ISSN 2052-9376

injection WORLD

www.injectionworld.com

January/February 2015

MOULDING THIN WALL COMPONENTS

ANALYSIS OF EUROPE'S MOULDERS

THERMOPLASTIC COMPOSITE FOCUS

NPE2015: PREVIEWING THE US SHOW

injection WORLD

Get the app!

Injection World magazine is available free-of-charge on iPads, iPhones and a huge range of Android-based tablets and smartphones.

Our dedicated Injection World app is easy to use and provides completely free access to the latest edition of the magazine plus back issues – more than 20 in total. Once you have downloaded an issue, you can read it offline – there's no need for an internet or data connection.

The Injection World app has already been downloaded by more than 11,300 readers in over 85 countries. Why not try it yourself? The app is available in Apple's App Store, iTunes and Google Play. Just search for 'AMI Plastics', or simply click on the relevant button below.

Download on the App Store

ANDROID APP ON Google play

The Injection World app is sponsored by

MAGUIRE®
The innovative market leader for...
INJECTION MOULDING
DOSING ■ BLENDING ■ DRYING
CONVEYING ■ STORAGE

injection WORLD

contents


PAGE 4

04 News

11 The injection moulding industry in Europe
As Europe's injection moulding sector continues its recovery a more focused and cost-effective industry is emerging. AMI's Sylvia Tabero provides exclusive insight.


PAGE 11

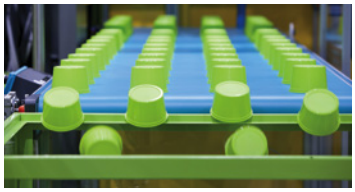
19 Composites aim to deliver
The latest injection moulding machinery and material developments are creating new opportunities for thermoplastic composites, writes Mark Holmes.

35 Paring down the walls
The goal for producers of thin wall parts is to make lighter products more quickly and without sacrificing performance. Peter Mapleston explains how.


PAGE 19

43 Investing for efficiency
Horticultural plastics firm Desch Plantpak has invested in energy-efficient thin wall moulding technology as part of a £2m upgrade of its UK operation. Chris Smith reports.

47 NPE set to break records
We preview the US NPE show, which the organisers predict will be the biggest ever and draw some 60,000 visitors.


PAGE 35

53 Moulding masterclass: Melt metering
The metering zone of the screw plays a critical part in melt preparation. Moulding expert John Goff explains how to steer clear of problems.

57 Moving towards the "Smart Factory"
Industry 4.0 – the Internet of Things – promises to connect entire manufacturing supply chains to provide instant real-time date capture.


PAGE 47

61 The virtual approach to moulding
SigmaSoft's Virtual Molding software aims to allow processing to be modelled and optimised at the product design stage.

64 Software update

coming next issue

Electrical and electronics | Bioplastics | Materials preparation | NPE 2015 show issue

➤ **Click here to make sure you get your copy**

contact us

Applied Market Information Ltd
AMI House, 6 Pritchard Street,
Bristol, BS2 8RH, United Kingdom
Tel:+44 (0)117 924 9442
Fax: +44 (0)117 311 1534
www.amiplastics.com

Head of business publishing:	Andy Beevers	E-mail: abe@amiplastics.com
Editor:	Chris Smith	E-mail: cs@amiplastics.com
Contributing editor:	Lou Reade	E-mail: editorial@injectionworld.com
Designer:	Nicola Crane	
Advertisement manager:	Claire Bishop	E-mail: claire@amimagazines.com
DOWNLOAD MEDIA DATA		Direct tel: +44 (0) 1732 605976

news in brief

Injection moulded components maker US Farathane Corporation has been acquired by private equity firm Gores Group and some of its management team for an undisclosed amount. The Michigan-headquartered processor has 10 manufacturing sites across the US and is a major supplier of interior and exterior plastic parts to customers including Ford, GM, Chrysler, Toyota and Honda.
www.usfarathane.com

German plastics packaging producer association IK's latest member survey reveals an expectation of modest improvement during 2015, despite weakness in many European markets. However, the association said there was some concern over the level of investment in the sector, pointing out that Germany's investment rate is currently one of the lowest of all industrialised countries.
www.kunststoffverpackungen.de

Italian bioplastics producer Novamont has signed an agreement with agricultural cooperative Coldiretii to encourage the development of cardi in Sardinia as a commercial crop for production of short chain oils and bioplastics at the Matrica biorefinery at Porto Torres (a joint venture between Novamont and chemical company Versalis). Cardi is a low input crop that requires no irrigation and will grow on land unsuitable for regular agriculture.
www.novamont.it

Bericap launches cap with a second-life

StackCap is a new plastic closure from Bericap that re-purposes into a "snap-together" construction toy element after use.

The new closure is available for the industry standard PCO1881 neck finish and can be used on carbonated and still beverages. Acccording to Bericap, the "second-use" concept is ecologically sound, economically affordable and provides a wide range of additional marketing opportunities to brand owners.

StackCap is based on the Groovy Cap concept developed by UK-based Smooth HIP. "The key focus was the secondary use and added-value it brings as a brand ambassador," said Smooth HIP managing director Arno Rabie.

www.bericap.com
www.smoothhip.com

● Rabie will be speaking at AMI's 3rd Plastic Closure Innovations conference in Berlin, Germany, from 9-11 June. Other speakers include experts from Euromonitor, GCS, Kao Group, Nolato Cerbo and Spadel. Download the full programme here.

Moretto takes to the road

Italian ancillary equipment maker Moretto will kick-off its European 'road show' next month when its mobile exhibition begins with a tour of Germany.

Previewed to visitors to the Fakuma trade show in October last year, the "Moretto in Motion" truck-based exhibition will allow the company to demonstrate its drying, conveying, dosing and temperature control technologies to plastics processors at their own site.

"To my knowledge this is the first time a manufacturer of ancillary equipment for the plastics processing industry takes his entire, market-relevant, product portfolio as close to the customer as it is possible to be," said Moretto founder and president Renato Moretto.

After Germany, the Moretto truck tour will take in France, Spain, Austria, Switzerland, Poland, the Czech Republic and Hungary.

www.moretto.com

Esterform buys Constar UK

UK-based Esterform Packaging has acquired the Constar UK PET preform and packaging business based at Sherburn-in-Elmet near York.

The move follows Esterform's announcement at the end of last year of an £8m investment programme, including the installation of four new Husky HPP 4.0 PET preform production lines, to lift capacity at its dedicated preform injection moulding plant at Leeds by 1bn units to 2.6bn. The investment also includes Piovan drying systems and plant automation.

Esterform founder Mark Tyne said the acquisition of the Constar business will take the group's capacity above 3bn units.

www.esterform.com

Smart's PC roof keeps it cool

The injection moulded polycarbonate panorama roof panel fitted to the latest version of Smart's forTwo city car is claimed to be the first to integrate infra-red absorption, allowing more effective control of cabin temperature.

Manufactured by Webasto at its plant at Schierling in Germany using a two-component injection-compression moulding process, the transparent section of the 1.2m^2 forTwo roof panel is moulded in Makrolon AG2677 from Bayer MaterialScience containing its heat-absorbing colour 771079.

The 9.8kg part cuts weight by around 50% compared to glass. This, together with a reduced air-conditioning requirement due to the IR absorbing additive, helps to reduce fuel consumption. Installation is also simplified as all fixings are integrated into the roof panel surround, which is moulded in a black Bayblend T95MF PC/ABS grade.

www.materialscience.bayer.com

RTP targets contract sector

RTP Company has acquired the remaining three US-based thermoplastic compounding facilities operated by Alloy Polymers as part of its plan to strengthen its foothold in supplying contract manufacturers.

The three US operations are located at Richmond in Virginia, and at Crockett and Orange in Texas. RTP said the plants will be merged with the Alloy operation at Gahanna in Ohio that it acquired earlier in 2014.

The Alloy Polymers business, which has more than 225,000 tonnes of compounding capacity, will operate as a wholly-owned RTP subsidiary using the Alloy Polymers name under the leadership of Peter Ploumidis.

"Alloy Polymers will continue to provide high-volume compounding production services for contract manufacturers, and RTP Company will continue developing custom engineered thermoplastic compounds for moulders and OEMs," Ploumidis said.

The Alloy Polymers production facility in India is not included in the deal.

www.rtpcompany.com

@PlasticsWorld tops 10,300 followers

@PlasticsWorld, the Twitter feed for AMI's magazines, publications and events, now has more than 10,300 followers from around the globe, reaffirming its position as the world's most popular plastics industry magazine Twitter feed.

The @PlasticsWorld Twitter page is used to announce plastics industry news as it happens, providing useful links to relevant web pages, reports, images and videos. Our expert team adds breaking news stories on a regular basis, as well as reporting live from major exhibitions.

Our 10,300+ Twitter followers are also the first to be notified when we publish a new issue of one of our digital magazines: *Injection World*, *Compounding World*, *Film and Sheet Extrusion* and *Pipe and Profile Extrusion*. In addition, the @PlasticsWorld Twitter page is used to announce special discount offers on our books and publications and to provide news about our plastics industry conferences.

If you already have a Twitter account, you can follow and contact us at @PlasticsWorld. Those without a Twitter account can still view our Tweets at: www.twitter.com/plasticsworld

Piovan acquires Penta

Italian plastics ancillary equipment maker Piovan has bought Penta, a designer and manufacturer of large-scale materials handling and storage systems for the plastics and food processing industries also based in Italy.

In a statement, Piovan described the move as a "strategic acquisition" that would provide it with a foothold in new non-plastics markets. It brings the company's number of production sites worldwide to seven.

