

PolymerPlace Notes

A plastics technology newsletter

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Feature Stories

- [The Fakuma Show October 15-18, 2002- Germany](#)
- [Commercial Development and Marketing Association \(CDMA\) Meeting](#)

Polymer Markets

Transportation

- [Paint films in the automotive industry](#)
- [Electrostatic-coated grille opening reinforcements](#)

Electronics

- [Electronics waste directives \(“WEEE” or waste electrical and electronics, and “RoHS” or Restrictions on Hazardous Substances\)](#)

Material Developments

- [Developmental corn-derived DuPont polyester tradenamed Sorona by DuPont.](#)
- [Xerox license enables Ciba to tailor make polymers](#)
- [RTP Co. granted an exclusive North American license for production of PowderFlo metal injection molding \(MIM\) compounds](#)

Process Developments

- [Ceramic injection molding and extrusion screws](#)

Product Design and Development

- <http://Pu2Pu.com> is a portal dedicated to the polyurethane industry.
- [Select Industrial Design Excellence winners](#)

What's new at Polymerplace

The business atmosphere is still, let's say, cautious...At least that is what we hear from the contacts we have made at the shows and during our project work. This month we attended the Fakuma show in Germany and the CDMA

(Commercial Development and Marketing Association) Fall Meeting in San Antonio Texas. We will comment on them a little later in the newsletter...

We really appreciate receiving press releases from our readers and try to incorporate the information in future newsletters. The target group for our newsletter is the product development community. Please send press releases to mbaumann@polymerplace.com

If you are interested in a free consultation regarding our market research and business development services please contact: 908-832-2207.

Feature Stories-

The Fakuma Show October 15-18, 2002- Germany

The famous German "K" show in Düsseldorf is held every third year; in the intervening two years that the K is *not* held, FAKUMA takes place. The largest regional plastics exhibition in Europe, FAKUMA 2002 in Friedrichshafen attracted over 1,200 exhibiting companies and nearly 32,000 visitors. While German firms made up 75% of the exhibitors, Swiss and Austrian corporations accounted for an additional 13%, raising the total of exhibitors from German-speaking countries to 88%. The fourth largest national group of exhibitors came from Italy. Only two US-based firms exhibited.

The number of new product introductions was restrained, in keeping with the economic climate. Nevertheless, there were several new company alignments that were prominent at the show. The **Ultrapolymers Group** made its debut. Headquartered in Belgium, the firm has subsidiaries and sales offices in Germany, Switzerland, Belgium, The Netherlands, Spain, Portugal, Italy, Great Britain, and Ireland. The company was recently formed by management, a Belgian private venture capital investment firm, and compounder-distributor Ravago Holdings, to acquire BASF's and Basell's small distribution holdings in Europe. In addition to **Basell** and selected **BASF** products, Ultrapolymers also distributes **Nova Chemical's** line of styrenic polymers.

Another corporate realignment that came into public view was **Stamylan**, the **SABIC** subsidiary formed to acquire **DSM's** polypropylene business, including long-glass **Stamax** compounds (the product of a joint venture with **Owens-Corning Fiberglas**).

Among materials highlights, compounder **Romira** displayed the Luranyl™ line of PPE-HIPS blends, newly acquired from BASF. Romira plans to manufacture these materials at its plant near Hamburg in the near future, and will also export them to Asia and other destinations. The line includes glass fiber reinforced and non-halogenated flame-retardant grades.

PolyOne Th. Bergmann exhibited its Petal® line of PET compounds based on recycled PET bottles and its ComPETe® line of color concentrates for PET bottles. The firm also showed its Bergamid® line of PA/sPS blends with optimized properties for a variety of applications.

Combined processing technology continues to dominate the technology development thrust of the European machinery manufacturers, such as the

long-fiber direct compounding/molding process, foam molding, water injection, etc., although much of the technology shown was only incrementally different than that shown at the K show a year ago.

Boy demonstrated tandem molding units. Despite recent extensive flood damage to its plant in Austria, **Engel** exhibited five lines, including its Victory Tech for clean-room production and its Victory Combi for modular configurations used for multi-component moldings.

