

PolymerPlace Notes

A plastics technology newsletter
By Margaret Baumann

Volume 1

August 2000

800.207.7659

Why a newsletter?

This is the inaugural issue of *The Plastics Technology Newsletter*- a service of PolymerPlace.com, the destination for plastics application development.

The Polymerplace.com website was formally announced at a press reception on June 21st during NPE. The newsletter will announce new features on the website and will cover topics useful to you for product development efforts in plastics.

The newsletter is organized as follows:

What's New with PolymerPlace

Feature (periodic)

Polymer market trends

- Transportation
- Consumer
- Medical
- Packaging
- Appliance/Electronics
- All other

New Polymer developments

Processing and finishing technology developments

Tooling

What's New

PolymerPlace.com was launched at the National Plastics Exposition (NPE). We are in the process of building the most inclusive supplier/service directory in the industry. If you are interested in being included in our directory please fill out our registration form found on our website <http://www.polymerplace.com/>

Feature: Here is our take on NPE what was really new...

What was different about this years' NPE? How about the reduced number of domestic tooling companies, the increased alliances between equipment suppliers, and of course, those dot coms? We also noticed cell phones everywhere- in the booths as well as with those walking the show...

A list of more than 2400 industry related web locations was distributed by Plastics News for attendees. Most of the major mold base and component suppliers have active, usable web sites. These sites often include catalogs which are downloadable as well as catalogs on CD-ROM, distribute 2D and 3D modeling and downloading of CA (computer aided) data for their offered components.

Hasco, a mold base supplier, appears to have made a quantum leap by offering 3D Universal (their own CAD module) that yields IDES, VDA, SAT, and STEP data for importation.

Some material highlights included a thermoplastic epoxy/amine (Blox) from Dow a high-resolution UV ink from Diversified and a low sulfur steel from Uddeholm. The Blox material is said to have good processing and chemical resistance (though clarity is not on par with TPX (polymethylpentene) grades). However, this material could be a good offering for low birefringence applications such as handheld portable lenses and screens.

We were surprised at the limited amount of new materials introduced at the show, but historically when advances in process technology are plentiful there are fewer new materials.

For processing, gas-assisted injection molding of silicones was demonstrated by Engel, sandwich co-injection molding by Milacron and a foam cell process by Arburg.

For CAM suppliers, Makuta (a tooling supplier) in alliance with Sumitomo, showcased impressively detailed ultra-micro molded parts. The parts were the size of the text "in god we trust" on the US dime.

JPI Technologies showed exceptionally compact single hot-runner drops with gates tapering down to 0.02 gram shot size (the weight of a large bug?). The tool-a-day demonstration by the PTC, Roundmate and Dynisco alliance showed NPE attendees how to quick-turn a tool.

No big news in injection molding as most companies were focusing on filling in their portfolios gaps in size offerings and a few had high performance electric machines. Battenfeld was promoting the advantages of electric machines by claiming reduced operating costs versus their hydraulic machines.

Engel is the only molding equipment manufacturer to feature all tiebarless machines. Husky had major issues with this and moved away from the concept. The advantage of tiebarless-is increased clearance for large sized molds on small presses, and also clearance for extended slides and external core movement cylinders.

The sandwich co-injection molding press from Milacron (Maxima 1000-ton) first plasticizes a core layer, then backs up the injection unit and reverse fills it with a skin layer from a 90 degree mounted extruder equipped with a cross-head attachment. The union of the two materials occurs when the two materials are injected from a single barrel into a mold. For the show, Milacron injected into a thinwall television cabinet base.

Three companies, which appear to modeling the business strategies of Product Development Technology (PDT from Lincolnshire, IL), are Socem (Portugal), Ideas (Akron, OH) and RCO Engineering (Roseville, MI). The Akron based Ideas looks like a twin, but earlier in their evolution and stress (no pun intended) integrated Pro/E S/W, coordinated tool building capabilities, and design analysis. They stated that they produce 60% aluminum tools and the remainder steel. These quick tools are still expensive, but certainly give a producer a faster introductory product for the market.

