Growing insulation markets – energy efficiency for a sustainable world

Adidas take athletic performance to the max with TPU film

Latest news on REACH
Innovation: the lifeblood of our business

Tony Hankins, President, Huntsman Polyurethanes

Welcome to the first issue of our new, yet long established, customer newsletter. Some will remember that we published PU Review through the 1980s and 90s, but discontinued the newsletter in 2004 because of the growth in popularity of online media. Since then, we’ve received many enquiries from our original readership base to relaunch the publication, so here’s our response, “back by popular demand” you could say.

The aim is the same: to give existing and potential customers, industry groups and academic bodies, the media and others who are interested in the world of polyurethanes, a flavour of the many new developments going on in Huntsman Polyurethanes, with a particular focus on technology innovation – the lifeblood of our Business. You’ll see as you read the stories in this issue that much of this innovation has a strong environmental driver and the main feature focuses on insulation – a key contributor to improved energy efficiency. There’s no doubt that these are exciting times for the Polyurethanes industry and I trust that the newsletter reflects this and hope it stimulates new ideas for you.

New Asia-Pacific Technology Centre opened

Huntsman has opened a new Asia-Pacific Technology Centre (ATC) in Shanghai’s Minhang Development Zone, giving regional customers direct access to a world-class technology innovation resource. The new Centre will initially accommodate research and technical experts from Huntsman’s Polyurethanes and Performance Products divisions, with the number of specialists expected to expand rapidly over the next few years. The ATC team will draw on the expertise of its counterparts at Huntsman’s Technical Development Centres in Europe and the USA, to speed the introduction of new technology platforms into the Asia Pacific Chinese market.

The company’s team of regional specialists will provide extensive developmental and testing support to customers, providing custom-made solutions for Asia Pacific markets on a quick and efficient basis.

Further details about the Centre and the September 2nd official inauguration will be covered in the next issue of PU Review.

New applications for biorenewable lignin

Huntsman and Lignol Energy Corporation of Canada have signed a memorandum of understanding to jointly develop new polyurethanes applications using bio-renewable high purity lignin HP-LTM.

Lignin, an agricultural by-product, is one of the three key constituents of wood, together with cellulose and hemi-cellulose. It is a highly functionalized and cross-linked aromatic material with potential to enhance performance in a wide variety of polyurethane applications.

“This agreement shows Huntsman’s continuing commitment to investigate the use of bio-renewable components – both for feedstock and for product applications”, says Niek Van Wiechen, Huntsman Polyurethanes Global Director for Core Science.

Polyurea association launched

Huntsman has played a leading role in the creation of the Polyurea Development Association Europe (PDA Europe), a new industry body set up to manage polyurea issues related to standards, EH&S education and REACH.

Marc Broekaert of Huntsman’s Business Development – Coatings Europe group has been elected first President of PDA Europe. He comments, “Creating a professional industry association committed solely to the needs of European polyurea formulators and users meets a long-standing requirement in this fast growing market.”

The association will have close working links with its sister-organization, PDA Americas (founded in 1999). PDA Europe’s next conference will be held November 18-20 in Vienna.
**Environmentally friendly floor coatings**

Huntsman Polyurethanes with its MDI technology and Alberdingk Boley with its environmentally-friendly polyols have joined forces to provide customers with new coatings solutions for industrial flooring.

In addition to environmental friendliness – Alberdingk Boley’s polyols are based on renewable castor oil and therefore 100% VOC-free – these solutions include increased toughness, ease of application and flexibility.

The Huntsman and Alberdingk Boley solutions impart toughness and longevity by providing elasticity and high performance impact and abrasion resistance properties; they provide low viscosity and advanced self-leveling properties to make application quick and easy; and coating curing period and pot life can be shortened or lengthened to suit type and complexity of application.

The two companies offer customers flexibility in that the products can also be tuned to provide different types of coating hardness. For example, soft for sporting halls where athletes absorb high impacts, medium for shopping malls where a balance is needed between comfort and longevity, and hard for warehouses where durability is the prime requirement.

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**Low-VOC steering wheel developed for Perodua cars**

Huntsman, working with Taiwan-based component supplier GSK, has achieved commercialization of a new, low-VOC (volatile organic compound) polyurethane steering wheel for Malaysian car manufacturer Perodua.

Wee Yoong Lee, Business Development Manager for Automotive in Asia, said: “We are delighted to have displaced an important MDI competitor in this field. Further promising trials will likely soon lead to new sales at other car companies in Malaysia and Thailand.”

