

Dimensions

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Going global with innovation

Delivering a competitive advantage where you need it



Mark Mendelson, Head of Business Communications

Global is where we are. Innovation is how we grow. And to be both is, in today's marketplace, not an option. It's essential.

In this increasingly competitive, globally challenging environment, our customers need to do it all. Delivering cost-effective, enhanced product performance to a consistent set of specifications – anywhere and everywhere in the world – is the new mantra.

Ultimately, it's all about providing what you need, where you need it. With more than 50 state-of-the-art polyolefins production facilities located throughout the world, LyondellBasell can help – whether you are operating in the established markets of Europe and North America, or in the fast-growing markets of Asia and South America.

By continuously redefining and expanding product performance through our world-leading polypropylene, polyethylene and advanced polyolefin process technologies and catalysts – and by building upon our ability to serve customers both locally and globally – we bring innovation to a worldwide level.

In our advanced polyolefins business, for example, the global reach of our polypropylene compounding facilities is unmatched by other producers. To further enhance our worldwide market leadership position in the automotive sector, we will continue to strengthen our capabilities and assets in the regions where our customers are investing, and where we see high demand for our quality materials and services.

We recently announced plans to expand our global polypropylene compounding capacity to 1.2 million tonnes per year by the end of 2009 – a growth rate of over 30%. In the coming months, new plants are scheduled to come on-stream in Altamira, Mexico and Guangzhou, China. We are also considering additional plant investment options in Saudi Arabia, Russia and India.

In this issue of **Dimensions**, you'll discover numerous examples of LyondellBasell's product innovations, and how they have delivered essential value to our customers around the world, with a focus on the pipe, automotive and packaging sectors.

In order to help us provide you with the information you need to succeed, we will be conducting a survey of our **Dimensions** readers. In this issue, you will find a one page survey, which contains a few questions about our customer magazine. Your feedback is very valuable to us, and we hope that you will be able to take the time to tell us your thoughts.

A stylized, handwritten signature in black ink, appearing to read 'Mark Mendelson'.

Mark Mendelson



Global leader follows customers worldwide

Acknowledged as a global leader in its sector, LyondellBasell's advanced polyolefins (APO) business continually targets opportunities to extend the products and services it offers to customers. As Senior Vice President, Advanced Polyolefins, Paul Yeates tells **Dimensions**, APO is currently implementing a strategy to grow and further strengthen its operations based on a global supply platform and a capacity for innovation.



Paul Yeates – Senior Vice President, Advanced Polyolefins

Can you give us a thumbnail sketch of the APO business?

Advanced Polyolefins is one of Lyondell-Basell's key value businesses. We have three segments: Polypropylene compounded materials and alloys (PCMA), *Catalloy* process resins and polybutene-1 (PB-1) polymers. Today, we produce around 1.5 million tonnes of advanced polyolefins a year at 18 plants, but within two years this will be increased to 1.8 million tonnes through a combination of new plants and acquisitions.

Currently, about 10% of our revenues are generated in Asia Pacific, so clearly our strategy is to increase sales in this region to 25% of our total revenues during the next 10 years. While we are consolidating and strengthening activities

in Europe and the Americas, the focus on Asia Pacific reflects the fact that this is where the future growth is occurring.

Does that explain why you personally are located in Hong Kong, which is where the global APO business is newly headquartered?

We have very strong businesses in Europe and the Americas, and we are still consolidating and growing our operations in both of these regions. Asia Pacific is an extremely dynamic region, in terms of growth opportunities and challenges. It's a real advantage for me to be based in this region, particularly in terms of understanding the dynamics and leading a team that is driving accelerated change. Any global business faces time zone challenges, but by being headquartered in Asia Pacific we're underlining our commitment to take this business forward.

How easy is it to recruit the talent you need in Asia Pacific?

There is great competition, particularly in China and India. But there are very talented people in Asia Pacific and we've been developing a strategy to both attract and retain new people, and not just newly-qualified engineers, but also marketing and sales experts. I can also say that it's much easier being based here, so we can work closely with our human resources team.

To what extent is globalization of industrial sectors and your customers driving APO's expansion in Asia Pacific?

The figures tell the story. Next year, car production in China will overtake Japan. Two years ago, China produced six million cars. In 2009, China will produce more than 10 million cars. Korea produces about four million cars a year, but will be overtaken by India by 2012. We are seeing a real paradigm shift, particularly in terms of China and India.

We also need to remember that production in both Japan and Korea will continue to grow, albeit more slowly, and that the changing geography of the automotive sector reflects the globalization of companies headquartered in Japan and Korea, which are building plants outside of their own countries.

Between 25-30% of our PP compounded products are used in electronic and electrical appliance applications, which – like automotive – have seen a shift in demand growth to Asia Pacific and also to Eastern Europe.

Having achieved clear leadership in global compounding, how are you planning to consolidate and strengthen APO's position?

We have approximately 900,000 tonnes of PP compounding capacity globally, and our target is to grow that – organically and by acquisition – by 30% in the next two years.

We have already announced the purchase of Solvay Engineering Plastics' PP compounding business, which is US-based and about the same size as our existing North American business. That consolidates our position in North America, making us a leading player in that field. Integration is going well and we're very excited about the potential. There weren't many overlaps between our two businesses and our customer base is highly complementary.

We are also starting up a new PP compounding facility in Altamira, Mexico in July of this year, and will be expanding our manufacturing capacity in both Brazil and Argentina.

Overall, we will have 18 compounding plants within two years. A new facility will start up in Guangzhou, China in September. In addition, our Saudi Polyolefins Company joint venture is currently constructing a new compounding plant in Damman, Saudi Arabia. We are also

considering additional plant investments in Russia and India.

So wherever LyondellBasell's customers expand, you ensure the APO business keeps pace in terms of supply, cost and quality?