Penta will benefit from access to Piovan's 23 international sales and services subsidiaries and 70 global distributors.

www.piovan.com

www.pentamfg.it

GLOBAL POLYMER DEMAND

An AMI Consulting Data Report

NEW

Fibre Extrusion

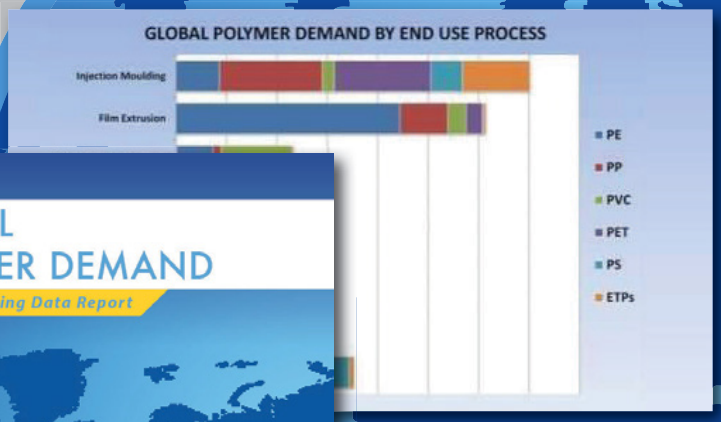
Film Extrusion

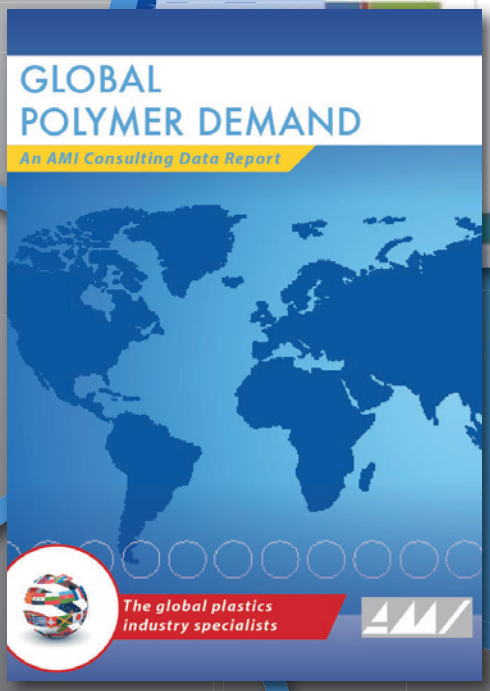
Pipe/ profile Extrusion

Injection Moulding

Blow Moulding

Sheet Extrusion





Click here to view sample pages or to order

Engineering Polymers

PET

LDPE

ABS

LLDPE

PS/EPS

HDPE

PP

PVC

Asia - Pacific

South America

Europe

Middle East and Africa

Greater China

North America

Indian Sub Continent

Included in this report:

- Detailed demand analysis by polymer and by region
- The nature of processing carried out in each region
- Regional profiles with key facts, trends and stastics
- Identification of where the best growth opportunities are

AMI CONSULTING **www.amiplastics.com**

Biggest ever KM at Weber

German machinery maker KraussMaffei has commissioned its largest ever injection moulding machine – a 5,500 tonne two-platen model supplied to Weber of Germany for production of waste containers up to 1,100 litres capacity.

The new MX Series machine is part of a major investment in production capacity at Weber's plant at Renish Haan that also included the installation of a 4,500 tonne MX Series unit. Both machines are supplied with KraussMaffei's integrated LRX1000 robots, which offer a maximum stroke of 3m.

Key factors in the decision to buy the MX machines are said to have included the sturdy machine bed and platens and generous sliding support shoes. These are claimed to help maintain a high level of platen parallelism with Weber's bulky moulds, which can weigh up to 150 tonnes.

"KraussMaffei not only stayed within standards when designing the machines, but also provided the perfect response to our specific requirements. That was a clear benefit," said Weber managing director Helmut Guntermann.

www.kraussmaffei.com

Verstraete invests in IML

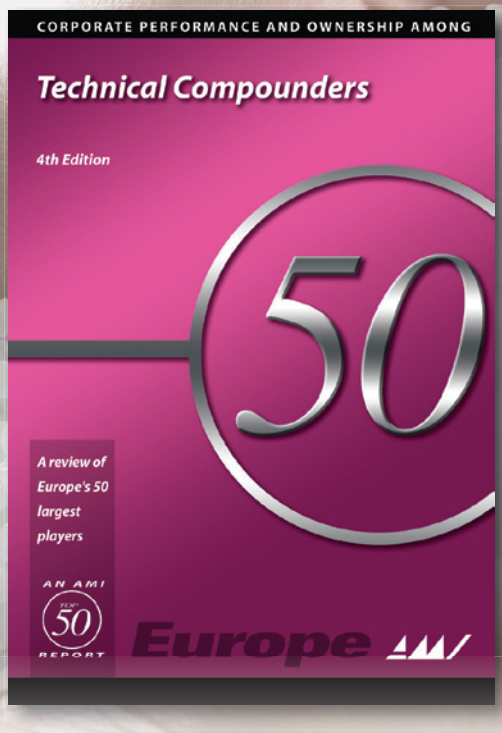
Leading IML label producer Verstraete is investing in new printing equipment at its plant in Belgium that will provide a 20% capacity expansion when it comes into operation in March.

The company, which generates sales of around €100m, is also set to embark on construction of a new 2,400m^2 factory at the Maldegem location. Scheduled to begin operation in 2016, the new facility is intended to help the company meet its target of sales of €180m by 2020. "We have clear plans to grow," said Verstraete CEO Koen Verstraete.

www.verstraete-iml.com

The Technical Compounding Industry in Europe is Changing Shape

Consolidation in Western Europe
Capacities building up in Eastern Europe
Asian groups emerging amongst the leading players



The business strategy of companies such as Ravago, A Schulman and Polyone as well as independent technical compounders is revealed in this unique report.

Click here for more details

Save time and effort

The information is at your fingertips.

For each of the 50 leading producers on technical compounds in Europe you will see:

- ✓ Business overview including recent acquisitions and investments
- ✓ Financial results
- ✓ List of plants operated in Europe and their compound production

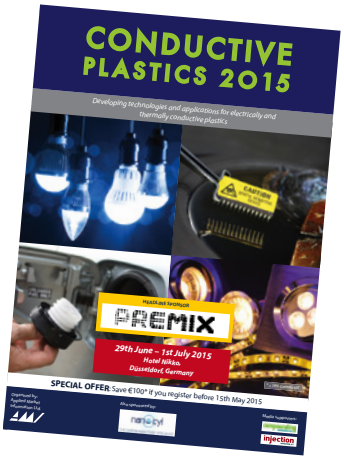
For more information contact us on **sales@amiplastics.com** or Tel: **+44 117 314 8114**

APPLIED MARKET INFORMATION LTD.

www.ami-publishing.com

Agenda set for Conductive Plastics 2015

AMI has announced the full programme for its new Conductive Plastics conference, which takes place in Dusseldorf, Germany, from 29 June to 1 July and is supported by *Injection World* and sister magazine *Compounding World*.



Conductive Plastics 2015 takes a detailed look at the application, development and processing of electrically and thermally conductive plastics, which are generating a great deal of interest in key developing markets such as LED lighting, electronic devices, automotive electronics and electric vehicles.

Expert speakers at the event include Pentair Thermal Management of the US and Technoform Kunststoffprofile of Germany, both of which currently process conductive plastics. US-based Lux Research will provide insight into some of the key emerging application areas, while technical specialists from firms including Premix, Imerys Graphite, Nanocyl, Quarzwerke and 3M Advanced Materials will explore different technologies for tailoring conductive properties.

For more information about the event, contact conference organiser Kat Langner: Tel:+44 (0)117 314 8111; Email: kl@amiplastics.com. Or download the conference brochure **here**.

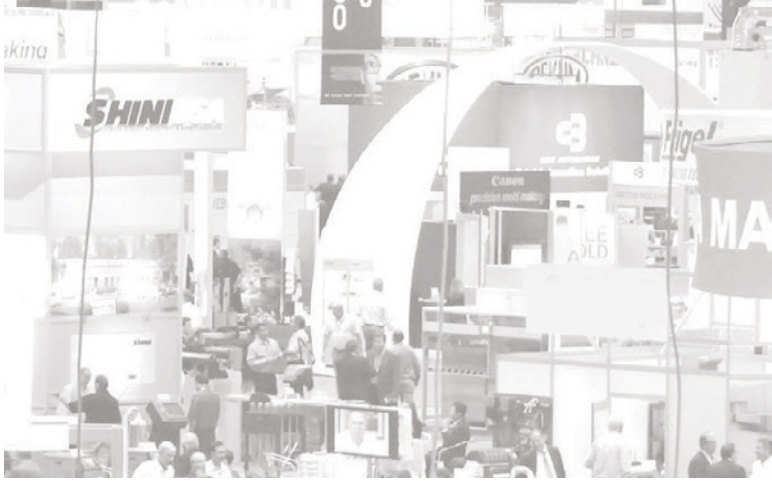
BPA no risk, says EFSA

The European Food Safety Authority published its re-evaluation of bisphenol-A (BPA) exposure last month, concluding that current exposure levels present no risk to consumers of any age, including infants.

The association said its re-evaluation had considered exposure from many potential sources - including diet, dust, cosmetics and thermal paper - and had determined that likely aggregated exposure was three to five times lower than its current safe level (TDI) of 4 µg/kg of body weight/day (recently reduced from 50 µg).

BPA is a chemical component used in production of polycarbonate and epoxy resins.

www.efsa.europa.eu



You make great things.

We make great things happen.

In March 2015, more than 60,000 professionals from every aspect of the plastics industry and its vertical and end-user markets will assemble in Orlando, Florida for the largest, most influential plastics event of the year.

Expect great things.

Register for free today at www.npeguestpass.org/IW2

NPE2015: THE INTERNATIONAL PLASTICS SHOWCASE
March 23-27, 2015
Orange County Convention Center
Orlando, Florida USA

NPE2015®
produced by spi

As Europe's injection moulding sector continues its recovery from the global recession a more focused and cost effective industry is emerging. AMI Consulting's **Sylvia Tabero** provides some exclusive insight into the market for *Injection World* readers

The injection moulding industry in Europe

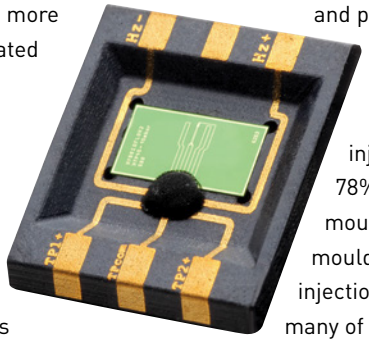
The global recession of 2008 hit the European injection moulding sector hard, accelerating an already ongoing process of rationalisation. While the moulding industry is likely to see a further modest contraction in the number of operating sites over the coming years – AMI predicts a 2% reduction in the number of moulding sites by 2018 - polymer demand and industry values are now growing across almost every sector. As this process of recovery continues, a smaller, more cost-effective and more strategically-located supplier base is emerging.

Fragmented market

Injection moulding is the most complex and fragmented of all plastics processing technologies. With more than 8,500 different injection moulding companies across Europe, according to AMI data, it is the largest processing sector in terms of the volumes of polymer processed and it converts the broadest range of materials. Applications range from micromouldings to large or multi-component structures that are decorated and/or assembled in the mould.