Some of the most interesting developments were seen at the booths of secondary processing equipment makers. **The Kurz Group**, for example, showcased new machinery for short run decoration and identification, even as little as a single impression. Kurz has made it possible to create a transparent polyester carrier directly controlled by a desktop PC. The transfer is then stamped onto the part, followed by a lacquer layer to protect against abrasion and scratching. Kurz also demonstrated its new line of high-precision feeding and positioning devices that can maintain registration of stamped foils within ± 0.2 mm in both X and Y directions. This technique has also been applied to multiple decorations, such as partially colored, metallized face plates of mobile phones (cell phones in the USA), which Kurz furnishes in the form of foils for in-mold decorating.

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Commercial Development and Marketing Association (CDMA) Meeting – October 20-23, 2002. This organization is focused on providing a forum for discussion of marketing and commercial development issues and strategies. Their members are business development executives from the chemical and allied industries. The Spring meeting will be held in Boston April 27-30, 2003. For more info visit <http://www.cdmaonline.org>.

The theme of the fall meeting was Global Innovation. To illustrate the theme, the Color industry was used as a back-drop. From all the presentations (Solutia, Bayer, PPG, Dystar and Clariant), it was clear that color or “effects” is a great contributor to product design today- whether automobiles, cell phones, appliances or textiles. PolymerPlace has covered this area in recent newsletters regarding color and effects in plastics resin via developments at Bayer, GE Plastics and Dow to mention a few. A lot of development with colors is going on in both the coatings and plastics industry. The next article included in this month’s newsletter is on a different approach to color and appearance technology, paint film.

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Polymer End Use Markets

Transportation

A lot of work has been going on with [paint films in the automotive industry](#). Engineers at Daimler Chrysler predict that within ten years they will be able to make all-plastic-body cars decorated with paint film applied in the mold.

Between developments in ionomer-based paint film allowing a class A finish and a metallic look and research in injection molding of paint films conducted by Daimler Chrysler's Liberty technical group could be just the advances that will allow automobiles to be made differently in the future. Nippani Rao, a senior specialist in exterior plastics for DaimlerChrysler claims that a new plant with a half dozen injection molding machines could potentially eliminate the need for a half billion dollars for a paint plant.

A. Schulman Inc., ExxonMobil Chemical Co., Mayco Plastics Inc. and toolmaker Build-A-Mold Ltd. all worked with Daimler Chrysler on this project. Results of their work was presented during the Society of Plastics Engineers Automotive TPO Global Conference Sept. 30 to Oct. 2 in Dearborn Michigan

The first application of the technology was for white front fascias on the 2002 Dodge Neon. The 2003 model now is ramping up for production of both front and rear fascias in three colors - white, red and yellow tones. There are another seven colors in final approval stage.

Paint film technology represents a major cost savings for Daimler Chrysler reducing production cost by more than \$20 per vehicle.

The ionomer film system consists of four layers of materials coextruded at Mayco of Sterling Heights, Mich. The top layer is a clear-coat protective finish, followed by a color layer - both developed by Schulman. ExxonMobil contributed the "tie" layer, which serves as an adhesive bond between the coating and the final backing layer, produced for the thermoplastic olefin bumper (Polypropylene) fascia. Mayco thermoforms a preform of the bumper skin, which then is loaded in an injection molding press and applied to the TPO bumper in the mold. The final part outperforms painted TPO bumpers for scratch and mar resistance and adhesion of the color and clear coat. It also requires no special tools or techniques for repair.

Schulman and ExxonMobil are looking at the modifications needed to use the film in other body panels, such as doors and fenders, which typically use a different resin combination. DaimlerChrysler and its research team headed up by John Horansky invented the film and in 2000 specified the ionomer system and selected the development partners. The group selected the Neon's fascia because of its difficult shape with curves and deep draws to prove out the concept.

Mayco had to perfect a preform for the skin that would match the final fascia, investing millions of dollars to add new equipment for automating the trim systems for the bumper skins.