Yes. We go wherever our customers are operating. By following them, we have built up a production and supply platform that is unique in the industry.

It means our customers can get the same grade everywhere to meet the requirements of their global platforms. Consistent high quality is essential to success, especially in the automotive industry. By providing high and consistent quality products on a global basis, we can help our customers to take costs out of their value chain by reducing expenditures required on certification and variance. Consistency of quality on a global basis is at the heart of our customer value proposition.

Polybutene-1 has been very successful, particularly in the specialized pipe and packaging markets. What plans do you have for this business?

This is a niche business. It's very exciting. We're already expanding capacity at Moerdijk, The Netherlands production facility, and expect to have a second plant operational within five years.

Optimally, we would like to locate the plant in Asia. We're confident that whether we build in Europe, North America or Asia, we have a global supply chain to meet the needs of our specialized customers wherever they are located.

LyondellBasell's heritage includes a very long and strong commitment to innovation. Are you maintaining that focus?

Absolutely! While we're investing in new plants to extend our global reach, we're also investing to extend product applications for polypropylene and to help our customers reduce costs and boost environmental performance.

For example, we are working on new compounding solutions to help reduce weight. One customer is targeting a 30% reduction in bumper weight and we're very confident that, by working together, we'll get there.

But we're looking to reduce the weight of all automotive parts – and those using our products in other applications, such as electronic and electrical appliances. Less weight means less cost, as well as lower CO₂ generation through lower fuel consumption on the road. We believe we can reduce overall weight of automotive parts produced with PP compounds by 10%, which equates to 3-5 kg/car. That's a lot of money at the end of the day.

We are also looking at substituting other thermoplastics and engineering resins, as well as replacing steel and other metals. Our estimate is that we can reduce overall weight by 15-20 kg/car.

So the mantra for innovation is "lighter, stronger, safer and more cost efficient"? Is there a similar focus on aesthetics and product processing advantages?

Our *Softell* family of products, which is part of the *Catalloy* process resins range, is a good example of this. *Softell* resins are being added to compound recipes that help customers produce parts that have previously been made with ABS. Not only do these compounds replace ABS, but unlike ABS, they do not need painting, which saves a manufacturing step and significantly reduces costs.

Application examples include glove box covers, which require a certain aesthetic touch, and the middle console where gear change location means there is a lot of hand contact, and feel is important. We have certainly developed a new range of resins that are creating great interest because they are replacing more expensive thermoplastic resins.

Can you sum up the value APO brings to its customers?

The key to our value proposition, "Driving for Success", is our ability to offer tailor-made innovative solutions which help our customers take cost out of their value chain. Coupled with this is our industry-wide global reach position, which allows us to offer global grades with the same consistent product quality everywhere.

World's largest plants prepare to come on-stream

Located in Al-Jubail, Saudi Arabia, the two plants will be highly competitive sources of HDPE and LDPE resins for the Asian and European markets.



Hostalen ACP and Lupotech T process plants under construction at Al-Jubail

Lupotech T – a broad grade slate on a single reactor

The *Lupotech T* process is the most popular tubular reactor technology for LDPE production. Since 2000, more than 15 production lines have been licensed globally, with a total licensed capacity of more than seven million tonnes annually. The *Lupotech T* process produces materials that can be sold at a premium over standard PE resins and the process covers the entire range of melt flow rates and densities, including vinylacetate copolymers (EVA). The process is extremely versatile and fast grade changes ensure that the amount of off-grade material is kept very low, allowing a broad product slate to run on a single reactor.

"These plants represent the state-of-the-art in current polyethylene process technologies," said Manuel Fraga, LyondellBasell Vice President of Africa and Middle East Operations. "The scale of production – each has a nameplate capacity of 400 KT per year – and the ready availability of local feedstocks will place them among the most competitive PE production assets in the world."

The two plants are being built by the Saudi Ethylene and Polyethylene Co. (SEPC), a joint venture between LyondellBasell and two local partners, Tasnee Petroche-

micals and Sahara Petrochemicals Company. Located at Al-Jubail Industrial City, on the east coast of Saudi Arabia, the two plants will use LyondellBasell's leading *Hostalen ACP* and *Lupotech T* technologies for the production of HDPE and LDPE (see boxes).

"The flexibility of these PE process technologies will allow the plants to produce a wide range of value-added PE resins to satisfy demand in Asian markets as well as Europe," said Fraga.

The facilities are scheduled to come on-stream towards the end of this year.

Hostalen ACP – high performance from pipes to packaging

With over six million tonnes per year of installed capacity, the *Hostalen* process is a leading bimodal slurry HDPE technology. The development of the Advanced Cascade Process (ACP) has further extended its range and efficiency. Multimodal resins produced using the *Hostalen ACP* process offer a combination of mechanical product properties and pro-

cessing behavior not achievable with conventional HDPE. The technology enables producers to address market requirements ranging from thin-wall packaging to needs for higher crack resistance in pipe applications. The first world-scale *Hostalen ACP* plant began operations in Germany in 2004, followed by another in Poland in 2005.

Kuga breaks new ground with PP body panels

The use of advanced polyolefin resins in body panels is a first for Ford's new crossover model.



Ford Kuga roof spoiler and tailgate outer panel produced using *Hifax* TRC 280X

Among the many innovative features of Ford's new crossover model is the use of advanced polyolefin materials for two prominent body elements – the roof spoiler and the tailgate outer panel. The two components are molded in a talc-filled grade, *Hifax* TRC 280X.

Cost and fuel savings

"With respect to steel – or even engineering plastics – the *Hifax* material delivers

significant cost and weight-savings, which translates into greater fuel economy and lower CO₂ emissions," commented Neil Fuenmayor, LyondellBasell's Ford Customer Program Manager.