Perodua, which is Malaysia’s second largest car company (250,000 vehicles per year), was founded in 1994 as part of a joint venture partnership with Daihatsu and Mitsu of Japan. Perodua cars are sold in more than 10 countries outside Malaysia, including the UK. Its MYVI model has won several Asian Car of the Year awards.

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**Collaboration to introduce MDI-based MDF panels in China**

Chinese market response has been extremely positive to the introduction of MDI-based MDF (medium-density fiberboard) panels for furniture-making by Huntsman and panel maker Dongying Zhenge Wood Industry Co Limited.

Most MDF panels in China are currently bonded with formaldehyde-based resins. MDI offers many extra benefits, such as reduced formaldehyde emissions and superior physical properties, such as higher internal bonding strength and lower thickness swelling.

Dongying Zhenge launched the new panels at the last China Wood fair in Beijing. The company is now working hard to meet growing market demand for these top quality panels.

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Growing insulation markets – energy efficiency for a sustainable world

With oil prices at record levels and greenhouse gases threatening to destroy the planet, the opportunities for energy-saving insulation are immense. PU Review spoke to Nick Webster, Vice President Europe for Huntsman’s Polyurethanes Division (and responsible for the Insulation market at division leadership team level), to obtain his perspective on why rigid polyurethane insulation foam in particular is making and will continue to make such large contributions to sustainability.

PU Review: What has changed in the world to spur the growth of building insulation in the last few years, and what has been the impact?

Nick Webster: One major change is that insulation growth is no longer driven by construction industry demand, but rather by the energy markets. Two dynamics are at work there – the increasing scarcity/cost of energy, and growing pressure to reduce global warming caused by the use of fossil fuels. Every key world region has reason to focus on insulation. China and India, for example, are having difficulties finding enough energy to fuel their growth. In Europe and North America, the issue is their extreme dependency on imported energy. All these factors have led countries to put energy very high on the political agenda. Several countries and regional organizations such as the European Union have already adopted legislation on energy efficient buildings. What’s more, this legislation continues to grow ever stricter, and will soon extend to areas like Eastern Europe and the developing world. National commitments to the 2020 Kyoto Protocol will play a larger role in future demand for insulation, too.

PU Review: Why is so much focus being given to improved insulation in construction as a major part of the solution to the energy problem? Shouldn’t focus also be given to other measures such as alternative sources of energy?

Nick Webster: The case for focusing on building insulation is very strong. Half of our energy is used in buildings. Heating energy demand in existing buildings can be reduced by 30-50% through retro-fitting insulation – and in new buildings, it can be reduced by a staggering 90-95%! While it is true that insulation should not be looked on as a total solution, according to recent McKinsey reports, building insulation is the least-cost option for reducing CO2 emissions. All energy measures can increase a country’s energy security – but a focus on building insulation also tends to drive economic growth by creating many new jobs in construction, typically a large sector of economic activity.

PU Review: Has growth in insulation been driven by factors other than construction?

Nick Webster: Yes, there are several other trends at work. First, the growth in urban populations means that huge investments...
must be made in storage, transportation and processing of perishable foods under controlled temperature conditions. This increased demand for cold storage requires insulation. Second, increased energy demand requires substantial investment in the supply infrastructure – via more pipelines or liquid natural/propane gas vessels, both of which require extensive insulation. Finally, the growing middle classes (India, for example, already has a middle class of 200 million) continue to want increased comforts, including more home heating and cooling. That, in turn, increases energy bills and the demand for insulation. This is true not only in new houses but especially in the huge home renovation area.

**PU Review:** How do polyurethanes compare against competitor products in the insulation market?

**Nick Webster:** Among the main options available today – mineral fiber, polystyrene and polyurethane – polyurethane offers the most efficient cost/performance solution. Polyurethane really comes into its own when anything more than the most basic insulation performance is required. This creates an excellent outlook for polyurethanes, not only because the overall insulation market is growing but because the demand for high efficiency insulation is weakening the position of non-polyurethane competitors. Polyurethane today only has about 8% of the European insulation market. The EU represents a huge market opportunity – and that’s part of the reason why many of our customers are achieving high growth rates. Stricter legislation and increased home renovation will continue to play a critical part in this growth.

**PU Review:** What are the main challenges you face to ensure that polyurethane continues to grow in the insulation market?

**Nick Webster:** In construction, the largest section, our main challenges include continuing to advocate for effective energy-saving legislation; implementing expanded awareness campaigns on the benefits of polyurethane insulation in buildings; and introducing new technologies, such as increased fire resistance, to open up ever larger markets.

**PU Review:** Can you give examples of how and where you are working on advocacy and public education for polyurethane building insulation?

