

**PolymerPlace Notes**

*A plastics technology newsletter*

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**FEATURE ARTICLE - Pressure on Polymer Prices**

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- Rapid Prototyping and Manufacturing conference is scheduled for May 13-15<sup>th</sup> in Chicago, Illinois

**What's New At Polymerplace**

Two of the principals of Polymerplace will be speaking at ANTEC 2003 in Nashville Tennessee (May 4-8) and NPE 2003, the National Plastics Exposition, in Chicago June 23-27. Maggie Baumann will be speaking on Supply Chain Planning topics and Roger Jones will speak on the evolving Nylon Polymer Industry and "Managing in Troubled Times".

ANTEC is the Annual Technical meeting of the Society of Plastics Engineers and NPE is the triennial exposition sponsored by the SPI (Society of the Plastics Industry). The SPE is organizing the executive conference which is scheduled concurrently with the trade show and is complimentary to all trade show visitors.

For more information on both events, check our calendar of events and/or <http://www.4SPE.org> and <http://www.NPE.org> or <http://www.SPI.org>.

Although we are not speaking, we will be attending the CDMA Meeting in Boston April 27-30, 2003. The CDMA (Commercial Development and Marketing Association) spring meeting title is, "Envisioning the Future: Are you In It?" The meeting features CEOs from Chemical and Plastics companies and Industry Analysts discussing the future of the industry and their advice on how to thrive rather than merely survive in these difficult times. For more information and to register visit <http://www.CDMAonline.org>.

### ***New item!***

Starting this month we will be highlighting a thermoplastic material. This newsletter we will bring the spotlight on LCPs (Liquid Crystal Polymers). For the next 8-10 newsletters we will profile a different material. Please let us know if you like this feature- e-mail us at [info@polymerplace.com](mailto:info@polymerplace.com).

### **Feature Stories**

*Strategic Management for the Plastics Industry* was written by Roger F. Jones, one of Polymerplace.com's founding partners. It was published in September 2002 by CRC Press. Endorsed by the Society of Plastics Engineers, this book covers all of the bases in the plastics industry, from polymer manufacturing, through compounding, distributing, processing – even machinery and additive suppliers are included – in a thoughtful, down-to-earth discussion of the particular problems faced by managers in this industry in running their businesses. Worried about globalization? Can't decide how to staff and organize your business? Do general management texts fail to cover your special problems? Look no further – it's all in here. Order your copy today – use our link to <http://www.amazon.com>.

We've been showing highlights from each chapter in our monthly newsletters. This issue will cover Chapter Four – Company Culture and Organization. The first half of this chapter explains how company cultures become established and how they change as the company grows in size. There are distinct differences noted between such business cultures as entrepreneurial, managerial, commodity, technology, and national/ethnic. One of the specific business cultures that has impacted the plastics industry is that of extractive industries, e.g., oil, gas, and coal, and this culture is described in some detail. Sometimes a company's culture is not appropriate to its success or even its survival and must be changed. A manager must be able to identify and understand the essential differences between different cultures, as well as how to change them when necessary, in order to manage successfully.

The second half of the chapter how to tailor organization forms to business needs, with the advantages and disadvantages of each type of form discussed. The principal organizational forms include functional, product, market, geographical, and hybrid. Different styles of management are next, with special emphasis on how to manage technology professionals to facilitate the maximum creativity and effectiveness. Managers are advised about the best ways to stay informed while avoiding micromanaging; even how to handle whistleblowers is included. The final section deals with the staffing and functioning of boards of directors and shows how important

they are to both privately and publicly held companies. There is even a description of how German company boards differ from most others.

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As we reach the end of March, the plastics markets are in some stages of disarray. Crude oil and Natural Gas prices spiked in the first quarter of 2003 because of shortages caused by the strikes in Venezuela, cold weather in the US, and fears of shortages as the result of the war with Iraq. We anticipate these markets to settle down in 2Q03, but at prices somewhat higher than they were in 2002. This will put [pressure on polymer prices](#) (PE, PP, PS and PVC). We expect polymer prices to settle out in the second and third quarters at levels several cents per pound higher than they were in 2002, maybe as much as 10 cents/lb. higher. This is because profits were extremely low in 2002 and the polymer producers need to regain reinvestment margins.