The specification for the material was extremely stringent – low thermal

expansion was essential given the close integration with the rest of the steel bodywork – and high stiffness was equally important.

Looking good

No less demanding were the application's aesthetic requirements. These highly visible parts had to display a flawless surface quality for painting – something that is often difficult to achieve with thermo-

sets and some engineering resins. "We managed to develop a resin with unique properties for this application," said Fuenmayor. "Thermal expansion is far lower than that of a standard PP resin and even many engineering thermoplastics, and stiffness is around 3000 MPa."

The surface quality of the molded parts is extremely good – thanks both to the resin's excellent melt flow characteristics (MFR = 18 g/10 min) and the extensive mold flow analysis carried out by LyondellBasell's CAE centre to optimize mold design and gating.

"This application marks a significant advance in the ability of polyolefin resins to satisfy the mechanical and aesthetic requirements of demanding bodywork applications," said Fuenmayor. "We have developed an innovative polyolefin solution that delivers an excellent cost/performance balance for customers and OEMs." Components are manufactured by Plastal GmbH.

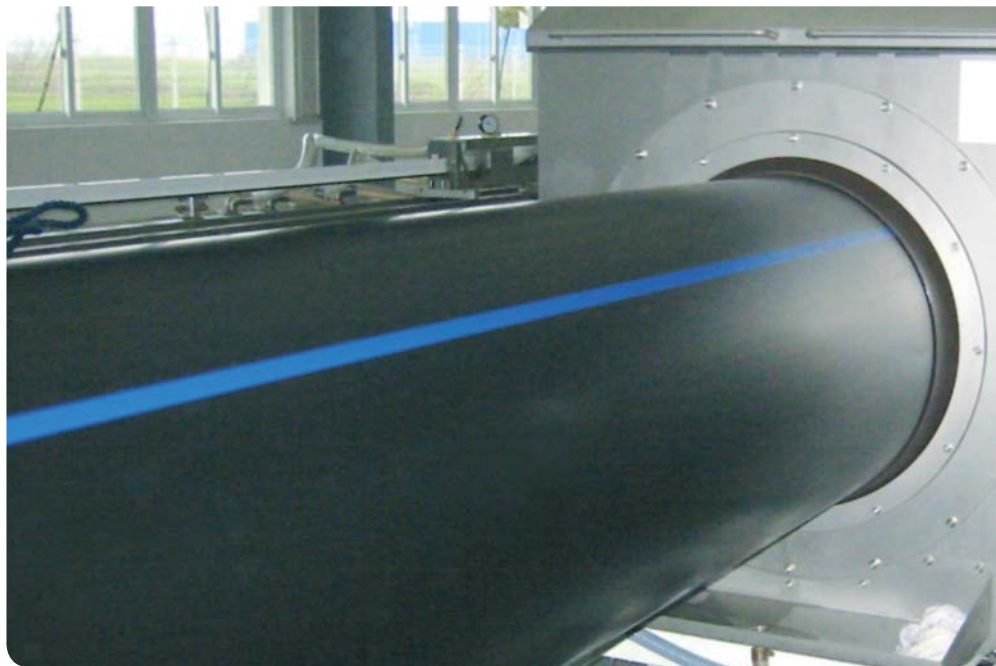
Hifax TRC 280X black

Density	1.13 g/cm ³ (Method A)
Melt Flow Rate (MFR)	18 g/10 min (230°C/2.16Kg)
Flexural Modulus	2800 MPa
Notched Izod impact Strength	10 kJ/m ² (23 °C)
Notched Izod impact Strength	2 kJ/m ² (-40 °C)
Heat Deflection Temperature A (1.80 MPa) Unannealed	61 °C
CLTE (-30°C to +100°C)	4.5 × 10 ⁻⁵ mm/mm/°C



Spanning the globe with pipe innovation

The integration of the Lyondell and Basell organizations has had particular benefits for the new company's Global Pipe, Industrial Sheet & Pipe Coating Business Unit, with new sources of supply and a strategy to expand into additional geographic markets.



Drinking water pipe produced using *Hostalen CRP 100* black resins



"We now have the resources to serve the pipes market on a truly global scale," said Didier Nozahic, LyondellBasell's Global Business Manager within the Business Unit Pipe, Industrial Sheet & Pipe Coating.

"With over 50 years of experience in Europe with established Basell brands such as *Hostalen* and *Lupolen*, as well as Lyondell's production sites and sales network in North America, combined with new assets in the Middle East and our growing network in Asia Pacific, we are now able to offer a highly competitive portfolio of products to an unprecedented range of customers throughout the world. This reconfirms once again LyondellBasell's long-standing commitment to the global pipe market."

Synergies in North America

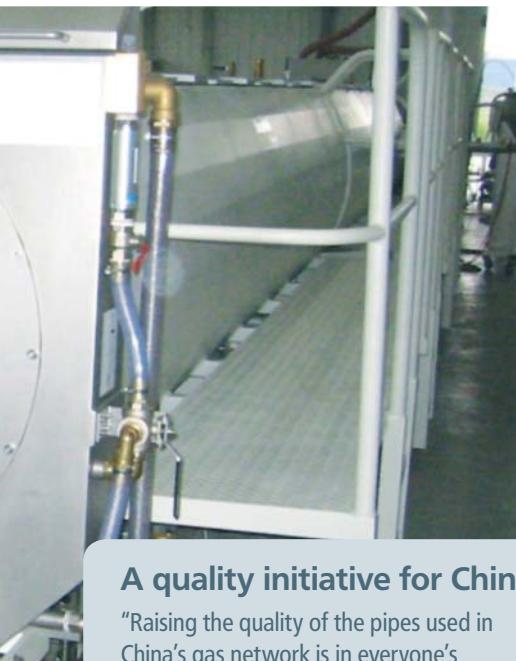
In fact, it was the pipe business unit that achieved one of the first major synergies in the new LyondellBasell organization.