On the decoration scene, painting was not represented at NPE, but colorants and specialty pigments showed their hues. Laser etching, pad printing and in-mold decorating were also demonstrated as methods for product enhancement, personalization and durability.

Polymer Market Trends

Transportation

As the automotive industry continues its trend of globalization (i.e. the integration and globalization of the car manufacturing sector), one outcome of this trend is Tier One's becoming Module producers.

The newly merged auto supplier ArvinMeritor is relying on roof modules to help them double their sales in 5 years. The North American auto industry is slowing, with sales expected to either drop or remain steady for 2000 compared to 1999's record of 16.9 million vehicles. Companies that want to expand must find ways to claim a bigger piece of the manufacturing process. Meritor is the only auto supplier with a roof module in production, making a plastic-topped roof for the Smart Car, a European two-seater produced in Europe by a division of Daimler-Chrysler AG. The company has four other development contracts in place, one of those programs to turn into a full production program within a year.

The roof module contains a headliner, a polyurethane composite middle layer for stability and an exterior made of plastic or metal. The Smart Car system contains a polyester and polyurethane headliner, a composite middle layer and an exterior made of layers of acrylic, acrylic styrene acrylonitrile and polycarbonate.

The modules change the way the automakers build a car. Now a roof is welded into place. In the ArvinMeritor system, it is one of the last parts added to a nearly completed vehicle. There are some added benefits to this manufacturing approach

- With no roof in the car, workers can more easily access the interior during production, meaning they can install seats, consoles and instrument panels faster.

- Roof module suppliers can oversee placement of a variety of options, ranging from sunroofs to electronics and curtain air bags.
- Using lightweight materials such as plastics or aluminum lowers a vehicle's specific gravity, making them less prone to roll over in a crash.
- A plastic roof will not interfere with radio and satellite signals that are part of the growing electronic information and entertainment packages offered in vehicles. This will allow the automaker to hide antennas and connections within the roof system.

A JV between a resin producer and a processing company has been formed. Solvay S.A. and PlasticOmnium have just received the go-ahead from the US FTC to create a 50/50 owned company in the sector of automotive fuel systems. The company will be called Inergy Automotive Systems. As a world leader it supply most of the global car manufacturers, such as: BMW, Daimler-Chrysler, FordDaewoo, General Motors, Hyundai-Kia, Peugeot Citroen, Porsche, Renault-Nissan, and Volkswagen. The new company will operate 30 facilities in 15 countries on 30 sites.

It is anticipated that together Solvay and PlasticOmnium will be able to offer better response to customers' expectations in terms of innovation, technical performance, expertise and international development.

Can we expect other analogous announcements between material suppliers and Tier One's?

The automotive industry may be seeing another trend where suppliers actually build niche vehicles for the automakers. This is already happening to a small degree in Europe; the predictions are that a NAO automaker is soon to try this. Suppliers like Magna International are targeting low-volume niche vehicles that are not a good strategic fit in the high volume manufacturing facilities of the OEMs.

The feeling is that they can fill the demand faster and more efficiently and at a higher profit margin because they can better manage the cost of overhead and line changes.

How will the UAW feel about this?

Medical

There is a new technique for sterilization of food and medical products which will soon be introduced to the marketplace- X-Ray sterilization. There are several methods used today in sterilization of food and medical disposables but each has some drawbacks. Not all polymers are stable in the current radiation methods practiced.

Ethylene Oxide- in 90% of the applications using ethylene oxide gas sterilization follow-up testing is required to insure that the sterilization is successful. Results can take up to a week. This is currently the largest single sterilization modality in the medical device marketplace.

Gamma radiation- this method involves a radioactive source in a pool of water. The product being sterilized is typically exposed 30-45 minutes. This method is good for dense products and allows you to sterilize a whole pallet at one time. However the long exposure can cause the polymer to rearrange molecularly imparting different properties than the original material.