Injection moulding companies vary considerably across the continent, extending from small family-owned concerns to multinational groups. Business models also differ widely. Some custom moulders, for example, produce only from moulds provided by their customers; others offer a full design service and supply customers with a complete assembled, tested and packaged finished product that may include many additional bought-in components.

AMI's analysis of the European injection moulding industry shows that 78% of companies are producing custom mouldings; 48% produce proprietary mouldings, and 18% are carrying out injection moulding for in house use. While many of these companies are involved in a combination of activities, it is estimated that 40% of European moulders are purely involved in custom moulding. These companies are often considered to have weak market power as they are wholly



Left: The requirements of industries such as electronics for highly integrated functional components presents opportunities for European moulders. Image: 2E Mechatronic

Above: Many European moulders have moved production eastwards to follow customers such as Fiat, which has production in Poland, Hungary and Serbia (pictured) as well as Italy

dependent on the OEMs they serve. However, profitability can often be better for those moulders with a diverse customer base than for those serving a specific end use segment such as automotive or packaging.

All companies in the European injection moulding sector, however, have faced considerable challenges in recent years. The global economic crisis was perhaps the single biggest but injection moulders also faced increasing globalisation of customers and competitors, coupled with changing demands and technologies within the market sectors that are served.

Rationalisation continues

As previously mentioned, the global recession accelerated a process of rationalisation in the European injection moulding industry that had been underway for several years, most notably in Western Europe. Demand for injection moulding in Europe as a whole – in terms of virgin polymer throughput - reached a low in 2009 and while it has since been recovering the industry has continued to lose sites.

AMI's unique database of injection moulding sites has tracked this trend, with more than 2,500 known European moulding sites removed since 2007. More than 2,000 of these sites were lost from Western Europe, where the number of moulding sites is forecast to continue to decline. Factors behind this include consolidation of activities within larger groups, retirement of private owners, and companies relocating to lower cost regions or shifting their focus from moulding to other activities.

While the number of moulding sites declines in Western Europe, in Central and Eastern Europe site closures have been more than offset by new entrants. This region continues to attract a high level of new investment and AMI expects the number of moulding sites to grow, although not at a rate sufficient to fully compensate for the losses in Western Europe.

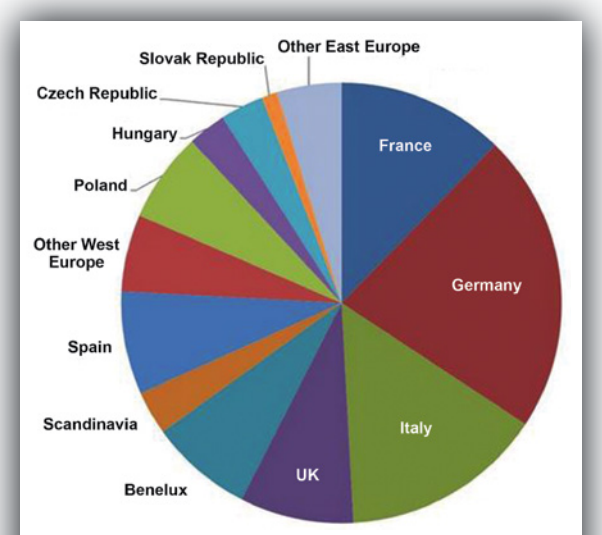
Site rationalisation and/or volume shift is taking place across almost all industry sectors in Europe. Both trends are most apparent in sectors where there is a high level of moulder specialisation and are less visible in the custom moulding sector. However, the versatility of the moulding process, together with innovative developments by moulders and polymer suppliers, continues to create new and enhanced opportunities for plastic injection moulded products across many market sectors and particularly in applications where metal replacement, part integration, light weighting, enhanced design or decoration are valued.

Moulders that are able to exploit innovative developments in the markets they serve are the most likely to prosper in the European marketplace. Those operating in sectors which have limited local growth opportunities, low specialisation and commodity pricing are likely to suffer as this business continues to move outside of the region.

Shifting markets

Within Europe, the shift of moulding volume from Western to Central and Eastern European countries has largely been a result of injection moulders following the investments made by their customers, particularly automotive and electrical appliance manufacturers looking to reduce their operation costs. However, the economic development of these regions has also created a larger European consumer market and this has benefited the entire moulding sector.

The European injection moulding sector has also been impacted by competitive pressures from manufacturers in overseas regions, particularly China and South East Asia, and from groups merging and restructuring



Injection moulding polymer demand by country 2014

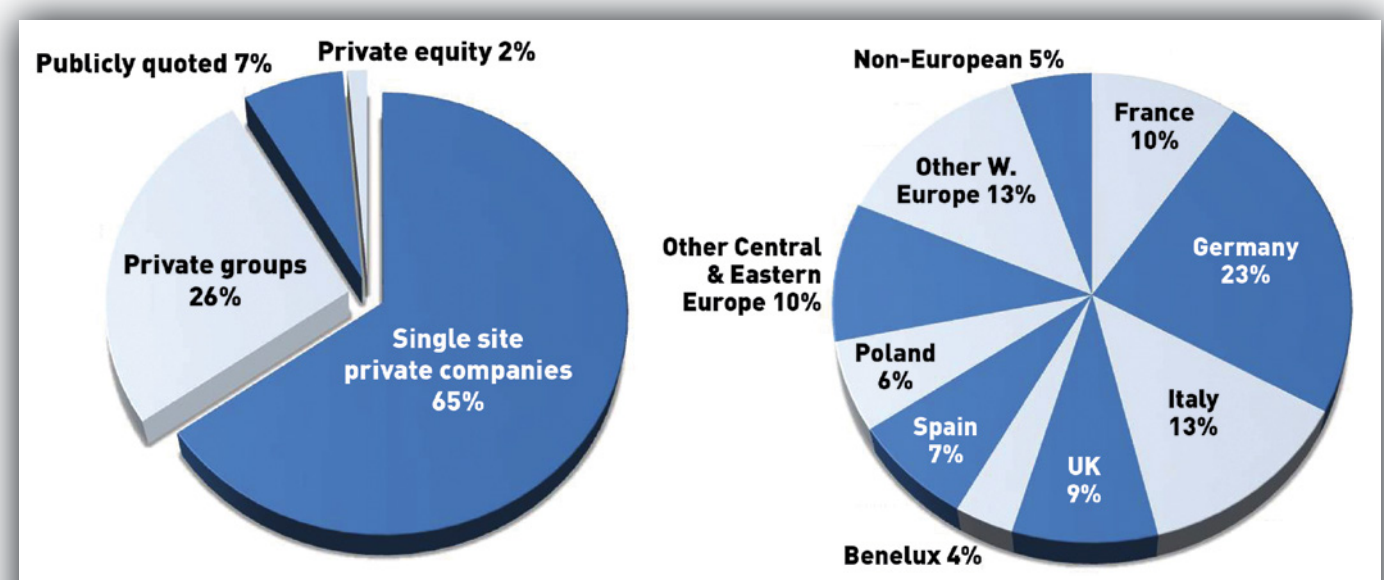
High performance counts! 7.3 million cycles per year on an ALLROUNDER HIDRIVE: performance becomes high performance. This is what really counts in the packaging sector. Whether it's yoghurt tubs or closure caps. At the end of the day, production efficiency alone counts. This is precisely what we offer you. ARBURG for efficient injection moulding!

NPE2015
March 23-27, 2015
West Hall, Booth # W3729,
Orlando, FL, United States

ARBURG GmbH + Co KG
Postfach 11 09
72286 Lossburg / Germany
Tel.: +49 (0) 74 46 33-0
Fax: +49 (0) 74 46 33 33 65
e-mail: contact@arburg.com

ARBURG

www.arburg.com



Injection moulding site ownership 2014 by owner type (left) and owner country (right)

within Europe. However, this has been offset by investment by larger European moulders in facilities in China and other low cost regions. These investments have been made to retain OEM business and to take advantage of emerging local economies.

AMI's database of injection moulders records more than 10,200 injection moulding sites. This figure is believed to represent more than 75% of the European industry in terms of the number of moulding sites but 80-90% of companies with an injection moulding turnover of more than €500,000 in injection moulding. Based on this data, it is estimated that the European injection moulding machine pool in 2014 amounted to almost 210,000 machines in operation across more than 13,000 separate injection moulding sites.

Size matters

The average European injection moulding site is estimated to operate 16 machines. Germany and Italy are notable exceptions. In the case of Germany, moulding sites are estimated on average to be more than one third larger than the average for Europe in terms of the number of machines operated (averaging more than 21 machines). Italy, with its more fragmented market structure, includes a high number of companies with only a few machines, reducing its average to just 10.

Injection moulding sites, of course, range in size from very small companies or in-house operations with single machines up to very large operations with more than 100 machines. AMI estimates that in 2014, 72% of European injection moulding sites operated fewer than 20 machines and 43% fewer than 10 machines. Just 8% of sites operated greater than 40 machines.

With the number of European injection moulding sites forecast to decline by 2% by 2018, it is considered unlikely that the overall number of machines operating in Europe will increase. Even today, it is believed that a high proportion of injection moulders retain machines they do not intend to fully load for production. While injection moulding machines are usually depreciated over 10 years, they can readily operate effectively for more than 20 years if well maintained. It is expected that new machinery sales will be largely balanced out by de-commissioning.

Industry rationalisation increases availability of second hand machinery on the market. While much of this volume is channelled outside of Europe, it still increases the pressure on new machinery sellers. This challenge is largely being met through a focus on machines offering better performance in terms of speciality optimisation or versatility, lower energy consumption and other features.

Industry ownership

The injection moulding industry in Europe is quite fragmented and this is illustrated by its share ownership structure. The 10,200 active injection moulding sites within the AMI database are owned by more than 8,500 different companies. The majority are privately-owned companies operating from a single site. Privately-owned groups account for a further 26% of sites (including injection moulding-focussed groups operating more than one site).