"Basell was supplying the US market with PEX for interior pipe applications from Wesseling in Germany," explained Nozahic. "Just four months after the merger was complete, a cross-functional team was able to transfer the production of these specialized grades to the former Lyondell plant at Clinton in Iowa, with significant savings in time and transport costs."

In addition, the pipe business unit can now rely on dedicated technical and commercial staff in North America to better serve the local markets across all pipe segments.

New capacity in the Middle East

Polyethylene and PP materials for pipe applications will be some of the most important outputs of the new capacity coming on-stream from LyondellBasell's latest joint ventures in the Middle East: "Assets in Saudi Arabia such as the *Hostalen* ACP HDPE plant jointly owned by LyondellBasell and Tasnee, and Al-Waha's *Spherizone* PP process plant are highly competitive sources for the pipe sector because of nearby advantaged feedstocks and overall good economics," said Gianluca Brescia, the Global Head of LyondellBasell's Pipe, Industrial Sheet &



Pipe Coating Business Unit. These production assets will be particularly valuable in supplying customers in the Asia Pacific region, home to high growth markets for plastic pipe materials and for the coating systems used to protect oil and gas pipelines.

On the ground in Asia Pacific

"We have dedicated teams in place in China, India and Malaysia," said Brescia.

"Working closely with manufacturers, utilities and local standardization bodies, we are well-positioned to provide the right pipe materials for the many infrastructural and construction projects that are being planned in these fast-growing economies."

LyondellBasell also works closely with its JV partners in the region on a number of PP developments for the pipe segment, with the objective of enhancing the ability to source local markets from optimally located assets based on LyondellBasell technologies.

"The LyondellBasell pipe organization can draw on an impressive legacy of know-how, technologies and proven products," Nozahic concluded. "These outstanding resources will soon be available to more users in more markets than ever before."

A quality initiative for China's gas network

"Raising the quality of the pipes used in China's gas network is in everyone's interest," said Michael Vogt, Market Manager for the Asia Pacific region within LyondellBasell's Pipe, Industrial Sheet & Pipe Coating Business Unit.

"The objective of the seminar we held in March was to get all interested parties round the table to talk about setting new quality guidelines for gas infrastructure in China. The results were extremely encouraging."

The seminar, hosted in Beijing by the China Gas Association, brought together representatives of China's main gas utilities, LyondellBasell and two major local resin suppliers, plus local pipe manufacturers and regulatory bodies. Also present were representatives of the PE100+ Association – an industry body founded "to promote consistent quality at the

highest level in the production and the use of polyethylene for PE100 pipes."

"The involvement of the association – which now has a working group for the Asia region – will lend valuable support to our efforts to define quality standards for the China market," said Vogt.

LyondellBasell is a founding member of the PE100+ association and is represented on its Board. "The seminar enabled us to draw up a list of measures needed – from training at each step of the supply chain to concerted action by purchasers to prevent the use of sub-standard and counterfeit pipe materials in the gas network," Vogt concluded.

"It was an important first step towards ensuring that the development of China's gas infrastructure proceeds in line with the right standards of quality, safety and long-term durability."

Quality of life in emerging markets – helping users make the right choices

"Developing countries such as those in Asia Pacific represent an exciting business opportunity," said Gianluca Brescia.

"But I would like to emphasize that LyondellBasell's commitment to these markets goes further: our materials are used in important infrastructure projects – such as drinking water, sewage and gas distribution – that are key contributors to the quality of life in these countries."

"We can give these communities the benefits of the latest developments in materials technology because the products we provide are in no way different from those we supply to more developed markets. Compared to locally produced materials, we can offer significant performance advantages."

Didier Nozahic explained: "*Hostalen* CRP100 black grades used in drinking water distribution, for example, have excellent durability and are designed for a projected service life of at least 50 years (as required by the latest ISO 4437 standard). ISO 4437 prescribes that ready-made compounds must be used for pressure water pipes. On the other hand, water pipes made from locally produced resins, typically colored by masterbatching, often show defects after just a few years of operations."

"This is an example where making the right choice at the beginning can lead to long-term benefits. Our mission in these markets is to help decision-makers make the correct choices for the future of their communities."

The new world-scale *Hostalen* ACP PE and *Spherizone* PP plants in Saudi Arabia are best positioned to provide top quality material to serve the needs of these markets and to enhance quality standards.

Stretchene PP sets new benchmark in ISBM

LyondellBasell's resins for use in injection stretch blow molding met a demanding specification for new household bleach packaging.



Procter & Gamble's Ariel Professional laundry bleach packaging based on *Stretchene* PP resins

When seeking an innovative packaging design for its new Ariel Professional laundry bleach, global manufacturer of household, beauty and personal care products Procter & Gamble was looking for a solution that combined excellent packaging performance with high shelf appeal and material and weight savings.

In close cooperation with LyondellBasell and packaging consultant PTI Europe, a series of 0.5-litre, 1.0-litre and 2.0-litre bottle designs were created by Procter & Gamble based on LyondellBasell *Stretchene* PP resins – a new product family that outperforms standard PP and traditional materials in terms of rigidity, transparency, impact strength and production output.

Outstanding cost/performance

Stretchene resins enabled the production of colorful, transparent, lightweight bottles with outstanding chemical resistance, good impact resistance and good water vapor barrier. In addition, the new bottles achieved a weight savings of between 15% to 20% compared to conventional HDPE.

Patrick Etesse, research fellow at Procter & Gamble's global packaging & device development R&D centre in Brussels, said: "*Stretchene* resins provide an outstanding cost/performance balance for ISBM applications, and are an excellent alternative to more traditional materials such as PET and HDPE."

