produced on different production lines will adhere more closely to specifications, thus reducing the defect rate and improving long term performance. These polymers also can improve yields and reduce scrap rates.

Displacement is occurring at the expense of conventional rubbers, engineering resins, metal and composite parts. Metallocene-based EPDM is finding applications in automotive components such as weatherstripping and corner seals, radiator and heater hoses and anti-vibration components. Outside the automotive arena, it can be used in roofing membranes, garden hoses, seals and other types of industrial rubber products. TPOs based on metallocene polymers (such as the ENGAGE line from DuPont Dow Elastomers) are rapidly becoming the modifier of choice for automotive TPO applications, and by general industry acceptance of the polyolefin elastomer as the enabling compound ingredient for soft, flexible molded and extruded goods.

Freedonia’s methods involve:

- Establishing consistent economic and market forecasts
- Using input/output ratios, flow charts and other economic methods to quantify data
- Employing in-house analysts who meet stringent quality standards
- Interviewing key industry participants, experts and end-users
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#1638.......... 01/2000 ................. $3700

**Geosynthetics**

The US market for geosynthetics is analyzed in this study. It presents historical data and forecasts to 2006 and 2011 by product (e.g., geotextiles, geomembranes, geogrids, geonets); and by application (e.g., ground stabilization and reinforcement, pavement repair and construction, solid waste disposal, drainage, erosion and sedimentation control, liquid containment). The study also examines the market environment, details industry structure, presents market share data and profiles key companies.

#1621.......... 12/2002 ................. $3700

**Emulsion Polymers**

Emulsion polymer demand in the US will reach 4.9 million pounds in 2006 based on an improved economy and a good environmental profile. Vinyl-acrylics, acrylics and styrene-butadiene latexes will lead gains based on rebounding demand for paint, high quality printing and writing papers, and paper and paperboard packaging. This study analyzes the $3.3 billion US emulsion polymer industry to 2006 and 2011 by type, function and market. It also presents market share data and profiles key companies.

#1595.......... 10/2002 ................. $3700

**World Thermoplastic Elastomers**

World demand for thermoplastic elastomers (TPEs) will grow 6.4% per year through 2006. In addition to displacing competitive materials, TPEs are also being over-molded onto rigid consumer goods to enhance ergonomic or “soft-touch” features. The TPE industry will remain concentrated in the US, Western Europe and Japan, while underdeveloped Asian markets such as China grow faster. This study analyzes the 1.6 million metric ton world TPE industry to 2006 and 2011 by type, market, region and for 13 countries.

#1553.......... 05/2002 ................. $4600

**World Textile Fibers**

World demand for textile fibers will grow 5.4% annually through 2005, driven by solid gains in synthetic fibers such as polyester and olefins. Manufactured fibers will expand their market share over natural fibers. The global fiber industry will continue to shift to the Asia/Pacific region, particularly China, South Korea and Taiwan. This study analyzes the 34 million metric ton world textile fibers industry to 2005 and 2010 by type, region and for 27 countries. It also profiles key firms and evaluates market share.

#1525.......... 03/2002 ................. $4700

**Nonwovens**

Demand for nonwoven roll goods in the US will grow 4.5% annually through 2005. Advances will be driven by consumer and filtration disposables, as well as by nondisposable geotextiles and battery separators. Factors such as product innovation, increased penetration of nonwovens into diapers, and new wiping products will propel market gains. This study analyzes the $3.7 billion US nonwovens industry to 2005 and 2010 by material, product and market. It also evaluates market share and profiles key firms.

#1487.......... 11/2001 ................. $3700

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