The number of publicly-owned injection moulding companies has declined by almost 9% since AMI last carried out this analysis in 2009. Less than 3% of companies involved in injection moulding in Europe are

It's your choice to **be a winner**

MEDICAL AUTOMOTIVE TECHNICAL MOLDING PACKAGING TELETRONICS

REACH FOR THE STARS Whether you need high-performance machines for high-speed output, intelligent automation for maximum operating convenience, or you want to incorporate the latest in processing technologies for overall improved manufacturing: ENGEL is your partner for success in your market. With our flexible standard machines and highly integrated customized solutions we will bring more dynamics, efficiency and profitability to your production. **www.engelglobal.com/NPE**

ENGEL

VISIT US AT NPE2015 | MARCH 23-27 | ORLANDO FL | ORANGE COUNTY CONVENTION CENTER
WEST HALL | BOOTH W1303

PHOTO: LEGO GROUP

Above: The scale of Lego's production plant at Nyíregyháza in Hungary is exceptional – the average European moulding site operates 16 machines

publicly-owned but, as the majority operate from more than one location, they account for about 7% of the moulding sites in total. These businesses also typically represent some of the larger groups within European injection moulding and will account for a much greater share in terms of turnover and output. The decline in their number reflects some rationalisation and reorganisation within the businesses to enhance shareholder value in a difficult economic environment. There have also been few, if any, IPOs for businesses involving injection moulding in recent years.

Fewer than 50 injection moulding companies are considered to be majority-owned by private equity, which is also a reduction on the 2009 figure. While they account for less than 2% of the moulding sites in total, these companies are often multi-sited with a particular market specialisation so tend to have a higher importance in terms of value. Private equity funding may also support a considerable proportion of the companies labelled as privately or publicly-owned through a minority shareholding or an investment that is not publicly reported.

Independent players

The nature of the injection moulding process, however, is such that it is primarily exploited by small, independent, entrepreneurial businesses that serve a wide variety of manufacturing activity. This small-scale nature of the European industry is further illustrated through analysis of multi-site operations. AMI's data shows more than 7,800 companies operate as single sites under private, public or private equity ownership. Only 110 companies operate five sites or more, and fewer than 30 companies operate more than 10 injection moulding sites in Europe.

Ownership of the European injection moulding industry also largely resides within Europe, with only an estimated 5% wholly-owned by capital from outside Europe. However, these investments can often be quite significant so may represent a much greater share in terms of value.

North American companies have traditionally been the most active within European injection moulding, followed by Japanese-owned operations. While these two countries continue to account for the majority of non-European ownership, there has been a notable volume of investment from other Asian countries in recent times.

Foreign ownership of European injection moulding operations is also often understated because many companies, particularly those from the Far East, tend to invest in Europe via a minority shareholding in a European concern. Investments of this type are not accounted for in the previous analysis.

Rounding up

In summary, since 2007 the injection moulding industry in Europe has been through a deep recession from which it is yet to fully recover in terms of polymer demand. However, recovery in value terms has been faster due to higher material costs and the realisation of added-value opportunities. The value of the industry is forecast to continue to grow but the rate of growth will vary across the different market sectors served. Intense competition, increasing customer pressures, fluctuating raw material costs and increasing energy and labour costs will combine to maintain pressure on profitability. The number of companies involved in injection moulding in Europe will also continue to decline, but the industry structure will remain substantially more fragmented than any other area of plastics processing.

This article is based on AMI Consulting's new in-depth report "The future of the European injection moulding industry", which provides a detailed analysis of this market in terms of the value, size (in terms of polymer consumption) and structure by key market served (including packaging, automotive, electrical etc). It reports industry trends from the last market peak in 2007 through to 2013/4 and provides forecasts to 2018. More about the report details can be found **here**. Alternatively, contact report author Sylvia Tabero. Tel: +44 (0)117 9249442; Email: **sat@amiplastics.com**

For more information about AMI's database of injection moulders, contact Regine Futter. Email: **rf@amiplastics.com** or visit AMI's website **www.amiplastics.com**

The Maguire Gravimetric Blenders...

It's all about

NUMBERS
NUMBERS
NUMBERS

VIEW ONLINE | VIEW PRODUCT GUIDE | VIEW SHOWREEL

OVER 120 STANDARD MODELS

10kg to 4,000kg using 2 to 12 materials

NPE2015

VISIT US AT BOOTH #W5663

45,000
BLENDERS WORLDWIDE

1.9 million
AVERAGE TONNES PER HOUR

9.3 billion
TONNES PER ANNUM

Billions of dollars
PASSING THROUGH MAGUIRE BLENDERS ANNUALLY

Find out more about our products
Email: info@maguire.com
www.maguire.com

MAGUIRE®
The innovative market leader for...
INJECTION MOULDING

DOSING • BLENDING • DRYING • CONVEYING • STORAGE

PLASTIC CLOSURE INNOVATIONS 2015

Trends and technical developments in the international closures industry

CLICK HERE FOR DETAILS

HEADLINE SPONSOR

THE CRAFT OF VTC PRECISION MOULD MAKING
Vasantha Tool Crafts Pvt.Ltd.
AN ISO 2001-2008 CERTIFIED COMPANY
www.vasanthatools.com

9-11 June 2015
Sofitel Kurfürstendamm, Berlin, Germany

** + 19% German VAT*

SPECIAL OFFER: Save €200* if you register before 24th April 2015

Organised by:
Applied Market Information Ltd.

Sponsored by:
BOREALIS
sabic
INglass HRS Led by your challenge

Media supporter:
injection WORLD

Rocio Martinez – Conference Organiser rmm@amiplastics.com Ph: +44 117 924 9442 Fax: +44(0)117 311 1534

Composites aim to deliver

The latest injection moulding machinery and materials developments are creating new opportunities for thermoplastic composites, writes **Mark Holmes**

Thermoplastic composites hold considerable potential in a wide range of markets requiring light weight and high performance. Automotive has certainly led the way, but improvements in processing technologies and materials are now opening up new application opportunities in sectors such as aerospace, construction, electronics and consumer goods.

Injection moulding specialist **Engel** has been working in close collaboration with **BASF** on a custom-designed manufacturing unit for processing fibre-reinforced thermoplastics at the material company's Ludwigshafen technology centre in Germany. This thermoplastics processing technology centre is designed to serve two roles. Firstly, it supports product development on-site by testing the processability and properties of new materials. Secondly, it provides a resource for customers to conduct joint development with BASF on new applications – in particular with BASF's range of Ultracom products. Finding new solutions to increase the use of thermoplastic composites in automotive applications is a key role for the centre.

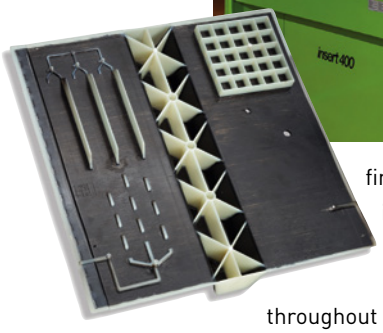
Engel has supplied an e-Insert 400 injection moulding machine to meet BASF's specific requirements. With a nominal clamping force of 400 tonnes, the system includes a fully integrated heating plate and temperature control system from Dr Collin of Germany.

The design of the clamping unit allows pressing of sheets of up to 450mm by 450mm in size, as well as the space to mount injection moulds with a surface area of up to 700mm by 1200mm.

The machine is designed not only for injection moulding, but also to pre-heat, consolidate, press and form the semi-finished fibre reinforced materials. Engel says the machine's ability to heat up the composite sheet at low pressure, increase pressure at a constant temperature, and then lower the temperature at a constant pressure is a processing breakthrough in this sector as it allows the semi-finished material to be melted under almost no pressure to avoid displacing the fibres. Less than 10% of the machine nominal pressure is used for this melting phase. The semi-

Main image: Hybrid long glass and long carbon fibre thermoplastic composite pellets from US-based PlastiComp

Right: This Engel e-Insert 400 is used for thermoplastic composite development in the BASF technology centre in Ludwigshafen



Above: BASF's Ultracom demonstration part combines 20 different functions within an area of 400mm by 400mm

finished material is then consolidated by increasing the pressure moderately.

This ability to regulate the temperatures and pressures precisely throughout the entire process presents new levels of flexibility in production. With this in mind, BASF has developed a demonstration piece that has allowed the problems of manufacturing with composite materials to be simulated. At almost 400mm by 400mm, the demonstration part shows around 20 different functions. These include a ribbed u-profile carrier, diverse mounting elements, areas where material is injected through the carrier and a ribbed field for crash investigations. It also includes a variety of different rib/wall thickness transitions between the laminate and over-moulded material.

A further development from Engel promises to bring additional benefits to injection moulders while also making the most of new thermoplastic composite processing technology. Its new pick-and-place robot, which is aimed at moulders looking for simple, space saving and cost effective process automation, will use a lightweight swivel arm made from thermoplastic composite materials that is designed for fast access into the mould area from above. It is designed for simple part removal, conveyor stacking and sprue cutting tasks.

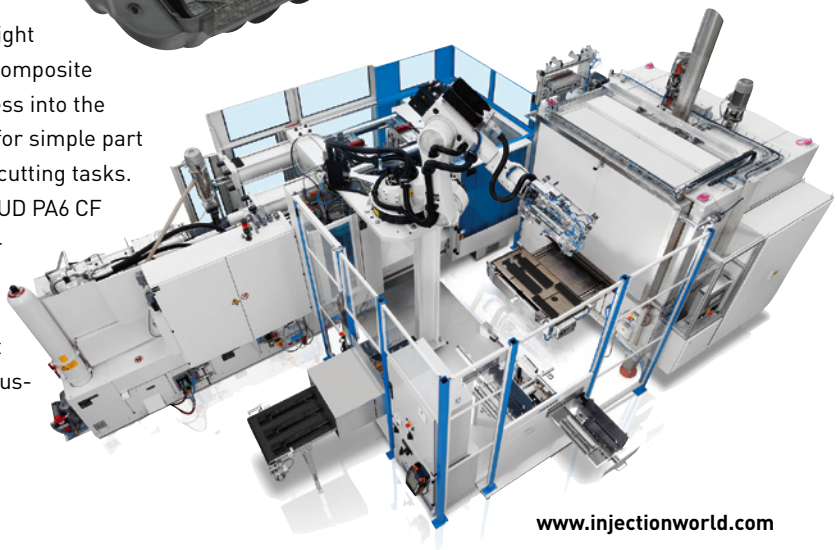
"We are working with thermoplastic UD PA6 CF carbon fibre reinforced tapes from Celanese," says Peter Egger, director of the Engel Centre for Lightweight Composite Technologies. "These are cut and we make a force-orientated lay-up, using a composites-related component design from Prime Aerostructures. It is then heated, formed and consolidated in a press, employing a mould from Schöfer. The final step involves joining the reinforced parts with some metal ones. The result is a swivel arm with a weight saving of around 40% compared to a pure aluminium one. This provides better dynamics and lower energy requirements."