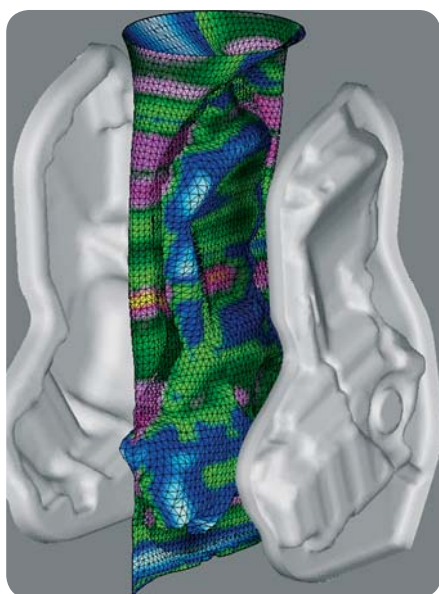
An important feature of the new bottle design is the full-body shrink-sleeving which gives the bottle its distinctive tactile and visual qualities. The ability of *Stretchene* resins to withstand the high temperatures of the shrink treatment was another essential requirement.

"Our two years of research and development have culminated in the development of a new benchmark in household product packaging," said Etesse. The bottles are produced at Alpla's facility in Italy.



Lupolen HDPE meets the biodiesel challenge

The growing proportion of biodiesel used in motor fuels has prompted the development of a new HDPE grade for fuel tanks.



CAE capabilities: example of blow molding simulation

“The effect of fuels with higher biodiesel content on HDPE was not recognized for many years because of the test methods being used,” said Thomas Lindner, Technical Manager of LyondellBasell’s Automotive Fluid Systems Business. “Simply immersing HDPE samples in biodiesel produces little or no effect, even in the long term.”

“But if you keep fuels with higher biodiesel content in an HDPE container – such as a fuel tank – over a long period at elevated temperatures, they begin to permeate the wall. When they reach the outside, where they can react with atmospheric oxygen and moisture, they begin to attack the HDPE. The polymer may become degraded and suffer embrittlement and loss of plasticity – obviously not desirable from a crash performance point of view.”

“I should stress that we have conducted tests under severe conditions, with temperatures of 40°C, with a very long exposure time of 11 years and with 100% biodiesel samples that are more concentrated than most commercially available blends.”

“Nevertheless, with the drive towards using higher proportions of biofuels in the future (biodiesel is expected to make up 10% of EU diesel consumption in 2009) this is obviously something that we should be preparing for.”

Preparing for the biofuel future

Work accordingly began at Lyondell-Basell’s technical centre in Germany on creating an HDPE grade able to resist the effects of higher proportions of biodiesel in long-term use.



“We identified a stabilizer that was capable of combating the polymer chain fractures caused by biodiesel,” explained Harald Schmitz, Polyethylene Product Development, R&D department. “These stabilizers work to protect the polymer without being consumed themselves. This means they can provide long-term protection during the service life of the fuel tank.”

Comparative tests have been carried out on the new HDPE grades, *Lupolen* 4261 AG BD and 4261A IM BD, in contact with pure biodiesel fuels. After 1500 hours, the change in intrinsic viscosity of the biodiesel resistant grades (an index of the reaction between the fuel and the polymer) was just 1.7%, compared with 52% for the unmodified material.

“This represents a thirty-fold increase in resistance to attack compared with conventional fuel tank grades,” said Lindner.

A solution

Apart from its resistance to biodiesel, the new grade’s properties and processability are identical to the unmodified *Lupolen* 4261 grades, which are widely used for fuel tanks.

“The new grades provide a solution for fuel tank manufacturers which significantly reduces the need for modification of existing equipment,” concludes Lindner. “They are likely to require no modification to existing molds or processing conditions.”

PB-1 sets new standards in spunbond masterbatching

Used as a carrier resin for spunbond masterbatches, polybutene-1 delivers brilliance, gloss and high throughput in colorful nonwovens.



Nonwoven fibers colored with PB-1 masterbatch

The spunbonding process for producing nonwovens is a highly critical conversion technology: when colored products are required, the addition of coloring agents through masterbatching can adversely affect the behavior of the spun resin, resulting in loss of tenacity, fiber breakage and blocking of the spinnerets.

The choice of the correct carrier resin for the coloring agent is therefore essential and PB-1, a polybutene resin from LyondellBasell, is setting new standards in this respect. PB-1's high cohesive strength, unique melt processing behavior and intrinsic higher melt drawability characteristics compared to PP can be fully exploited in fiber spinning applications and is therefore being increasingly used in these applications.

PB-1 has been adopted by specialist additive producer Fimas in northern Italy to produce a series of masterbatches for Lenko in Poland, a major manufacturer

of nonwovens used in the agricultural market.

"The new masterbatch enables our customers to increase production line output by significantly reducing breakage and loss," said Fulvio Malacarne, research & development coordinator at Fimas. "Due to its outstanding viscosity, the material prevents the blocking of the spinnerets, leading to spin-pack longevity and reducing the time required for changing and cleaning operations."

The development of the new solution involved close collaboration between LyondellBasell's textile technical service, Fimas, and Lenko, the final user. Waldemar Urbaniak, Lenko's commercial director, commented: "LyondellBasell's expertise extended beyond resin supply – they also served as a very effective problem-solver, enabling us to achieve unprecedented production and performance goals."

Akoafloor PB-1 is hot (and cool) in China

Innovative PB-1 pipe resins offer performance and processability in surface heating and cooling for the China market.



Customer testing the installation of an underfloor heating and cooling system produced using Akoafloor PB-1, with the help of Xue Qin from the LyondellBasell office in Shanghai

PB-1 is not being sold in pipe applications intended for use in North America.