E-Beam has developed over the years to address the shortcomings of Gamma. The radiation source scans the product through a window. This is a fast dose resulting in less potential rearrangement or degradation of the polymer. The shortcoming of this method is that E-beam does not penetrate very dense products. Penetration is two-three inches. It is usually impossible to scan a whole pallet.

X-ray is a new process which is a variation on the E-Beam method. The machine converts the energy to X-Rays. This results in a quick dose and a deeper penetration than electron beam. It appears to be the best of both worlds. This method is being introduced by the IBA Group initially to the food industry.

IBA is concentrating on the Food Industry because approximately 5000 people die from Food poisoning a year. The products targeted are Poultry and Hamburger. In the future milk could be sterilized this way...sterilized milk doesn't need refrigeration.

IBA has done some initial testing in Medical applications. One of the potential benefits of this technology is the broader range of polymers that would be available to the designer of medical devices. Unlike Gamma, the X-Rays do not exhibit as much change to the properties of the polymer. Some materials are more susceptible to radiation resulting in embrittlement or yellowing.

Acceptance of this technology could potentially result in a broader choice of materials for medical product developments.

For more information on the process contact Bill Young, Director Steripro Consulting Services at IBA-Group at (630)655-5550 or byoung@iba-group.com.

Jurrius Manufacturing has applied for a patent on a polyurethane film it has developed with Deerfield Urethane that is comfortable and strong for use in making gloves for medical, laboratory, food service and electronics manufacturing . Deerfield and Jurrius say the seam or weld process used to join the material has been demonstrated to be stronger than the material itself. The material is non-allergenic and it does not contain any plasticizers as might be contained in a competitive PVC glove.

Deerfield says people who have used the glove say it is very different from wearing a latex glove and has a nicer "feel".

The gloves have been given the Spectrum brand and are produced by Jurrius Manufacturing Co. in Akron. The polyurethane monolithic film is sold under the Duraflex name. Deerfield Urethane is a unit of Bayer Corp., Pittsburgh. For more information on the film, contact Larry Johnson at 413 665-7016. For information on the gloves, contact Jurrius at 330-762-6877.

Packaging

Graham Manufacturing has quickly grown to be a recognized name in design, manufacture and sale of custom blow molded food and beverage containers. It joins the company of such well-known producers as Owens Illinois and Schmalbach-Lubeca Containers USA. They view themselves as a solution provider for hot fill and custom containers, a rapidly growing market segment. Everybody who makes containers wants to be in the heat-set, barrier PET business. Graham has made inroads into new markets especially in high density polyethylene and PET containers, including an HDPE can for Welch's frozen juice concentrate and Welch's first hot-fill, grippable PET jelly jar. Experts feel that 65% of the bottle market is yet available to PET.

At NPE Groupe Sidel demonstrated for the first time its Actis 20 PET barrier coating technology which treats blow molded bottles in line. Actis stands for amorphous carbon treatment on internal surfaces. What makes the technology unique is that it directly connects the blow molder to the treatment so that bottles are treated in line. Another benefit is that it works with just about any PET bottle application from Beer to ketchup. The vice-president of Global sales stated that "there is a huge potential market –beer juice, soft drinks and other applications that require a better barrier". About 15 systems have been sold since Actis 20 was introduced in April of 1999. Plastipak Packaging Inc. of Plymouth, MI, was the first US bottle manufacturer to purchase an Actis system.

Sidel's US base is located in Norcross, Georgia.

Another sign that the PET preform market is growing rapidly is the entrance of additional equipment manufacturers.

Husky Injection Molding Systems, LTD is the dominant supplier of injection molding presses for PET preforms but others are now entering the market. With Peanut butter, jelly and other applications on the rise, Milacron Inc., Italy's SIPA SpA. Netstal Maschinen AG and Krauss-Maffei are already in the market...the market for PET containers is estimated at 350 billion containers and this does not include the emerging Beer market and new custom containers.