We are also seeing some polyethylene end use markets (films in particular and some injection molded items) losing out to low priced imports from South East Asia and China. In the case of films we are seeing this occurring primarily in shopping bags. Wal-mart is believed to be importing most of its shopping bags from Malaysia. This represents about 1-1.2 billion pounds. We attribute this move because of significantly lower labor costs in Asia and low cost polyethylene coming in from Saudi Arabia and Iran. We are not seeing significant imports of the volume polymers to the US, because of high freight costs and US tariffs.

However there is still a lot of resistance at the fabrication level to the price hikes. Fabricators are claiming that they cannot pass on these price increases to their customers. Because we believe that the resin suppliers need to have these price increases (most suppliers are operating in the red), fabricators should not accept contracts with their customers that do not include a clause that allows for inflation in raw material pricing.

Note: these comments are from Bill Kuhlke who writes a newsletter tracing pricing and supply trends in volume polymers, i.e. Polyethylene, Polypropylene, Polystyrene and PVC. More information and a sample issue s available through the <http://www.Polymerplace.com> site.

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## **Polymer- Market Trends**

### **Transportation**

#### [DuPont claims first ETP wiper bracket](#)

The 2003 Lincoln Town Car contains an injection molded polyethylene terephthalate windshield wiper bracket, also known as a "nosecone," that DuPont says is the first such part to be injection molded from an engineering thermoplastic. The system, made of DuPont™ [Rynite®](#) post-consumer recycled PET polyester resin, eliminates a significant number of post-finishing operations and reduces weight approximately 10 percent to deliver significant

production cost savings compared to a previous component of SMC (sheet molding compound).

The nosecone, located just below the lower edge of a windshield inside the engine compartment, supports and positions the windshield wiper module and provides a seal against the hood.

A team from Ford Motor Co., Carlisle Engineered Products, Valeo and DuPont Engineering Polymers collaborated on design and engineering for the nosecone, configuring the shape to accommodate under-hood engine packaging requirements. Replacing the previous SMC version also eliminated exposed glass fibers, improving part handling and assembly.

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#### [Battenfeld molding process may open door for PC auto glazing](#)

Small plastic windows are already standard components in motor vehicles. So far, however, economically feasible production of large plastic windows has been no more than a dream for car manufacturers. Heavy glass windows in cars could be replaced with light polycarbonate windows. The total weight of the windows is thus reduced by roughly 40% - 50%, which, in turn, reduces fuel consumption. At the same time the vehicle's center of gravity is lowered, thus improving its road performance. The plastic material's extremely high resistance to impact ensures maximum passenger safety. The well-known problem of sensitivity to scratching in plastic materials is solved by applying a plasma coating to the surface. This part of the development process is contributed by Exatec (a joint venture of Bayer AG and GE Plastics).

In a joint project Battenfeld Injection Molding Technology and Summerer Technologies have now succeeded in developing a system for manufacturing large motor vehicle windows from PC. The impressive production cell consists of a 2-platen HM injection molding machine, a mold optimized for the new IMPmore<sup>®</sup> process, and an ABB IRB6650 robot. This innovative production unit will be presented to customers for the first time at NPE in Chicago.

A core element of this manufacturing system is a new compression-injection-molding process implemented by means of a special mold technology. With the new IMPmore<sup>®</sup> process large, thin-walled components, such as polycarbonate window panes for motor vehicles, can be injection-molded with long flow distances, low clamping force, and low tension.

Another essential part is the Battenfeld HM injection molding machine with a 2-platen module, which, thanks to its construction principle and Unilog B4 control, is ideally suited to this application. This injection molding machine stands for ultimate precision, easy access and short footprint. With its 2-platen module, the machine is equipped with four telescopic tiebars and a large platen area, thus providing easy access for insertion of the mold from the side, and for the removal of bulky molds – both of which

are necessary for the production of large motor-car windows. The HM's hydraulic clamping system ensures a repeatable high-precision compression stroke at controlled speed. The HM 20000 2P/19000 Unilog B4 manufacturing system is also equipped with a screw and cylinder unit optimized for processing transparent PC.