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[Electrostatic-coated grille opening reinforcements](#) on Ford's 2003 Expedition and Lincoln Navigator models are now being made from an engineering thermoplastic. This is a first. The structural parts must withstand short-term 376° F oven temperatures without significant dimensional changes. The Ford GORs are injection molded by Venture Industries, Fraser, MI, from a 40%

glass/mineral-reinforced Rynite polyethylene terephthalate developed by Dupont Automotive specifically for this application. The injection-molded Ford GORs provide substantial advantages over components produced using conventional thermoset sheet molding compound (SMC), according to DuPont. There are other GORs produced from PET compounds, the resin maker says, but they are installed after e-coating during the final assembly operations of the vehicle. Venture Industries observes that the GOR is crucial for the fit and alignment of key vehicle front-end components. Essential parts, such as headlights, must stay properly focused and fenders need to line up precisely with the hood.

SMC provides a lower coefficient of linear thermal expansion and higher tensile modulus, according to DuPont, but is more brittle, heavier, and requires greater draft. This necessitates thicker ribs. In addition, SMC cannot incorporate snap fits, replicate complex details, and must undergo secondary operations such as punching, drilling, and milling. GORs made of engineering resins, on the other hand, can use tooling to incorporate complex undercuts, molded-in holes, and capability to employ self-threading screws.

Ticona has also commercialized a 45% glass/mineral-filled grade of its Impet PET that is suitable for e-coating. Ticona has initiated programs with automotive OEMs and their suppliers to develop similar structural applications for the compound, which exhibits DTUL values of 424° F and 471° F under 1.8 and 0.45 MPa loads, respectively.

For more information contact Dupont at <http://www.Dupontautomotive.com> or Ticona at <http://www.Ticona.com>.

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Electrical/ Electronic

The European Commission has reached an agreement to approve the two [electronics waste directives](#) (“WEEE” or [waste electrical and electronics](#), and “RoHS” or [Restrictions on Hazardous Substances](#)). Experts say these directives will become law by early spring 2003.

These far-reaching directives will require takeback of anything with a cord or battery, as well as many gas-powered appliances. It will ban four heavy metals (lead, cadmium, mercury and chromium VI) and three brominated flame retardants. Under the new agreement, these substances must be phased out by July 2006.

It has been estimated these directives will cost electronics makers about \$7 billion per year. Other industry estimates claim it will cost about 40 billion Euros to gear up the infrastructure to recycle all electronics.

While there is high awareness of these directives amongst major electronics and computer makers, observers say overall awareness is low. One UK study found only one in five manufacturers was aware of the impending directives.

The directives do not allow any exemptions for small businesses, nor are there any exemptions for business-to-business transactions. Full financial responsibility will rest on manufacturers or distributors to ensure recovery.

Collection organizations already exist in six European countries. A total of 11 countries worldwide have takeback mandates for electronics, according to research for the Raymond report "Electronics Recycling: What to Expect from Global Mandates". This report is available on the website at <http://www.raymond.com>)

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Material Developments

DuPont and its collaborator, biotechnology firm Genencor International, Palo Alto, CA, say they have significantly raised the efficiency of a fermentation process that produces the monomer for a [developmental corn-derived DuPont polyester tradenamed Sorona by DuPont](#).

DuPont first developed 3GT more than 50 years ago, but because the petrochemical route to its PDO (1,3 propanediol) monomer was too expensive, the company did not commercialize the polymer. The polymer has a blend of properties characteristic of both polyester and nylon. For the past seven years, however, DuPont has been collaborating with Genencor to develop a lower cost route to PDO based on the fermentation of glucose derived from corn.

According to DuPont and Genencor, researchers from both firms have recently combined the DNA from several different microorganisms into one production strain, resulting in a 500-fold increase in fermentation yields of PDO. In addition to its work with Genencor, DuPont is also collaborating with UK-based food ingredient producer Tate & Lyle to develop a large-scale fermentation process for PDO.

Sorona polymer has potential applications in fiber, film, and engineering resins, says DuPont. According to the firm, the polymer is soft, features excellent stretch and recovery, stain resistance, and can be dyed to brilliant colors. DuPont says the Sorona material is being positioned as a competitor to certain grades of nylon. Fiber and fabric licensees include Toray and Teijin in Japan, Far Eastern Textile Ltd. in Taiwan, and Saehan Industries in South Korea.