Appliance/Electronic

Cellular phone makers are looking for more sophisticated injection molding solutions to meet the increasing demand for the handsets and reduced life cycles in current models. In a report filed by PRW, annual demand for cellular phones will rise to one billion within three years – that's more than three times the current level. Injection molding machine maker Demag Ergotech has some ideas on how phone makers will meet that demand. Future designs, the company says, will use

body moldings that combine in-mold surface decoration with 3D-MID (molded interconnect devices). This concept was first conceived over 15 years ago. Production volumes of the boards never reached the quantity that made it economical to use injection molding.

The circumstances could be different with cellular phones. The process would involve printing the surface decoration onto the back of the foil, and applying a flexible primer in the shape of the required electronic circuits. The foil would then be high pressure formed to the shape of the mold and the conductor paths built up using either selective plating or metallizing. The formed insert could be over-molded either before or after metallizing depending on the configuration of the phone housing.

A new bill, the Resource Efficient Appliance Incentives Act which was introduced recently is expected to hasten the market introduction of super-efficient clothes washers and refrigerator/freezers over the next decade. While the goals on clothes washer efficiency will have little effect on the plastics industry as the savings are geared mainly toward water savings, the energy savings goals for refrigerators and freezers will result largely from improved insulation.

The Act seeks to reduce the amount of water used to wash clothes by 870 billion gallons, enough says AHAM (Association of Home Appliance Manufacturers) to supply the water needs of every household in a city the size of Phoenix for two years. The Act also seeks to save over 200 trillion BTUs of energy, or the equivalent, again says AHAM, of taking 2.3 million cars off the road or halting six coal-fired energy plants for a year. Appliance manufacturers will be looking to the plastics industry, particularly manufacturers of polyurethane chemicals and systems to develop more efficient foam insulation for food storage appliances. Several polyurethane firms have already been working earnestly to develop these foams. ICI Polyurethanes, now Huntsman Polyurethanes, for instance, announced three years ago that it was developing next-generation appliance insulation materials, called aerogels, based on polyurethane or polyisocyanurate. These are low-density (0.08-0.4 g/cc), air-filled, microporous materials that have low thermal conductivity and were being investigated as possible fillings for vacuum insulation panels used in refrigerators and freezers. The company now markets what it describes as a revolutionary "super insulant" called the VACPAC panel, which is said to provide insulation that is three times better conventional panels.

Bayer AG in Germany has been developing a process for recovering polyurethane fluff used as insulation in old refrigerators and binding it with an isocyanate to produce an open-celled rigid panel that can be used as insulation in new refrigerators with double the insulation capability of standard rigid foam.

The legislation has bi-partisan support and will offer tax credits to encourage appliance manufacturers to produce clothes washers and refrigerator/freezers that exceed the federal minimum efficiency requirements. For more information send e-mail to jnotini@aham.org.

Consumer/Institutional

Building and Construction applications make up over 60% of all vinyl produced. These applications include pipe, siding and windows (largest volume applications).

The growth is practically limitless with housing starts on the rise and the average size of the home increasing the demand for building products and materials. The demand sometimes exceeds the supply. Vinyl building products are gaining in use.

Earlier this year the Vinyl Institute created a meaningful outreach initiative for the Building and Construction market. They rolled out a program called Vinyl By Design. This is targeted mostly at architects, interior designers and other construction industry decision makers. They have assembled a comprehensive resource on eight types of vinyl building products: siding, windows, pipe electrical products, flooring, wallcovering, roofing and fencing, decking and railing. This comprehensive library of information has been developed for a website: www.vinylbydesign.com. In addition they have an education program. Architects will soon be able to take Vinyl Institute courses for credit on line.

This approach came after a comprehensive series of surveys, focus groups and other informal research. While many architects have used and are familiar with individual vinyl applications such as siding or flooring few truly understand the material and its attributes. The misperceptions of vinyl are derived largely from past experience and rarely on environmental concerns. In fact there is little effect of the environmental groups on the application of Vinyl in Building products.

Many architects see vinyl as a substitute for natural materials, a product that they have to settle for because to contain costs. Vinyl can never compete with natural materials among architects who have that bias. But vinyl can challenge the way people look at the design and functionality.