Combining technologies

Composite developments at **KraussMaffei** include the FiberForm system for production of automotive components. The FiberForm technology is designed for large series production of lightweight thermoplastic composite parts. In order to highlight the potential of the FiberForm process KraussMaffei recently demonstrated a 300 tonne machine from its CX Series producing airbag housings made of glass fibre reinforced polyamide with a shot weight of 350g in a cycle time of 45 seconds.

The FiberForm process combines injection moulding with thermoforming of composite sheets. KraussMaffei says that this combination of lightweight materials and construction design means that new fibre-reinforced thermoplastic components can be manufactured with particularly high strengths while retaining the part integration benefits of injection moulded components. In the FiberForm process, continuous fibre fabric or textiles impregnated with a thermoplastic matrix are heated, then shaped in the injection mould and over-moulded. According to KraussMaffei, this method allows ribs to be added for additional stiffness, as well as other functions to be integrated into the process.

Stefan Schierl, a KraussMaffei engineer in the Technology Development department, highlights the potential of the FiberForm process. "FiberForm combines the advantages of injection moulding and thermoforming," he says. "Injection moulding provides good functional integration, while the use of formed composite sheets can

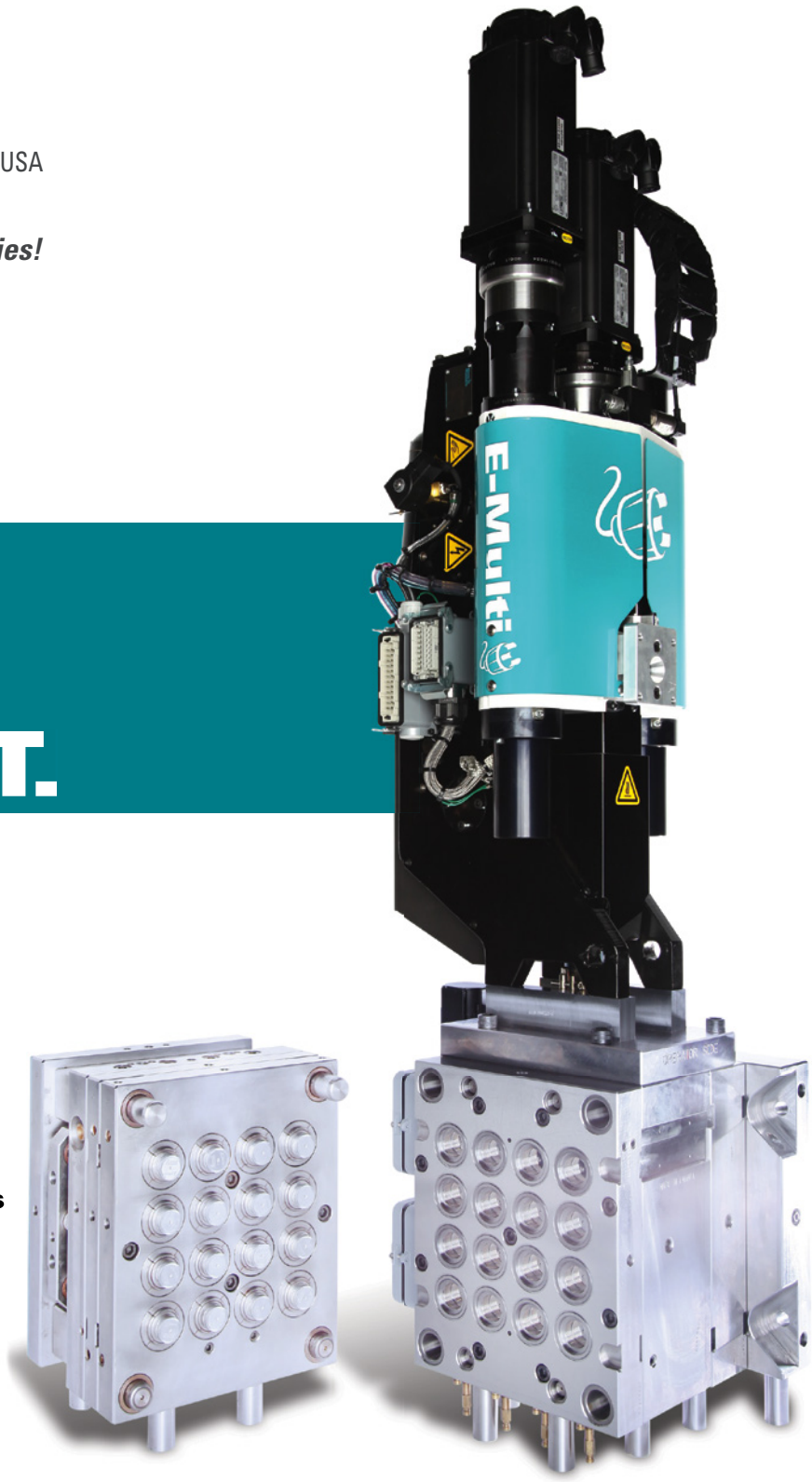


Centre right: This composite airbag housing made of glass fibre reinforced PA is moulded on a Krauss-Maffei CX300 FiberForm machine (right)

VISIT US AT NPE 2015
March 23-27, 2015 - Orlando, Florida USA
West Hall, Booth W2703
Over 25,000 sq ft of possibilities!

E-Multi™

GIVE IT YOUR BEST MULTI-SHOT.



Convert your conventional injection molding processes into a highly efficient, multi-shot molding operation.

- **Compact and portable with flexible mounting options**
- **Highly precise, robust control system**
- **Dependable with maximum uptime features**
- **Shot volumes up to 500 cc**

ALWAYS INNOVATING.

Rely on our global support network for fast service and parts.
North America 1-800-387-2483 | Europe 49 (0) 7221 5099-0

moldmasters.com

Mold Masters®
performance delivered

Right: Sumitomo SHI Demag demonstrated its composite capabilities at Fakuma with this nutcracker exhibit

significantly improve the mechanical properties. By using the FiberForm process it is possible not only to replace metal parts, but plastic ones also.

"An example of this was an airbag housing developed in conjunction with Lanxess, Siebenwurst and Takata. The standard part made of glass fibre reinforced polyamide had a wall thickness of 3mm. By using the FiberForm process the 3mm wall could be replaced by a 0.5mm composite sheet, which offered the same mechanical properties," he says.

Schierl says the FiberForm process is ideal for creating parts that are subject to high tensile forces due to the continuous fibre reinforcement in the composite sheet. "Furthermore, holes can be formed," he adds. "This leads to improved load application in comparison with drilling, because the fibres are not damaged."

Applications are not only focused on the automotive sector. The FiberForm process was used successfully to manufacture a multifunctional stringer for a touring ski binding for Marker of Germany. "There are a number of advantages that FiberForm has delivered for this ski binding," says Schierl. "These include high strength and stiffness, as well as an injection moulded connection for a bolt and a thermoformed bead that provides improved mechanical properties. Other features that can be integrated include the size adjustment for the length of the boot, ribs and screw bosses. In addition, the edge of the composite sheet can be over-moulded with plastic to protect the open fibre ends from moisture."

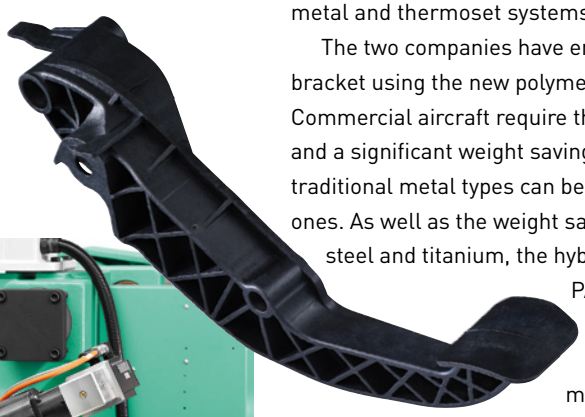
Integrated functions

Sumitomo (SHI) Demag says it is also investigating thermoplastic composite processing techniques to achieve savings through the production of functionally integrated components. The company recently demonstrated a space-saving, compact production cell around a 210 tonne Systec Servo 210-430 machine equipped with the company's energy saving activeDrive servo-hydraulic drive system. It was demonstrated at the Fakuma fair in Germany in October last year producing a hybrid composite nutcracker.

The process starts with the pre-heating of an organic fibre reinforced sheet which is then inserted into the injection mould. The mould is designed to form the sheet as it closes and the formed sheet is then back injection moulded with polypropylene to create a honeycomb reinforcing structure. A metal insert placed in the mould tool as part of the process provides the hinge mechanism and gripping edge for the completed nutcracker. The complete assembly is achieved in the production cell. The result is a lightweight hybrid component with the required stiffness to facilitate the high forces required for the application.

Meanwhile, **Victrex** collaborated with US-based Tri-Mack Plastics Manufacturing Corporation to develop a new PAEK-based polymer/hybrid moulding technology. The development means it is now possible to over-mould a PAEK-based composite sheet with fibre-reinforced Victrex PEEK injection moulding materials. According to Victrex, stronger, lower-cost components that are up to 60% lighter than typical metal and thermoset systems can now be designed.

The two companies have engineered an aerospace bracket using the new polymer/production technique. Commercial aircraft require thousands of such brackets and a significant weight saving could be realised if traditional metal types can be replaced with plastic ones. As well as the weight saving compared to stainless steel and titanium, the hybrid-moulded Victrex PAEK-based composite bracket is able to offer equivalent or better mechanical properties such as strength, stiffness and fatigue.



Below: Arburg's long fibre direct injection technology adds fibre reinforcement into the liquid melt via a side feeder on the injection unit and was used to mould this automotive pedal (centre right)

LFT developments

Arburg demonstrated its capabilities in long-fibre direct injection moulding by producing a high strength lightweight pedal for the automotive sector on its stand at the Fakuma fair in Germany last year. Using a 400 tonne Allrounder 820 S with energy saving servo-hydraulic system, it claimed that material costs could be reduced by more than 50% by using its direct technol-

ogy to compound an LFT during the moulding process. The production system also incorporated an inline flexural testing system for quality control.

In Arburg's long-fibre direct injection moulding process fibres of up to 50mm can be added into the melt through a side feeder on the injection unit. The company says this minimises fibre damage during material preparation. The fibres come from rovings and are cut to the correct length in an upstream process. The process can be used to produce LFT components or to overmould a thermoplastic composite sheet.

The 335g automotive pedal produced at Fakuma was manufactured from PA6 from Akro Plastic on a cycle time of 50 seconds. A Multilift Select robotic system was used to remove the part, set it down and pass it on for inspection. During the quality check, the parts were bent in a defined manner at a flexural testing station. If the resulting bend line was within tolerance, the parts were passed and placed on a conveyor.