**Nick Webster:** In China, we are working not only directly with the government and building institutes but also with building contractors, who play an important role in the development and design of insulation systems, as well as in the final construction. In North America, many of our representatives contribute actively to the work of key trade associations such as such as the Center for the Polyurethanes Industry (CPI), the Polyisocyanurate Insulation Manufacturers Association (PIMA) and Spray Polyurethane Foam Alliance (SPFA). In Europe, currently our largest market, we are key members not only of European Union-level organizations such as the European Diisocyanate and Polyol Producers Association (ISOPA) and the Federation of European Rigid Polyurethane Foam Associations (BING) – but we are also founding members of national organizations such as IVPU, the German industry association for rigid foam producers. The activities of these associations can be measured. For example the use of polyurethane foam for insulating flat roofs in Germany has grown by around 150% in the three years since the IVPU was created!

**PU Review:** Finally, how are you organized internally to best leverage the skills and experience of your people, in addressing the polyurethanes insulation market across the globe?

**Nick Webster:** A couple of years ago we created a global group within the company called the Insulation Advanced Growth Platform (IAGP), to manage and coordinate the company’s efforts to grow the market for polyurethanes insulation. The Chairman of the Team is Rob Helwick, Director Americas Region Rigid Systems. Other members are Steve Hubrecht Commercial Director Rigid Europe; Su Bingli, Commercial Director China Insulation; and James Barlow, Performance Director Europe. The IAGP was created as a means to collaborate between our world regions, to create insulation growth over and above what would naturally have been achieved. The team is operating very successfully.
Adidas AG, a global leader in the sporting goods industry, has developed a pioneering new body-suit designed to maximise an athlete’s performance, using TPU technology from Huntsman Polyurethanes.

TECHFIT POWERWEB® which is manufactured by US extrusion specialists Bemis, was developed to harness the intrinsic power in the human body and improve an athlete’s performance. The body-suit is made from an elastic base fabric with a special two-layer TPU film coating. This unique combination provides excellent directional stretch and energy return to support athletes’ movements, maximising the use of energy produced by the body during exercise.

The suit’s two-layer TPU film consists of two bespoke grades of Huntsman’s IROGRAN® TPU. The top layer was selected for its exceptional adhesive properties, ensuring the suit has excellent washability and dry clean resistance throughout the garment’s lifetime.

**Suits amplify muscle movements**

Dr. Berthold Krabbe, team leader apparel of the Adidas Innovation Team (AIT)*, said: “The suit provides dynamic support by containing and amplifying muscle movements and linking key joint and energy systems together. Following extensive research into the biomechanics of top sprinters, football players, and other athletes, and the effect of movement on muscle compression in key areas, we developed this new technology based on Huntsman’s IROGRAN® TPU. Research and testing done by independent universities like the Human Performance Lab of the University of Calgary (Alberta/Canada) showed a performance increase for sprinting speed (1.1%) jumping (4%) and endurance (0.8%). Additionally, very positive feedback from top athletes and leading experts had been received. The first prototype of the suit was used by Kim Collins when he became 100m World Champion; today top athletes like Jeremy Wariner and Tyson Gay, Kaka and Michael Ballack, Dan Carter and Reggie Bush perform in these suits.”

The technology works by wrapping bands around key areas of the body—for instance, just above the knee. This harnesses the power of the muscle and links it through the back of the thigh to the abdominal muscular system – the real power centre of the body.

**Optimised elasticity is key**

Berthold Krabbe explained: “The crucial benefit of TPU is its optimised elasticity; once stretched, it always returns. This means the kinetic energy of the athlete’s movements is constantly stored and released through the elastic behaviour of the TPU. As a result athletes have increased joint power, better posture, improved feedback for more accurate movement and they can also experience faster recovery times due to increased blood circulation.”

The new technology has significant benefits for manufacturers as well as end-users. Existing products can require multiple seams to join the various sections, which can be labour intensive and relatively complicated. The new two-layer TPU film can easily be laser cut into any shape and applied to the LYCRA® fabric by simple heat pressing, making the manufacturing process far more efficient and cost-effective. The end-user also benefits from increased wear comfort due to the reduced number of seams.

**Huntsman’s broad TPU technology platform**

Berthold Krabbe continued: “Huntsman’s TPU expertise was key to the success of this project. Huntsman Polyurethanes has one of the widest technology platforms in TPU, so the team could offer just the right materials. Their contacts were also vital, as they very quickly put us in touch with Bemis for co-extrusion of the TPU.”

Dr. Krabbe concluded: “In today’s sporting arena, the difference between first and second can be just milliseconds. Although we cannot make athletes better than they are, with this technology we can help optimise their performance, potentially giving them that winning edge.”