Where we identify initiatives like Vinyl by design we will bring this to the attention of our readers and where possible link to these information sites.

New Polymer Developments....

Dow is applying technology globally to advance resin properties and performance and provide more cost-effective processing and improved end-use performance for a variety of markets worldwide including consumer electronics, appliance, packaging and toys.

The new Styron-A Tech 2220 fills an unmet need in the electronics industry, says Dow marketing manager Taro Fukuzaki. Current trends in electronic manufacturing are toward larger cabinet designs with thinner walls and more intricate design features. The challenge for manufacturers has been finding a resin with the appropriate balance of flow and toughness to meet all these conditions. The new Polystyrene resin has a high melt flow rate of more than 16.0 g/10 min. that allows for easy processing of large, complicated or thin-walled parts, such as TV housings. At the same time A-Tech 2220 resins yield parts with the strength needed to hold heavy electrical components such as large, flat picture tubes and to resist breakage during shipping and use. The resin has a notched Izod impact strength of 2.0 ft-lb. at room temperature.

Electronics manufacturers are moving toward low- and no-paint technology because of the potential for significant cost savings. Reducing or eliminating the need for paint can often save 10% or more in terms of production time and manufacturing costs.

Surface aesthetics are a critical consideration for electronics manufacturers. Styron A-Tech 1300 polystyrene is a benchmark resin created for use with today's state of the art technologies for television and information technology equipment applications.

Styron A-Tech 1400 is a premium grade, high impact resin for use with current and future processing technologies for consumer electronics applications. Both resins are available to customers in the Asia-Pacific. It is being introduced to customers in Europe and will be made available to other regions based on customer needs. A-Tech 1300 offers a balance of toughness, high heat-resistance and high flow which allows for greater design freedom making it well suited for appliance applications such as refrigerator accessories and air conditioners.

New ethylene-styrene interpolymers (ESIs) from Dow Plastics are lowering the limits on achievable density in polyolefin cushion-packaging foams. What is claimed to be the first foam with a density less than 1.0 pcf is commercially available from Sentinel Polyolefins in Hyannis Mass. This is a physically blown film with a 0.9 pcf that reportedly exceeds the performance of typical PE foams and polyurethane foams more than twice as dense.

Wood/Plastic composites are growing quickly. Combining the workability and aesthetics of wood with plastics durability, these new material composites are being used in decking, window profiles and other traditional wood markets.

Composite decking alone could be a \$350 million market by 2005 according to Louisiana-Pacific group. The Portland Oregon wood products manufacturer is building a big wood composites plant in Selma, Al. The first commercial application of wood composites is over 15 years ago. Ford Motor Company bought an extrusion system to produce composite sound-deadening door panels.

Demand for the composites is growing after the construction industry accepted pure plastics in the form of vinyl siding and windows and even more recently plastic lumber. The composite is an ideal way to use wood by-products that would otherwise be landfilled or burned. This is also a steady market for recycled plastic.

A composite producer has to ensure the wood fiber is well encapsulated and environmentally durable. Foamed versions saving up to 30% weight are being developed (thin profiles using nitrogen as the blowing agent injected into a twin-screw extruder. Getting moisture out of the wood is key to making the composite extrusion process work. Wood fiber can contain up to 12% water, which can create problems.

American Leistritz, Extrusion Tech Milacron, Davis and Standard, Krupp Werner Pfleiderer and Farrell are extruder manufacturers which have developed systems to produce wood/plastic composite pellets and even direct to profiles.

Special Technology Developments

Milacron has created a new unit targeting metal injection molding. It has also recently built the world's largest machine for co-injection molding (a 6600 ton Maxima press.)

At NPE Milacron demonstrated MIM on its budget priced small presses, the Vista Edge line. The press was turning out stainless-steel turbine impellers, using a hot runner setup. The new machines include special wear-resistant barrels, screw tips and nozzles.