Peter Larrass, Vice President of LyondellBasell's PB-1 Business

"The British Museum, the Royal Albert Hall ... for decades, when technical excellence was needed in hot water pipe, in Europe and Asia, polybutene-1 has always been the top choice among polymers," said Rémi Perrin, LyondellBasell's Global PB-1 Innovation & Marketing Manager. "With the rapid development of underfloor heating and cooling, we have further enhanced Akoafloor PB-1's technical advantages such as flexibility and strength, which have attracted customers in China to select the resin for underfloor heating and cooling systems."

"The new homes and offices being built in China are bypassing conventional systems and going straight for the latest, more sustainable climate control solutions, such as surface heating and cooling."

"The high demand that this tendency is likely to create in the region is one of the major factors that led us to launch Akoafloor in China," Perrin said.

Easy installation

Akoafloor materials exhibit the exceptional flexibility of PB-1 resins (as low as 350 MPa), making for easy installation – even at low temperatures. PB-1 piping needs no pre-heating to adapt flexibly to

the geometry of the floor or wall area, passing easily around obstacles and making installation quick and safe.

Flexibility reduces the number of connections required. Where jointing is necessary, several methods are available from socket fusion to electrofusion and push-fit.

Material and energy savings

The superior strength of Akoafloor materials allows significant reduction of wall thickness – pipe sections made from Akoafloor resins weigh up to 40% less than equivalent products made of other polymers. The increased internal diameter results in lower energy requirements for pumping operations.

"This source reduction allows material savings that contribute to Akoafloor resins' attractive cost/performance ratio – while reduced energy consumption increases the sustainability of the system over the long term," said Perrin.

High productivity

Akoafloor resins also hold significant benefits for converters with a typical extrusion rate that has been increased by up to 50%, and a faster post-extrusion crystallization speed (approx. 48 hours).

Akoafloor resins were presented to customers in China at a special event held recently in Hainan. Speaking at the event, Peter Larrass, LyondellBasell's Vice President of PB-1, said: "We believe Akoafloor resins will make a significant contribution to the sustainable development of building infrastructure and energy management in China as well as the rest of the world."

After the prize, the pledge: sustainability in Australia

Following last year's sustainability award, a groundbreaking agreement is further recognition of LyondellBasell's commitment to environmental care in Australia.

together with the Victorian Environment Protection Authority (EPA) and the Plastics and Chemicals Industries Association (PACIA) – to explore ways of incorporating principles of sustainable growth into LyondellBasell's operations and adopting a 'life-cycle' approach to the polypropylene market in Australia.

"Through this agreement, we have committed to incorporating societal considerations into the economic and environmental impact scenarios used for our business planning and strategies in Australia,"

applied to all Basell Australia Pty Ltd's activities, including internal production, operations, marketing, business development, communications and education, professional relationships and the supply chain.

Award-winning expansion

LyondellBasell operates two sites in Australia: a polypropylene plant at Geelong and another at Clyde. In 2006, the Geelong plant completed an expansion project to increase its capacity from 70 KT to 130 KT per year.

The environmental excellence of the project – which resulted in a reduced energy requirement of 85% for the new equipment and involved extensive consultations with the local community – was recognized through PACIA's 2007 Sustainability Award for Chemical Plants.

In further recognition of its long-term achievement of operational excellence, Basell Australia Pty Ltd was inducted into the Victoria Manufacturing 'Hall of Fame'.

HSE award

Safety is a high priority for LyondellBasell in Australia and the Geelong plant recently received the 2008 PACIA HSE award for chemical companies for implementing a shutdown with no recorded injuries.

"We operate our facilities with a focus on protecting the health and safety of our employees and contractors, and with a commitment to safeguarding our local communities and environment," said David Stannard, Basell Australia Pty Ltd's Geelong Site Manager.



Victorian Manufacturing Hall of Fame Award received for Operational Excellence

Basell Australia Pty Ltd is the first polymer company in Australia to sign an innovative three-way agreement with the local environmental protection agency and industrial association aimed at maximizing the sustainability of polyolefin use from manufacture to final disposal.

The Sustainability Covenant commits the signatories – Basell Australia Pty Ltd,

lia," said Barry Kelly, managing director of Basell Australia Pty Ltd.

"LyondellBasell in Australia has taken their commitment to sustainability to a new level," commented PACIA CEO Margaret Donnan. "LyondellBasell is, without a doubt, setting a precedent for other PACIA members." Under the terms of the covenant, sustainability principles will be

Innovative jersey keeps sailors cool and dry

Innovative jersey woven from Dryarn® fibers provide exceptional levels of performance and comfort for Italy's sailing team.



"Area 51" sportswear produced using *Metocene*-based PP fibers

Climatic conditions in Beijing this summer are likely to be challenging with high temperatures and high humidity expected in China's port city Qingdao, where regattas will be held.

Italian sportswear manufacturer Slam was commissioned to create a sailing jersey for the national team that would optimize its performance in such demanding conditions, while being tough enough to stand up to the rigors of competition sailing.

For the "Area 51" jersey, Slam chose a unique polypropylene fiber, Dryarn, produced by Italian synthetic fiber manufacturer Aquafil.

Tough, light and dry

Dryarn is an extremely soft, fine microfiber yarn. Its lightness, durability and hygienic characteristics have allowed new levels of comfort and performance to be achieved in skin-contact textile applications. Dryarn's resistance to abrasion, sea-water and solvents make it the ideal choice for a demanding nautical environment.

Dryarn's hydrophobic polypropylene fibers rapidly conduct perspiration away from the skin, leaving the wearer dry and comfortable.

Polypropylene does not allow humidity to collect close to the skin and harbors none of the microorganisms that create odor in garments made from other synthetic fibers.

"Cooler than cotton"

During the development of the jersey, tests were carried out to assess its performance when worn by athletes undergoing strenuous activity in a high-humidity chamber. Sensors measured body temperature and water-vapor transmission rates at various points around the garment.