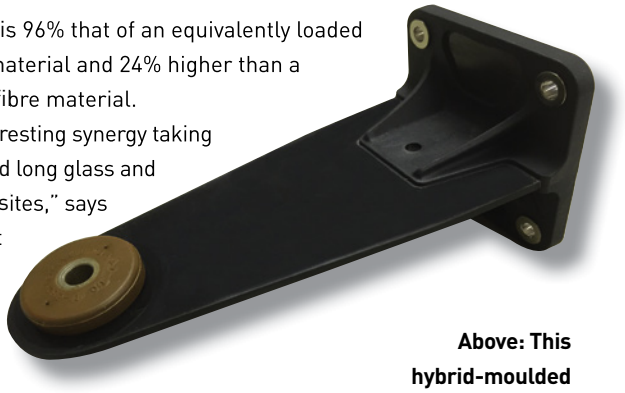
PlastiComp has developed a set of hybrid thermoplastic composites that combine long glass fibre and long carbon fibre reinforcement together in the same pellet for injection moulding. The US company says the new products expand the performance range of the long fibre material options available to product designers while offering a cost effective route to adopt the high performance capabilities of carbon fibre.

"Carbon fibre significantly boosts strength and stiffness, while glass fibre allows the toughness that many choose long fibre thermoplastic materials for to be retained. Strength and toughness are key long fibre attributes that can't be achieved in unison with other reinforcement methods," says Eric Wollan, business development manager at PlastiComp.

"Typically, carbon fibre reinforced composites have a price point that is up to five times the cost of glass fibre materials, which is a high entry barrier for many cost sensitive applications. Our long glass and carbon fibre products can lower this entry point for adopting long carbon fibre by up to 50%. In addition, blending these two reinforcements provides a unique set of properties that combines the best capabilities that each can offer individually," he says.

For example, PlastiComp claims that a polyamide 6/6 hybrid 40% long glass and carbon fibre reinforced composite with 20% carbon fibre has a tensile strength of 284 MPa (41,200 psi), which is 96% that of an equivalently loaded long carbon fibre material and 24% higher than a similar long glass fibre material.

"There is an interesting synergy taking place in these hybrid long glass and carbon fibre composites," says Wollan. "We can cut the amount of carbon fibre used in half and still keep 85-95% of the strength and stiffness, plus the addition of glass fibre is bumping up the durability by up to 25%. The performance combination really makes these products attractive, because they land right where a lot of people need to be to use long fibre thermoplastic composites as substitutes for metals."



Above: This hybrid-moulded Victrex PAEK-based composite aircraft bracket cuts weight by up to 60% compared to stainless steel and titanium

PlastiComp has also introduced Velocity high flow polyamide long fibre reinforced composites. The company says that the products simplify the injection moulding of high fibre content long fibre thermoplastic (LFT) components by more easily producing the smooth, fibre-free finish desired on external surfaces. Standard LFT materials with fibre loadings of 50% or more typically exhibit high viscosity characteristics which can make them problematic to mould, particularly in thin wall sections.

The company says that with standard high fibre content materials, higher moulding temperatures are required to obtain a resin-rich surface, which results in slower cycle times and increased operating costs. It claims that by using Velocity long fibre grades, enhanced fibre-free surfaces can be obtained at 17-22°C lower processing temperatures. A smooth-to-the-touch, resin-rich surface free of fibres makes colours more vibrant and is capable of holding finer embossed details. Secondary finishing operations are not required.

Left: Image showing the improvement in surface finish available from Plasticomp's Velocity long fibre compounds

RTP Company has expanded its Very Long Fiber reinforced Polypropylene (PP VLF) range to include low emission products. Claimed to be ideal for injection moulding, RTP says that the PP VLF products satisfy OEM requirements to reduce VOC levels found in thermoplastic materials specified for use in automotive interior applications. International legislation and automotive OEMs have identified the need to reduce odour, fogging and total VOCs to improve air

Right: Pellets containing recycled carbon fibre from WIPAG

quality and the safety of vehicle interiors.

According to RTP, its PP VLF materials are designed for structural use and provide good strength, stiffness and dimensional accuracy, with reinforcement levels of 20-50 weight percent. The company says that they have been tested and authenticated by approved outside laboratories according to German Automotive Industry (VDA) test methods for odour, fogging and total VOC emissions. Results from VDA test methods show that the PP VLF products meet or exceed OEM requirements in all three categories. Automotive applications include instrument panels, door module carriers, overhead and centre consoles, seating, load floors, pedal boxes, spare tyre covers and storage bins.

Recycling matters

One of the challenges for the composites sector in the past has been recycling, which has been difficult to achieve without a significant downgrading of performance. However, an increasing number of organisations are now getting involved in carbon fibre recycling.

German company **WIPAG** has just completed a carbon fibre recycling facility and is supplying thermoplastic composites with recycled carbon fibre reinforcements for injection moulding. The company sources production waste from the car manufacturing industry, as well as end-of-life vehicles.

"We can now offer a full range of thermoplastic composites with up to 40% recycled carbon fibre, from polyamide and polypropylene to polyphthalamide (PPA) and styrene maleic anhydride (SMA)," says marketing manager Simone Wiedemann. "All are suitable for a full range of injection moulding applications, similar to those for glass fibre reinforced materials."

The company adds that the mechanical properties are good. For example, a PA 6 material with 40% recycled carbon fibre has an impact resistance of 60kJ/m^2, notched impact resistance of 9kJ/m^2, tensile E modulus of 27,000MPa and tensile strength of 210MPa. Similarly, PP with 30% recycled carbon fibre can offer an impact resistance of 48kJ/m^2, notched impact resistance of 8kJ/m^2, tensile E modulus of 13,000MPa and tensile strength of 90MPa.

Click on the links for more information:

- **www.engelglobal.com**
- **www.basf.com**
- **www.kraussmaffei.com**
- **www.sumitomo-shi-demag.eu**
- **www.victrex.com**
- **www.arburg.com**
- **www.plasticomp.com**
- **www.rtpcompany.com**
- **www.wipag.de**

MORETTO

ΣUREKA

Drying Revolution

The absolute world leader in energy efficiency,
54 W/h per kg for the PET treatment.

Σureka includes X MAX, Flowmatik, OTX.

NPE2015

STAND **W7371**
HALL **E**

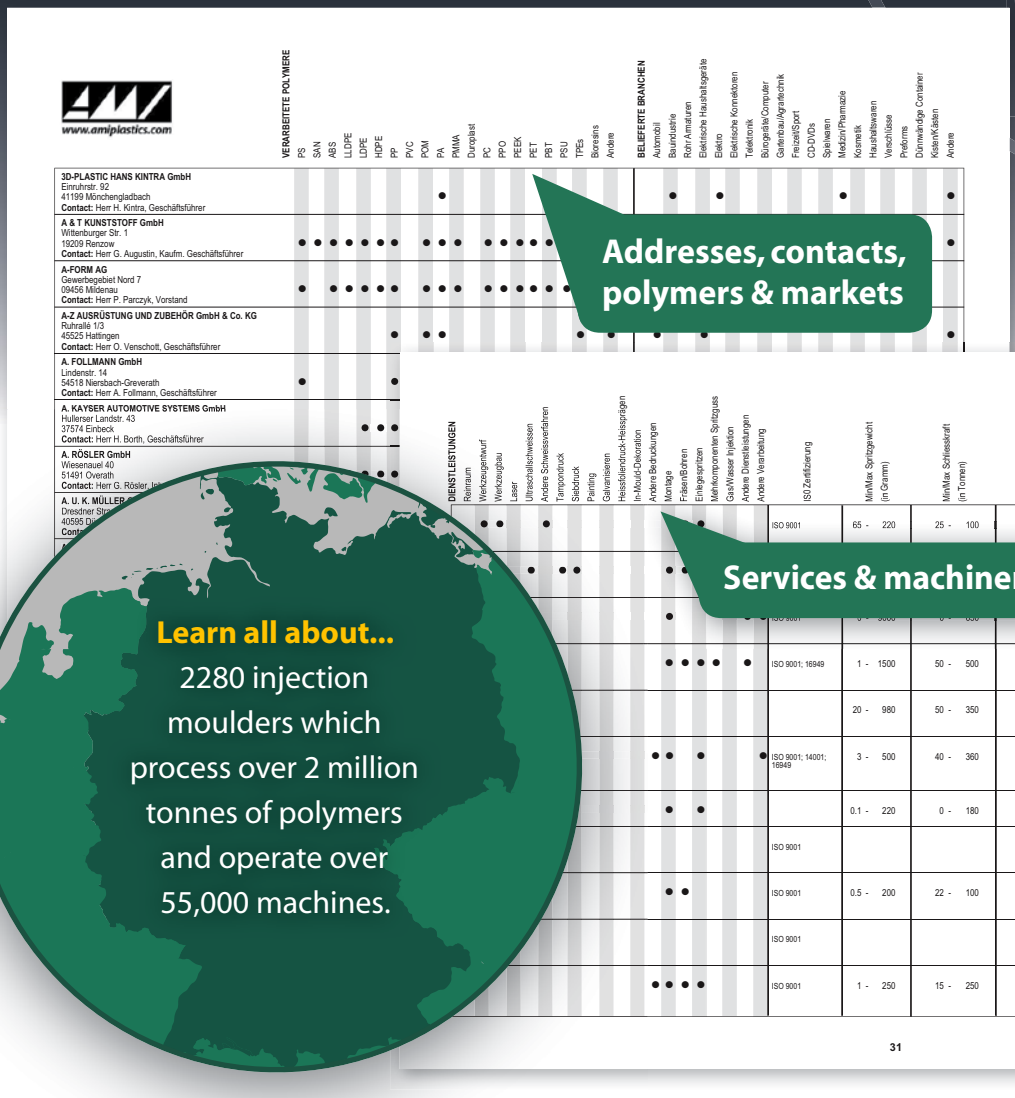
www.moretto.com

NEW 2013

AMI's database:

THE INJECTION MOULDING INDUSTRY IN GERMANY

Germany is without a doubt the powerhouse of the European injection moulding industry. In depth knowledge of this industry can be yours with AMI's new comprehensive guides and database.



Addresses, contacts, polymers & markets

Services & machinery

Learn all about...
2280 injection moulders which process over 2 million tonnes of polymers and operate over 55,000 machines.