The co-injection unit built for an unidentified customer in the Midwest, features two injection units with shot capacities of 368 ounces and 413 ounces feeding through a single nozzle through Milacron's patented co-injection manifold.

These two product introductions indicates the increasing interest in metal and ceramic injection molding as well as two material moldings.

Apex Plastic Technologies, Premix and Milacron Inc. (which uses Apex technology for its thermoset injection presses) began a cooperative program last year to give thermoset molders access to the Fuel cell market, a market that is projected to grow by 2 billion pounds of material a year by 2003.

Fuel cells a new technology that could power tomorrow's cars and generate electricity. Fuel cells produce electricity from propane, natural gas or hydrogen, with water and heat as the only emissions.

The bipolar plates in early fuel cells were made of platinum whose cost prohibited them from moving beyond the exotic stage. Current fuel cells are made of machined steel, which is still fairly expensive, or compression molded thermosets, which is a slower process than thermoset injection molding.

Premix developed a special thermoset material through its Quantum Composites division for fuel cell plates. The material called Pemtex must be able to conduct electricity and be corrosion resistant.

At NPE 2000 in Chicago, Apex demonstrated the molding of the thermoset plates on a Milacron Magna injection press.

Bekum America, a blow-molding machinery manufacturer in Williamston, Michigan, has enhanced its monolayer extrusion heads, to produce attractive and low-cost multi-layer bottles. A two-layer parison with PE and PP is formed in extrusion head while a second extruder vertically mounted to a standard monolayer extrusion head is feeding the second layer. The multi-colored bottles that are about 10% polypropylene are contemporary looking bottles that are in demand by makers of upscale beauty-care products.

A thin layer of polypropylene on the outside of the HDPE bottle produces a velvet-like feel. Processors can save money by only tinting the outer layer. In addition regrind from these bottles can be introduced back into the container while keeping the recycling code for HDPE.

Cinpres Ltd. has introduced its electrically actuated nozzle for gas-assisted injection molding-demonstrated for the first time at NPE 2000. This is the icing on the cake for a true all-electric injection press.

The patented new gas nozzle was fitted on a 200-ton Ube injection press. Cinpres is targeting the nozzle to key markets for all-electric presses, such as clean room molding, medical electronics.

Tooling

Two of the leading hot runner manufacturers have launched Internet sites to bring mold makers the latest information with access 24 hours a day.

Husky Injection Molding Systems has launched www.hotrunners.com. Not to be outdone by Husky, Mold-Masters Ltd. has launched www.moldmasters.com. Both companies claim that their

sites will help customers meet requirements to produce molds in four to six weeks compared with the 20-week standard for many molds in 1997.

Companies in the rapidly changing telecommunications industry were a major force behind the change in requirements Husky's system emphasizes the exchange of mold design files and information, while Mold-Masters system will address transaction speed.

Husky's site includes an extensive design center with hot runner guidelines, downloadable computer-aided-design files and file-transfer capabilities. Mold-master's will guide mold-making customers from initial order to completion through on-line automation.

Husky's site launched at NPE 2000; Mold-Master's site will launch this summer.

Hot-runner controls provider American MSI Corp. is launching its MSI Cell-Net technology to make the world a little smaller.

"We want to take the roof off manufacturing plants, and let customers go live to the plant from anywhere in the world," said American MSI Chief Executive Officer Timothy Triplett.

The Moorpark, CA., company believes its system is the first that provides instant connectivity to presses globally. Triplett envisioned engineers from many parts of the chain-Material suppliers, toolmakers, processors and their customers- linking by computer from offices around the globe. "You won't have to fly them to the plant, and you'll have no expenses for travel," he said.

Visitors to American MSI NPE booth could view the Nypro presses at the plant. Sumitomo Plastics Machinery also exhibited the technology at NPE, although Triplett said the package is available to any press supplier.

Cell-Net monitors press temperatures, chiller controls, and blenders down to the mix of colors or additives. It looks at conveyors and robots.

It also can download drawings, material data sheets and other information needed to solve a problem or bottleneck.

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