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[Xerox license enables Ciba to tailor make polymers](#). Ciba Specialty Chemicals says it has obtained a worldwide license from Xerox Corp. Ciba is applying the Xerox technologies to a process called controlled free radical polymerization (CFRP). Unlike other forms of free radical polymerization, CFRP permits precise control over molecular weights, branching, and other polymer properties. The control is made possible by use of polymerization regulators containing nitroxyl free radicals, which affect the way polymers grow and branch. By changing the chemistry of these nitroxyl-based additives, Ciba researchers have been able to create tailor-made polymers. Polymers

generated using CFRP exhibit improved melt flow, impact strength, transparency, and adhesion claims Ciba.

The Xerox technology licensed by Ciba, known as stable free radical polymerization (SFRP), employs nitroxyl-based additives to produce a very narrow range of molecular weights in free-radical-generated polymers. The licensing covers 24 U.S. patents awarded to Xerox and their overseas equivalents. According to Xerox, the SFRP system is especially applicable to polymers such as acrylates, styrenes, and dienes. Potential SFRP product applications, the company notes, include coatings and paints, adhesives, cosmetics, food packaging insulation, automobile and appliance parts, tires, and shoe soles.

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[RTP Co. has been granted an exclusive North American license for production of PowderFlo metal injection molding \(MIM\) compounds](#) from development company Latitude Manufacturing Technologies, Hackettstown, NJ. Latitude Technologies acquired the rights to the Powder Flo product line from Honeywell last year. Under the agreement, RTP gains the rights to commercially compound and sell MIM materials using the PowderFlo trade name.

A golf putter marketed by Ping Inc. is the first commercial application of PowderFlo metal injection molding materials.

RTP will expand its product line by offering MIM feedstocks.

Metal injection molding is exhibiting strong growth. RTP entered the market because of its compounding expertise and the growing interest among injection molders to diversify their product offerings. A key feature of the technology is that PowderFlo products require no debinding. Unlike other MIM binders which require solvent, thermal, or other possibly toxic debinding steps, PowderFlo products achieve their high degree of purity through simple air-drying. Because of PowderFlo's unique binder system (a patented combination of aqueous agar and proprietary additives), the materials can be used to make products weighing over 200 grams with no limitation on wall thickness. In addition, PowderFlo materials can be custom formulated by RTP to meet specific application needs.

PowderFlo products are available in four grades of stainless steel (316L, 410, 440C, and 17-4PH) and two nickel-based super alloys. All are available in 50 lb quantities to truckload. Additional grades of steel compounds, molybdenum, copper alloys, and other metal alloys will be available in the near future. The companies said they will be jointly involved in continued R&D and market development for PowderFlo products.

For Ping Inc.'s golf putter, processor Remington Arms Co. consolidated a stainless steel putter blade and hosel into one part using the PowderFlo products. To further customize the putter, a range of high-specific-gravity compounds were added to the blades' back, imparting a heft to the club that is specified by the individual golfer's needs.

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Process Developments

Battenfeld has formed a strategic alliance to develop [ceramic injection molding and extrusion screws](#) which provide greater wear resistance to highly abrasive compounds than conventional bimetallic screws and barrels. The project is expected to result in commercial components by the end of 2004.

Germany-based partners in the project include the RWTH Technical University in Aachen; H.C. Starck Ceramics GmbH, Selb; and the German Plastics Institute in Darmstadt. In addition to Battenfeld, Dronco AG, Wunsiedel, is involved in injection molding applications. Händle AG, Mühlacker, will build extruders with ceramic-based screws tested by the Institute for Industrial Ceramics in Hermsdorf.

Effort to create steel shafted screws with ceramic components has been tried before and failed due to the lack of tools needed to develop a successful design.

Battenfeld says a key element of designing ceramic screw components involves adjusting their geometric shapes to compensate for the relative drawbacks of these nonferrous materials, particularly brittleness. Tensile stress, for example, must be reduced to a minimum and converted into compressive loads, or a complex module must be broken down into several simple modules to prevent ceramic component failure. Another challenge is to sinter ceramic components to meet tight dimensional tolerances. With computer-aided design software this project was pursued again.