This innovative manufacturing cell represents a great step forward in the development of car windows, which, at the same time, is only the beginning of many more innovative moves. For example, this production cell can be equipped with a 2-component module for molding on seals. A functional integration of lamps and fastening elements is also possible. Another benefit is an increase in scope for 3D design.

For further information contact at Battenfeld: [Hof.K@bmf.battenfeld.com](mailto:Hof.K@bmf.battenfeld.com)  
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[The new 2005-model Ford GT will be equipped with a first-of-its-kind fuel-tank system](#) developed to meet the world's most stringent evaporative emissions requirements.

Designed by TI Automotive, the world's leading supplier of automotive fuel-storage and delivery systems, the unique system includes the latest in fuel system technology and encloses fuel pumps, level sensors and other components inside a blow-molded plastic fuel tank to limit evaporative emissions.

Referred to as a "ship in a bottle" or SIB design, the system was developed to help automakers meet stringent new evaporative emissions legislation, including LEV II and ZEV legislation in California. The Ford GT will be the world's first production car equipped with TI Automotive's SIB technology.

TI Automotive's SIB system for Ford will feature the very latest technology in tank-system architecture, level sensing, fuel management and manufacturing processes, said Brian Lindsay, the company's managing director for global fuel-system sales.

The GT's fuel system uses Piezo fuel-level sensing, SIB component integration to maximize tank volume and a fuel-delivery system that includes two turbine and three jet pumps to feed the GT's 500-horsepower engine, he explained.

The blow-molding technique and innovative fuel-system architecture perfected by TI Automotive enable vehicle manufacturers to take advantage of the widely known benefits of plastic fuel tanks, including weight savings, cost savings and design flexibility, while significantly reducing evaporative emissions from the system. The SIB systems for Ford will be built at TI Automotive's facilities in Ossian, Indiana.

An added advantage of the system is its proven ability to increase the volume of fuel

stored. By putting components inside, the tank can be enlarged to use space previously needed for external components and the tank shell.

The breakthrough design proves that advanced-design plastic-tank systems can deliver the benefits of low emissions, Lindsay noted. Analysts now predict the global use of plastic fuel tanks will increase from about 40 percent today to around 60 percent by 2004.

Further information about TI Automotive is available on the company's website at <http://www.tiautomotive.com>.

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## **Polymer Developments**

### **Spotlight on LCPs**

LCPs are high temperature dimensionally stable thermoplastics materials that sell in the range of \$6.00-10.00 per pound. Liquid crystal polymers form a family of high-performance plastics set apart from other semi-crystalline resins by their long, rigid, rod-like molecules that retain order even in the melt phase. Their unique balance of properties includes a low coefficient of expansion, high flow into thin wall cavities, good dimensional stability at high temperature, and excellent chemical resistance and impact strength. LCPs are highly valued because they are inherently flame retardant. LCPs have a UL V0 rating without use of flame retardant additives.

There are four suppliers of LCPs: Ticona, DuPont, Solvay and Sumitomo. Eastman has recently announced that it will sell its LCP business to Dupont this year.

Ticona, the leading global producer of liquid crystal polymer has announced the 15th anniversary of its Vectra® LCP plant in Shelby, North Carolina (USA). The availability of commercial quantities of Vectra LCP in 1988 enabled customers of Ticona to pioneer a wide range of electronic, medical and other applications since then. Ticona advanced LCP technology by developing grades that perform at high temperatures but can be molded in conventional equipment at relatively low temperatures.

The Shelby plant allowed Ticona to process a broad family of base polymers to create Vectra LCP grades encompassing an exceptionally wide range of properties and processing characteristics. By contrast, other LCP plants typically use between one and three base polymers.