Available as a fully searchable database

Click here for more details

Book format:
The data is available in two seperate books, Volume 1 North Germany & Volume 2 South Germany

CD database format:
The data from the two books is also combined into one fully searchable database

CD database functions include:

- Search and select records by name, country, polymer, market, number of machines, etc.
- Export addresses and contacts to an excel spreadsheet

Peter Mapleston reports on some of the latest developments in glass, carbon and alternative fibre reinforcements for use in thermoplastic composites

Reinforcing the fibre options

Suppliers of fibres for reinforcing thermoplastics are working hard to deliver products to meet requirements for improved mechanical, chemical and even electrical properties. While glass fibres might be considered a rather mature technology, producers are still making strides in high-end products and major capacity investments are changing the supplier landscape. There is also considerable activity in carbon fibre development as well as basalt, which some believe could find new opportunity in the thermoplastic composite arena.

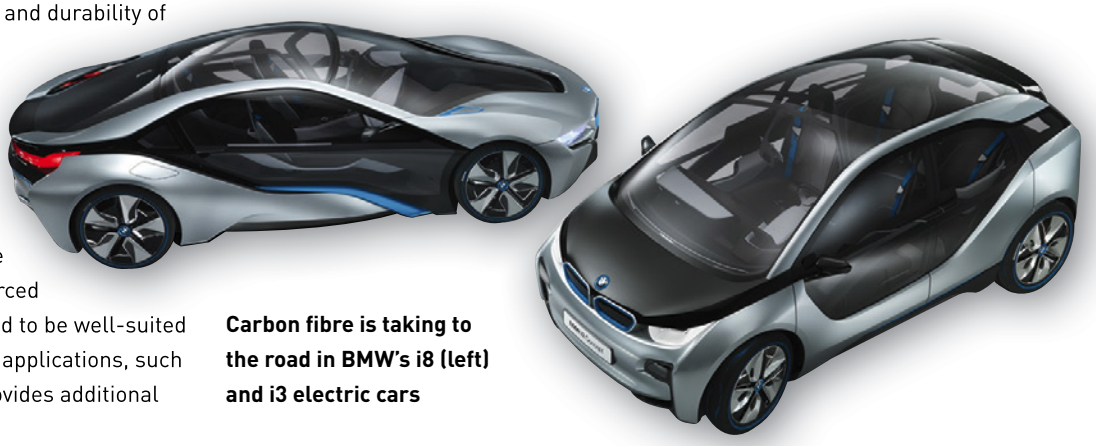
Last year, Owens Corning introduced its Performax SE4849 roving, which has been developed specifically to provide improved adhesion between fibre and matrix in long-fibre-reinforced thermoplastic polypropylene (LFT-PP) compounds. The new fibre uses the company's boron-free Advantex glass, which combines the electrical and mechanical properties of traditional E-glass with the corrosion resistance and durability of E-CR glass.

Corey Melvin, Owens Corning product manager for LFTs, says Performax SE4849 has been designed for hot-melt compounding, pultrusion, and direct compounding (DLFT). It can also be used to produce unidirectional continuous fibre reinforced thermoplastic (CFRT) tapes and is said to be well-suited for a broad range of consumer goods applications, such as appliances and power tools. "It provides additional opportunities to replace traditional metals in complex and often challenging structural and semi- structural automotive components," Melvin says.

The company has also introduced new chopped strands for PBT and PET under the grade name of 272. It says this product is designed for use in short fibre compounding applications requiring superior electrical insulation properties, dimensional stability, and wear resistance. Target applications include automotive electrical systems and connectors.

Last year also saw producer 3B extend its range of short glass fibre reinforcements for high temperature resins. Grade DS 8800-11P is compatible with polymers such as polyethersulphone (PES), polyphenylenesulphide (PPS), polyetherimide (PEI), or polyetheretherketone (PEEK). Its, optimised dispersion behaviour allows its use in highly viscous resins and at loadings in excess of 55%.

Main image: Lehmann & Voss is one of a growing number of compounders incorporating carbon fibres into its high performance products



Carbon fibre is taking to the road in BMW's i8 (left) and i3 electric cars

Right: Johns Manville's ThermoFlow chopped strands offer increased processing at higher glass loadings

According to the company, DS 8800-11P exhibits very good mechanical properties, especially stiffness and heat stability. Heat ageing and hydrolysis/glycolysis resistance are also said to be very good. It is also suitable for food contact applications. Claudio Di Gregorio, 3B's product leader for thermoplastics, says that growing restrictions related to food contact norms are adding severe limits to the design freedom of glass fibre products, and that this normally results in a decrease of product performance associated with a higher cost and product offering fragmentation.

Johns Manville has developed a new range of ThermoFlow chopped strands and StarRov direct rovings offering increased processing speed at high glass loadings. Products are suitable for use in polyolefins, polyamides and high heat resistant polymers.

Lanxess reports strong growth in demand for its milled short glass fibres, especially in thermoplastics compounds. Lanxess has four basic grades of milled short glass fibres in its range, all of them classified as E-glass. They differ in the formulation of their finishes (surface treatments) and the length of the fibres. Average fibre lengths range from 50 to 210µm. They have a uniform fibre diameter of 14µm and the residual moisture content is less than 0.05% by weight. The company highlights ease of dosing and consistent white colour. The range also includes product grades suitable for food contact applications.

Lanxess says the milled short glass fibres also have potential applications outside of conventional plastics compounding. For example, their small size makes them suitable for use in reinforced thermoplastics for 3D printers.

Established glass fibre manufacturers in Europe now have to contend with a new(ish) kid on the block. Jushi Egypt For Fiberglass Industry, part of China Fiberglass, opened an 80,000 tonnes/year production plant in Egypt earlier this year. It is the only glass fibre plant in Africa and, due to its location in the China-Egypt Suez Economic & Trade Cooperation Zone, provides Jushi with good access to Europe as well as Asia and Africa.

Below: Jushi Egypt's new 80,000 tonne/year glass fibre plant opened in Egypt last year

Output includes roving and chopped strands for thermoplastics as well as chopped strand mats for thermosets. The company believes it has an advantage over established suppliers with a plant that incorporates the latest technology that makes it very cost-efficient; the facility is claimed to have the most advanced large-furnace technology in the world for the production of glass fibres. The company adds that, "depending on the market situation," it could raise capacity to 200,000 tonnes.

Cutting the cost of carbon

There's been a great deal of buzz around carbon fibre-reinforced composites in recent months, especially in connection with new cars such as the electric BMW i-Series. Most of these composites are based on thermosetting resins and continuous fibres, but fibre producers are also looking at applications in thermoplastics compounds. Indeed, SGL Group (which has a joint venture with BMW in the US called SGL Automotive Carbon Fibers) recently began production in Scotland of carbon fibres that are formulated for compatibility with thermoplastics. The new production is initially aimed at applications in the automotive industry.

"The next generation of carbon fibre-based products is currently emerging in the thermoplastics sector," says Peter Weber, VP for sales and marketing at SGL Group. The company introduced a new heavy tow carbon fibre - Sigrafil C50k - at the JEC Composites Show in Paris.

SGL Group has developed a special sizing to optimize bonding between the fibre and the thermoplastic matrix. More sizing systems, for high-temperature applications and others, are at the development stage.

Most carbon fibre reinforced thermoplastic compos-

Piovan Group

5 production plants

21 service and sales branches

70 distribution locations

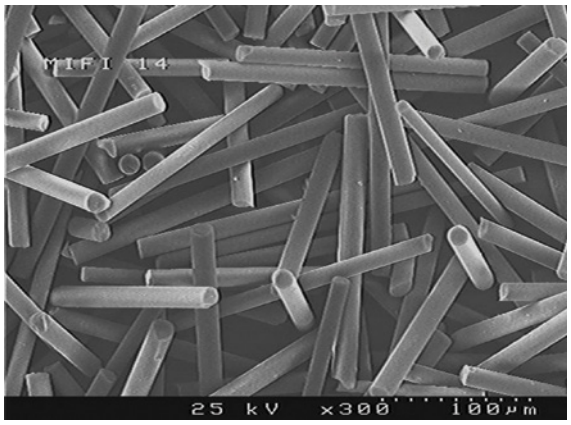
Together at your service

Piovan
Customers. The core of our innovation

Una·Dyn
A Piovan Company

Fdm
A Piovan Company

Visit our new website
www.piovan.com/newidentity



Right: Milled short glass fibres from Lanxess provide a narrow length distribution and uniform diameter

ites are high-performance continuous fibre-reinforced types that use low-tow aerospace-grade fibres (3-12 k) that are relatively costly, says Andreas Erber, head of SGL's thermoplastic program. He says by using larger industrial-grade carbon fibres, with a 50-k tow, both the fibre and the manufacturing processes for the thermoplastic component can be optimised in terms of total material costs. "Consequently such material systems can be the enabler for high-volume applications in, for example, the automotive and consumer goods industries."

SGL Group currently estimates that global annual demand for carbon fibres will amount to around 100,000 tonnes/year by 2020, with the industrial segment having a share of 75%. It should be pointed out, however, that a large part of this demand will still be in continuous fibre tape and textile-reinforced composites.

Alternative reinforcements

An alternative to traditional reinforcements is offered with new types of synthetic reinforcing fibres such as Milliken's Hyperform HPR-803i. Once again a key market is automotive. Milliken says the grade allows designers to create parts that are up to 15% lighter than currently-used reinforcement/filler systems without compromising performance. Hyperform HPR-803i is added at a lower addition rate than mineral fillers to polypropylene compounds, so the compounds have a lower density.

Hyperform HPR-803i compounds are said to be suitable for injection moulding operations originally designed for talc-filled compounds, simplifying testing requirements and reducing implementation costs. Milliken cites processors switching from compounds containing 20% talc to compounds with 10% talc and 7% HPR as a cost-effective route to product improvement.

Fibres made from basalt – a rock that forms when lava cools very quickly – are increasingly being considered as a further possible solution in thermoplastic compounds. Basaltex, a supplier of basalt fibres in Belgium, envisages them being used in place of glass for applications such as automotive parts where their extra high strength can be used to produce lighter parts. In some applications, they could also provide an alternative to carbon fibres.

The company says that good mechanical properties, the easy wetting of the filament surface and recyclability make basalt fibres particularly suitable for composites. The fibres also show good resistance to UV, heat and abrasion and offer low water absorption and inherent fire resistance.

Jeroen Debruyne, project manager at Basaltex, says the company began offering chopped basalt fibres compatible with polypropylene earlier this year, and already has one major compounding customer. It is currently testing sizings compatible with polyamides. Fibres have a diameter of 13 microns.