Following FEM simulations, as well as tribological and corrosion resistance testing, the first ceramic components are now ready for production trials.

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Product Design and Development

Launched in April 2001, [Pu2Pu.com](#) is a portal dedicated to the Polyurethane industry.

Through Pu2Pu.com, Polyurethane professionals can access:

- Companies (Foam, Coating, Adhesive and Elastomer Industries),
 - Technical datasheets,
 - Technical articles,
 - Latest industry news,
 - Latest patents.

More than 7,000 links are categorized manually in this unique search engine fully dedicated to the Polyurethane Industry.

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Polymer materials play significant roles in nearly two dozen of the gold winners in the [2002 Industrial Design Excellence Awards](#) competition. The Industrial Designers Society of America of Dulles, Va., and Business Week magazine co-

sponsor the annual contest. We have chosen to highlight a few winners this month. We will cover a few more of the applications in next month's newsletter

Akro-Mils of Akron, Ohio, a unit of Myers Industries Inc., received an award for its well-organized AkroClean janitor cart. A flexible configuration and storage area eases the workload on building and mall cleaners. Structural-web molding is used for the main structure and blow molding for the center-positioned trash cabinet, both of high density polyethylene. The cabinet can accommodate refuse bags of up to 32 gallons, and it offers side access. Two 10-inch-diameter wheels are made of a two-durometer PVC blend, and the four 4-inch-diameter corner casters are thermoplastic rubber. Hubs are a rugged PP that won't dent, mar, fade or stain.

Pearce Research and Design of Woodland Hills, Calif., and **Steelcase Inc.** of Grand Rapids, Mich., won for Steelcase's lightweight Cachet office-chair line. Steelcase approached the plastics injection molding community to implement elements of the concept. Both stacking and swivel models have a balanced-action rocker mechanism allowing an individual to gently recline and gain comfort as the seat flexes on rubber torsion springs. Extensive use of gas-assist injection molding lowers Cachet's weight. The frame is injection molded of glass-reinforced nylon. The seats and slotted backs are made in a two-shot injection molding process on a rotary platen press with glass-reinforced PP for the perimeter frame and unfilled PP for the surface. Steelcase performs final assembly. Four-leg stackable models range from \$300-\$530, and swivel five-caster-based models, from \$500-\$650. Cachet reached the commercial market in January of 2002.

The design firm **Karim Rashid Inc.** of New York won an award for a portable chess set developed for **Bozart Toys Inc.** of Philadelphia. Pop-art circles replace the traditional square grid on the board of injection molded acrylic and screen-printed graphics. The tactile chess figures are molded in a custom-blended thermoplastic elastomer of a soft durometer with a fluorescent pigment. The raised board allows light hitting the table to reflect under the translucent figures, which glow and appear lit. Bozart introduced the \$50 set in October and sold 25,000 in two months. Design-to-market time was five months.

Segway LLC of Manchester, N.H., won for its innovative two-wheel human transporter. HT parts and components consist of die-cast aluminum and several grades of polymers from GE Plastics. Sollx film is applied using an in-mold-decoration process overlaying Xenoy PC/polybutylene terephthalate for the fenders. A 20 percent glass-reinforced Noryl nylon-based blend with modified polyphenylene ether forms the wheels, and a 30 percent glass-reinforced Noryl is used for the handlebars. For aesthetics, Cycloy PC/ABS covers the aluminum control shaft and user interface. A clamp of 25 percent carbon-fiber-reinforced Ultem polyetherimide joins the user interface to the control shaft. And an impact-modified Valox PBT/PC forms the battery housing's halves, which are welded together. The product was introduced in December 2001.

Polymerplace included a story in the March 2002 newsletter about the collaboration among the supplier team brought together to launch the HT Transporter.

References: The stories in *PolymerPlace Notes* come from a variety of sources including Company Press Releases, Interviews, PR newswire and other electronic newswires and trade publications, e.g. *Plastics News*

www.Polymerplace.com

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