The trials confirmed that the "Area 51" jersey kept athletes significantly cooler and drier than the cotton jersey used as a control: Thirty minutes after the test, subjects wearing cotton reported being 'sticky' and 'wet', while subjects in the Dryarn jersey felt comfortable and dry.

Metocene resin used by Aquafil to produce Dryarn microfiber (see article in Dimensions 18)

Dryarn owes its unique properties to LyondellBasell's advanced metallocene catalyzed resins. The trials carried out by Slam's R&D department with the Polytechnic Universities of Milan (Prof. Davide Bruno) and Turin have shown that Dryarn outperforms cotton in terms of wearability and comfort. "This is just one of a growing range of applications exploiting the outstanding skin-contact characteristics of *Metocene*-based fibers in demanding physical conditions," added Bernd Schütz, Global Business Manager of LyondellBasell's *Metocene* Business.

LyondellBasell debuts at Chinaplas 2008

The Shanghai expo was LyondellBasell's first presentation at a major trade event in China.

"As our first major appearance in China since the formation of LyondellBasell, Chinaplas was an excellent opportunity to introduce our new company and feature our expanded products and services to this growing market," said Anton de Vries, President of LyondellBasell's Polymers Division.

LyondellBasell and its predecessor companies have been active in China for over 20 years and it is the country's largest polyolefins importer.

"Leadership, Innovation and Collaboration"

At this year's event, with the theme of "Leadership, Innovation and Collaboration", the company presented an extensive range of products available from its



LyondellBasell's stand at Chinaplas 2008

compounding facilities in China and joint ventures in the region. They included advanced polyolefin materials for applications in China's rapidly growing automotive, appliances and electrical and electronics sectors, as well as innovative packaging products based on *Catalloy* process materials and polybutene-1 products.

Through close cooperation with leading machinery manufacturers, visitors were also able to see a range of LyondellBasell materials being processed during the event, from *Hostalen CRP* 100 resins at Krauss Maffei Technologies' Haiyan plant (see box) to *Hostalen* HDPE and *Clyrell* resins run on numerous film and TWIM molding lines at the fair itself.

"Visitors to this year's Chinaplas could have no doubts about the scale of LyondellBasell's commitment to serving the China market," said Kathy Chan, Marketing Communications Manager in



Asia Pacific for LyondellBasell's Polymers Division. "We were able to present a highly competitive range of products across a wide spectrum of application areas that directly addressed the growing demand for quality and added value among polyolefin users in this exciting market."

The four-day event at Shanghai's Expo Centre attracted over 70,000 visitors.

Hostalen PE100 stars at KMET event



Pipe produced using *Hostalen CRP* 100 black resins at Krauss Maffei open house

The live demonstration of a 630 mm HDPE pipe extrusion was the spectacular centerpiece of the Krauss Maffei open house event held at the machinery manufacturer's plant in Haiyan, which was attended by almost 400 guests from all over the world.

The large-diameter pipe sections were produced using *Hostalen CRP* 100 black and *Hostalen CRP* 100 S blue resins supplied by LyondellBasell.



Equipment at Argenplast producing bottles with LyondellBasell *Adfflex* Q 302 B resin

Argenplast showcases unique soft-touch products

LyondellBasell Adfflex resins were among the products on display at the Buenos Aires trade event.

Held in Buenos Aires, Argentina, Argenplast is South America's second largest trade event for the plastics sector.

Among the LyondellBasell products featured at the event was the innovative soft-touch *Adfflex* Q 302 B resin. The spe-

cial tactile characteristics of this material make it the resin of choice by customers for high-value packaging in areas where haptics are important, such as personal care products.

At the Argenplast event, the material was processed into small cosmetics bottles on a blow molding line provided by Italian equipment manufacturer Magic MP.

LyondellBasell sponsors Moscow auto forum

The company was associate sponsor at an event bringing together key figures from Russia's growing automotive sector.

"With annual production growth rates between 10% and 20%, the market for passenger cars and commercial vehicles in Russia offers exciting opportunities for auto manufacturers," said Dr. Christoph Sondern, Vice President of LyondellBasell's Automotive Business in Europe. "This in turn has created a demand for advanced polyolefin materials that LyondellBasell is well-placed to satisfy."

He was speaking at the Russian automotive industry's 11th Annual Forum,

organized in Moscow by Adam Smith Conferences. LyondellBasell was associate sponsor of the event.

A promising future

Speakers at the conference were upbeat about the potential for Russia's auto sector. While noting that the industry had been hampered in the past by poor roads and shortage of resources, it was pointed out that 10 major OEMs are planning to build plants in the country and that car ownership is expected to reach European levels in the next few years.

In his presentation, Dr. Sondern illustrated LyondellBasell's extensive track record of providing the global automotive sector with tailor-made, high-perfor-

mance materials used in a wide range of applications from fuel tanks to instrument panels and bumper fascias.

Growing cooperation

He emphasized LyondellBasell's intention to build on existing links with global OEMs and Tier 1 manufacturers to support their expansion into the Russian market, as well as working more closely with domestic manufacturers.

Incorporation of local content through sourcing of raw materials from Russian suppliers is another feature of LyondellBasell's plan to develop the market, as is the plan for a new PP compounding plant to create advanced polyolefin products locally.

HMC Polymers expands production capabilities



Buddhist ceremony held to bless HMC's new dehydrogenation plant in Thailand.

A stone-laying ceremony was held in April to celebrate the construction of HMC's propane dehydrogenation (PDH) plant at the Map-Ta-Phut site. The traditional Buddhist ceremony to bless the project was conducted by nine Buddhist



Stone-laying ceremony in Thailand for HMC's propane dehydrogenation plant.

monks and was attended by representatives of all shareholders and local Government officials. HMC is a joint venture of LyondellBasell in Thailand.