The Shelby plant's initial Vectra LCP capacity of about 4 million lb./yr. was doubled through debottlenecking in subsequent years. In 2002, it was expanded to 13.2 million lb./yr. by adding new process equipment, controls and ancillary systems. A Vectra® LCP compounding line was built in Shelby in 1989. We estimate the worldwide production capacity of LCPs including compounding to be in the 40-50 million pound range.

Vectra® LCP was initially used in Electronic applications. Early electronic applications included chip carriers, sockets, surface mount switches, and 30-, 64- and 72-position single inline memory modules (SIMMs). In addition to their high flow in thin walls and high temperature soldering performance, Vectra LCPs are tough enough that engineers replaced metal latches on SIMMs with integrated LCP latches.

In healthcare LCPs are used in surgical and dental instruments, especially those for minimally invasive surgery (MIS), and finely structured parts in drug delivery systems. Its groundbreaking applications included key elements of MIS staplers, a saphenous vein harvester, and a trocar blade and shaft. These applications capitalized on the ability of LCP to undergo various types of sterilizations, its high melt-flow during molding, its strength in thin walls, and its weld-line integrity.

Ticona has lead in this market in application development.. It introduced the first commercial, melt-processable LCP fiber polymers, lower temperature LCPs that can be co-processed as barrier films with conventional packaging materials, and high temperature LCP grades that process well in conventional equipment. Ticona and Polyplastics Co., Ltd., Ticona's joint venture company in Asia, recently developed Vectra LCP grades particularly well suited for the high temperatures required during attaching surface mount electronic components with new lead-free solders.

The majority of LCP goes into electric and electronic components, such as connectors, sockets, bobbins and switches. It is also used in chemical equipment, medical instruments, motors, business machines, and automotive and aircraft parts, among many other applications.

**For more information**

For information on Vectra® liquid crystal polymer, contact: Ticona, 90 Morris Avenue, Summit, New Jersey, 07901, USA. Phone: 1-800-833-4882 or 1-908-522-7500.

Other supplier sites include: <http://www.Dupont.com>, <http://www.SolvayAdvancedPolymers-US.com> and [http:// www.Eastman.com](http://www.Eastman.com).

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**Process Developments**

Tricon Industries, an insert molder and manufacturer of specialized components for automotive, mobile communications and appliance markets, recently added a certified Class 10,000 clean room to enhance assembly processes. The clean room was added to support Tricon's continuing efforts to drive PPMs to zero.

Tricon's HL-A door and trunk lock switch sub-assemblies are products currently using clean room assembly. During assembly, the sub-assemblies go through several additional process steps such as vacuuming and auditing, and endure rigorous testing to make sure the component was manufactured correctly. To ensure the switches meet tight customer tolerances for performance specifications, both assemblies are tested for torque, continuity and make/break contact angles on the Tricon-developed

tester. The switch components also are measured for mechanical actuation torque and electrical performance characteristics.

For more information on Tricon Industries visit, <http://www.triconinc.com> or call Pat Grandle at 1-630-964-2330.

### **Design-related Developments**

The SME (The Society of Manufacturing Engineers) **Rapid Prototyping and Manufacturing conference is scheduled for May 13-15<sup>th</sup> in Chicago, Illinois.** This conference covers all the latest developments in this fast-changing area. A feature of the conference is joint papers between customers and suppliers. These act as case studies to help the attendee understand the benefit of the various approaches to rapid prototyping, rapid tooling and rapid manufacturing.

An excellent paper which we have had the opportunity to review is “Composite Stereolithography Materials- The Coming Revolution” co-authored by Tom Mueller of Express Pattern and Charles Kaufman of DSM Somos. In this paper the authors review the history of materials available to the rapid prototyping community and the development of new materials which bring us closer to the Holy Grail of rapid prototyping, a rapid prototyping system that can produce parts with the accuracy and material properties of production injection molded parts.

For more information on the conference and to register: visit [www.SME.org](http://www.SME.org).

**References:** The stories in *PolymerPlace Notes* come from a variety of sources including Company Press Releases, Interviews, and newswires.

**PolymerPlace.com**

<http://www.Polymerplace.com>

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