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Huntsman on track with REACH

The new EU REACH legislation (Registration, Evaluation, Authorization and Restriction of Chemicals) affects all manufacturers, producers of articles, importers and downstream users of chemical substances. Any company not complying with REACH in the future will not be permitted to manufacture or import chemical substances into the European Union (EU).

Over the last few years Huntsman has been actively preparing for REACH. On June 1 Graham Knaggs was appointed Director REACH for the company and PU Review interviewed him on the project's status:

PU Review: How is Huntsman doing in complying with REACH?

Graham Knaggs: Huntsman recognized the magnitude of this issue a long time ago and assembled many teams of highly dedicated professionals to oversee compliance and implementation, as well as to advise customers and suppliers. As Director of the REACH project for Huntsman since 1 June 2008, I am very pleased to see that the company is very well prepared. Indeed we have just set a number of internal deadlines aimed at completing our pre-registration activity a couple of months before the official year-end deadline.

PU Review: Can you please explain pre-registration?

Graham Knaggs: We have just entered the first critical period of REACH – called pre-registration – which runs until 1 December this year. During pre-registration, we have to identify all the chemical substances we import or manufacture within the EU (as do our EU customers and suppliers). This has involved significant resources to collect manufacturing, sales and inventory data for the last three years. We then had to identify the raw materials used here to create our final list – a huge task. We also have to ensure that our raw material suppliers do the same.

PU Review: Presumably pre-registration is followed by registration?

Graham Knaggs: Pre-registration is just the start of the full REACH process which will run until May 2018. Full registration for substances comes next, and this involves the assembling or creation of analytical and toxicological data – a key task for Huntsman scientists. During this activity we will join various Substance Information Exchange Forums (SIEFs) with other companies who manufacture or import the same or similar substances, to share data and agree on any additional work required.

PU Review: Where do our customers fit in?

Graham Knaggs: Our EU customers also have obligations and responsibilities within the REACH legislation. At a minimum, they have to advise their raw material suppliers – including Huntsman – regarding the end-use of their products which use our substances. Suppliers then have to provide significantly enhanced advice and information on the safe handling and use of each substance for that application. Our non-EU customers may believe that they are not affected by the legislation, but if they have agents or distributors who are importing into the EU then they will also be affected – and should check.

PU Review: What is the main challenge going forward?

Graham Knaggs: We have made an excellent start with our pre-registration activities, but we will have to change gear towards the end of the year to ensure that we are prepared for the ten-year marathon of data sharing and full registration. At Huntsman we treat REACH as business critical in the sense that it affects our license to operate. We will therefore dedicate all the energy and resource needed to ensure complete success.

Key dates
December 1, 2008 Pre-registration completed
December 1, 2010 Registration completed > 1,000 tonnes/year
June 1, 2013 Registration completed 100 – 1,000 tonnes/year
June 1, 2018 Registration completed 1 – 100 tonnes/year

“We will dedicate all the energy and resource needed to ensure complete success.”
New phthalate-free, soft TPUs launched in Americas

Huntsman Polyurethanes has introduced two new grades of patented, unplasticized, soft thermoplastic polyurethanes (TPUs). IROGRAN® A60E4902 polyester grade (Shore 55A hardness) and IROGRAN® A65P4910 polyether grade (Shore 65A) achieve very soft Shore hardnesses through the chemistry of their formulations rather than by the addition of plasticizers or other modifiers. This makes them ideal for PVC replacement in extrusion, molding or film applications where the presence of phthalates or other plasticizers may be an issue.

Bockmühl Kabel, a leading manufacturer of niche, high performance sensoric and automotive cabling solutions, is realising significant production efficiencies during manufacture of its range thanks to A85P4380 – a special grade of thermoplastic polyurethane (TPU) from Huntsman.

Huntsman’s A85P4380 TPU ensures reduced start-up wastage and provides excellent dimensional stability. This enables Bockmühl Kabel to run its production lines at maximum speed without distorting the cable, thereby increasing manufacturing output, minimising costs and ensuring increased coil capacity.

Another unique feature of Bockmühl Kabel’s cabling solutions is the non-adhesive, matt finish created by Huntsman’s TPU; as a result, cables move freely and end-users benefit from much simpler, and potentially more cost effective, maintenance.

Further Schmidt, cable construction manager for Bockmühl Kabel, said: “As a niche manufacturer it is crucial that we can quickly and efficiently swap between production runs. Huntsman Polyurethanes A85P4380 TPU offers fantastic flexibility and ease of use”.

Rheology study in polyurethane rigid foams, by Lifeng Wu, Janine Van Gernert, Rafael E. Camargo.

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