The new PDH plant will manufacture propylene for HMC's new *Spherizone* polypropylene process line, which is also currently under construction. The two plants are scheduled for start-up in 2009. The *Spherizone* process is based on a

multi-zone circulating reactor mode and significantly extends the property spectrum of polypropylene materials, enhancing performance in existing applications while creating opportunities for polypropylene to expand into new end-uses.

HMC already operates two existing *Spheripol* polypropylene plants at Map-Ta-Phut with a combined annual capacity of 450 KT.



Toyota honors LyondellBasell for product quality achievements

LyondellBasell was the only polypropylene supplier to receive the Toyota Certificate of Recognition for Quality award for its supply of polyolefin materials to Toyota's operations in Europe.

"This award recognizes our achievement of total quality in supplying advanced polyolefin materials for all of the Toyota models manufactured in Europe," said Paul Ashurst, LyondellBasell's Sales & Project Manager. "We are extremely proud to have fully satisfied the significantly high standards of a quality-focused organization like Toyota."

LyondellBasell provides materials directly to Toyota plants in Europe for the Auris instrument panel, Yaris bumpers and the instrument panels and bumpers of the Avensis. The company also supplies Toyota's Tier 1 and 2 manufacturers with a range of PCMA grades for interior and exterior trim and under-hood applications. "All of the resin batches supplied

must comply with a 'Materials Inspection Standard', defined by Toyota. Each batch undergoes a double quality check – first in our own laboratories and again by Toyota, before it can be dispatched to the plant."

Global reach

As well as the quality of its products LyondellBasell's global reach is another important factor in serving the Toyota organization. "We are able to deliver materials with equivalent specifications in many different markets," said Christoph Sondern. "This is a valuable aid to Toyota in maintaining the efficiency and quality of their worldwide manufacturing operations."

To assist this process with Toyota and other global manufacturers, LyondellBasell has established a working group – the Japanese Global Automotive Team (JGAT)– which meets regularly to help improve product consistency on a global basis for Japanese projects.



Toyota Certificate of Recognition for Quality award

ITB conference highlights fuel systems

LyondellBasell presented its innovative solutions at a recent global conference addressing the challenges facing automotive fuel systems.

Held against a background of soaring oil prices and concerns about the effect of vehicle emissions on global climate, this year's Automotive Fuel Systems conference, organized by the ITB Group at two venues in Dearborn, Michigan, USA and in Shanghai, China, addressed many of the challenges facing the global car industry.

Polyethylene is now by far the most commonly used material for vehicle fuel tanks and LyondellBasell (one of the conference's regular sponsors) is a leading supplier of design expertise and materi-



From left to right: Richard Gu, Hendrik Schoenfelder, Thomas Lindner, Yamamoto Noboru and José Mikael from LyondellBasell's AFS Business

als used by its customers in this respect.

In a paper presented by Thomas Lindner, at the Shanghai conference and by Bernd Hoecker, at the Dearborn conference, both Technical Managers in LyondellBasell's Automotive Fluid Sys-

tems (AFS) Business, the result of 11 years of long term exposure to fuels with higher biodiesel content and fully patented R&D investigation was looked at. After reviewing the potential of fuels with higher biodiesel content to change the physical properties of conventional HDPE resins, they presented a new *Lupolen* HDPE family of resins, with significantly greater resistance to these fuels with higher biodiesel contents (see article on page 11).

"The ITB conferences are a valuable forum for those seeking technological solutions in the automotive sector," said Lindner. "As a major supplier to the industry, LyondellBasell is pleased to use this unique platform to present its innovative initiatives."

Healthcare innovation on show at CPhI in Shanghai, Frankfurt and Rio

Featuring LyondellBasell *Purell* family of resins formulated especially for the pharmaceutical industry.

Held each year at a number of venues worldwide, from Frankfurt to Shanghai, CPhI is the world's leading trade show for suppliers to the pharmaceutical industry.

The Shanghai event, held in June of this year, has become an important business forum for China's rapidly growing pharmaceutical sector. There are two more shows to come, CPhI Worldwide in Frankfurt and CPhI South America in Rio de Janeiro.

LyondellBasell presents its *Purell* family of resins, specially formulated to meet the needs of the medical and pharmaceutical sectors. Compliance with worldwide regulatory protocols, purity and continuity of supply make *Purell* materials a valuable resource for pharmaceutical manufacturers, simplifying the process of validation, and allowing long-term product planning.



LyondellBasell's stand at CPhI in Shanghai

Michael Lütke, Global Marketing Manager for Healthcare Applications, said: "CPhI, with their worldwide coverage, is an ideal vehicle for us to communicate that we are serving the healthcare industry on a global level. We will also be promoting and strengthening the *Purell* brand – which will ultimately create additional value for LyondellBasell and its customers."

News

Hostalen process plant achieves million-tonne milestone

LyondellBasell's world-scale HDPE plant, located in Wesseling, Germany, has produced one million tonnes of prime HDPE grades since start-up in 2004.

The plant has a capacity of 320 KT per year and uses LyondellBasell

Hostalen Advanced Cascade Process (ACP) technology.

The resins from the Wesseling plant are primarily used throughout the world in the manufacture of pipes for use in municipal water, gas and sewage systems.

Spheripol technology chosen for LyondellBasell JV upgrades

LyondellBasell joint venture Sun-Allomer has selected the *Spheripol* technology for a revamp project of one of its existing PP plants in Oita, Japan. The revamp is expected to increase the plant's capacity by 60 KT per year.

SunAllomer has also been granted an extension to its license for the upgrade of its existing *Spheripol* process unit at the same site.

The upgrade will enable the production of high performance PP copolymers.

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