Basalt is a mafic rock, meaning that it contains magnesium and iron. Mafic is also the name of a 2012 start-up company with basalt fibre production in Kells, Ireland (it also produces LFTs in Woodbridge, Canada). It has six small ovens there, an arrangement that provides it with flexibility to produce grades for specific requirements, says Jeff Thompson, a marketing specialist at the company.

Thompson says Mafic puts a strong emphasis on quality control to set it apart from established producers in eastern Europe and Asia, where currently the bulk of basalt fibre comes from.

Mafic is aiming its products at numerous markets, including thermoplastic compounds. Thompson says the company has in-house capability to produce sizings, and will work with customers to produce grades according to requirements.

Compounders producing compounds reinforced with basalt fibres include Lehmann & Voss. Thomas Collet, responsible for product management and marketing in the company's Luvocom business unit, says that it has been using basalt fibres for some time, often in combination with other fibres that enhance tribological properties for example.

Click on the links for more information:

- **www.basaltex.com**
- **www.jm.com (Johns Manville)**
- **www.jushi.com.eg**
- **www.lanxess.com**
- **www.lehvoss.de**
- **www.maficbasalt.com**
- **www.millikenchemical.com**
- **www.owenscorning.com**
- **www.sglgroup.com**
- **www.3B-fibreglass.com**

Turn page for the full programme ➤

CONDUCTIVE PLASTICS 2015

Developing technologies and applications for electrically and thermally conductive plastics

HEADLINE SPONSOR

PREMIX

29th June – 1st July 2015
Hotel Nikko,
Düsseldorf, Germany

** + 19% German VAT*

SPECIAL OFFER: Save €100* if you register before 15th May 2015

Organised by:
Applied Market Information Ltd.

Also sponsored by:
nanocyl
THE CARBON NANOTUBE SPECIALIST

Media supporters:
compounding WORLD
injection WORLD

CONDUCTIVE PLASTICS 2015

29 June - 1 July 2015, Hotel Nikko Düsseldorf, Germany

AMI is pleased to announce its first Conductive Plastics conference, a brand new event that will examine the development, processing and application of electrically and thermally conductive thermoplastics. This high level international event takes place from the 29th June to the 1st July 2015 at the Hotel Nikko in Düsseldorf, Germany, and will bring together OEMs, engineering designers, processors, compounders and additive producers.

Interest in the use of thermally conductive and electrically conductive thermoplastic compounds to replace metals and ceramics is growing fast across a wide and varied range of demanding applications. These include LED lighting, automotive components, electronics manufacturing, electromagnetic shielding and ATEX applications for reducing the risk of explosion.

However, developing electrically and thermally conductive components is not straightforward. Conductive Plastics 2015 will look at the wide range of additive technologies available to developers of conductive plastic compounds. Expert presentations will examine how to optimise the design and production of electrically and thermally conductive plastics components, and will address the critical influence of processing parameters on the properties of finished parts.

In addition, the conference will provide insight into existing and emerging market opportunities for conductive plastics. In particular, speakers will look at how the design and production flexibility provided by conductive plastics, combined with competitive cost and light weight, are can open up exciting new opportunities for compounders, processors, designers and OEMs.

Conductive Plastics 2015 will provide a unique learning and networking environment where all involved in the development of electrically and thermally conductive plastics, and those designing and manufacturing conductive components, can explore the very latest technology options and identify new opportunities and applications.

EARLY BIRD REGISTRATION OFFER

Register before 15th May 2015 and pay €890* saving €100* on the full price of €990*. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Welcome Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

SPONSOR THIS EVENT

A variety of sponsorship opportunities are available at this conference to help to promote and enhance your company's products and services to this highly targeted international audience. Contact the conference hotline for further information.

*+19% German VAT

CONFERENCE HOTLINE

Contact: Kat Langner, Conference Organiser
Tel: +44 (0) 117 314 8111
Fax: +44 (0) 117 311 1534
Email: kl@amiplastics.com

See the latest programme and confirmed speakers at:
www.amiconferences.com

HEADLINE SPONSOR

CONFERENCE

Monday 29th June 2015

18.00-19.30 Registration and Welcome Cocktail Reception

There are no conference sessions on this day

Tuesday 30th June 2015

08.00 Registration and welcome coffee
09.00 Opening announcements

MARKET OVERVIEW

09.10 **Identifying market opportunities for electrically and thermally conductive plastics**
Ms. Pallavi Madakasira, Analyst,
LUX RESEARCH INC., United States

09.40 **Conductive polymers - Trends and developments**
Dr. J. Carlos Caro, R&D Manager,
GRAFE POLYMER TECHNIK GmbH, Germany

SESSION 1 – PROCESSING AND COMPOUNDING

10.10 **Important variables impacting performance of carbon black filled conductive plastic compounds**
Ing. Christine Van Bellingen, Product Manager,
Carbon Black & Graphite For Polymers,
IMERYS GRAPHITE & CARBON, Belgium

10.40-11.10 Morning coffee sponsored by:

11.10 **Extrusion and injection moulding of semi-conductive compounds**
Mr. Kari Alha, R&D Director,
PREMIX Oy, Finland

11.40 **Key considerations in the selection and application of graphene based plastic masterbatch and compounds**
Mr. Leonardus Jo Peeters, Managing Director,
COLOR2PLAST, Switzerland

SESSION 2 - MANAGING ESD AND EMI

12.10 **Inherently dissipative polymers (IDP) in plastics for static control applications**
Mr. Jukka Hillberg, CTO,
IONPHASE Oy, Finland

12.40-14.10 Lunch

14.10 **Utilising unique fillers and compounding methods to add EMI and thermal conductivity to thermoplastic compounds**
Mr. Neil Hardwick, Marketing Manager,
RTP COMPANY, United States

14.40 **Carbon nanotubes composites: commercially available solutions for automotive and electrical / electronic applications**
Dr. Marie Hurtgen, Technical Services & Development Application Scientist,
NANOCYL, Belgium

SESSION 3– ENHANCING THERMAL CONDUCTIVITY

15.10 **Application of aluminosilicate fillers to improve the thermal conductivity of electrically-insulating plastics**
Dr. Jörg Ulrich Zilles, Head of R&D,
QUARZWERKE GmbH, Germany

15.40-16.10 Afternoon tea

16.10 **High performance boron nitride fillers for polymer-based thermal management solutions in E&E applications**
Mr. Armin Kayser, Manager Product & Application Development,
3M ADVANCED MATERIALS DIVISION, Germany

Turn page for booking details ➤

PREMIX

PROGRAMME

16.40 **The effect of in-plane and through-plane thermal conductivity on LED heatsink performance**
Dr. Frans Mercx, Chief Scientist, T&I, Material Science - Functional Materials,
SABIC INNOVATIVE PLASTICS, Netherlands

17.10 **Opportunities, challenges and applications for thermally conductive plastic compounds**
Mr. Matthias Wuchter, MSc., Development Manager Compounds,
ENSINGER GmbH, Germany

20.00 Conference Dinner

Wednesday 1st July 2015

08.30 Registration and welcome coffee
09.00 Opening announcements

SESSION 4 – ELECTRICALLY CONDUCTIVE APPLICATIONS

09.10 **Development of Raychem self-regulating heat trace cables and other products based on conductive plastics technology**
Dr. Larry Welsh, Materials Scientist,
PENTAIR THERMAL MANAGEMENT, United States

09.40 **3D printing electrically conductive plastic components - technical challenges and material properties**
Dr. Simon Leigh, Assistant Professor,
UNIVERSITY OF WARWICK, United Kingdom

10.10 **Formulation and processing of highly-filled conductive plastic compounds for fuel cell applications**
Mr. Mario Gillmann, Research Associate,
ZENTRUM FÜR BRENNSTOFFZELLENTECHNIK ZBT GmbH, Germany

10.40-11.10 Morning coffee

11.10 **Boosting electrical conductivity of plastics using high performance plastic concentrates**
Mr. Sebastian Heitkamp, Marketing Manager EMEA,
CABOT CORPORATION, Switzerland

SESSION 5 – THERMALLY CONDUCTIVE APPLICATIONS

11.40 **Technical development and market opportunities for thermally conductive extrusion profiles**
Mr. Sebastian Ossadnik, R&D Engineer,
TECHNOFORM KUNSTSTOFFPROFILE GmbH, Germany

12.10-13.40 Lunch

13.40 **Thermally conductive polycarbonates for LED lighting**
Dr. Klaus S. Reinartz, Director Marketing LED EM/LA,
BAYER MATERIAL SCIENCE AG, Germany

14.10 **Speaker to be confirmed**

14.40 **Thermal management of portable electronic devices utilising latent heat sink (LHS) plastics**
Mr. Mark Hartmann, Chief Technology Officer,
OUTLAST TECHNOLOGIES LLC, United States

15.10 Closing comments

15.20 Afternoon tea and conference ends

AMI reserves the right to alter the programme without notice.
The latest programme including any new speakers or changes to schedules can be viewed on our website ***www.amiconferences.com***

HEADLINE SPONSOR

PREMIX

Premix is one of world's leading manufacturers of electrically conductive plastics. Premix offers a comprehensive product portfolio of electrically conductive PRE-ELEC® compounds and concentrates and static dissipative PRE-ELEC® ESD compounds for electrostatic discharge (ESD), explosive atmospheres (ATEX) and metal replacement applications.
Today the products and tailored solutions are used in a wide range of industries, including automotive, electronics, diagnostics, mining and chemical. The profound knowledge in carbon black dispersion and polymer modification, along with strong product development know-how and close partnerships with customers, has led to the creation of innovative and reliable product concepts.
Visit www.premixgroup.com for more information.

CONDUCTIVE PLASTICS 2015: EXHIBITION SPACE

Make it easy for the delegates to find you at this busy event with your own table top exhibition space. Bring your own display stand, or just use the space to have literature and samples available and ensure that you make an impact. The table top exhibition will run throughout the conference in the in the exhibition room next to the main meeting room.

Registration includes 1 delegate place!

Space is limited so to avoid disappointment please register for this service as soon as possible.

HOTEL ACCOMMODATION

Delegates are responsible for booking their own accommodation. AMI has negotiated a limited number of rooms at the rate of €123 for a single room and €153 for a double (breakfast, Wi-Fi and taxes included) at the Hotel Nikko in Düsseldorf until 29th May 2015 only. To reserve a room, please contact the reservation department and state that you are attending "AMI's Conductive Plastics 2015" conference on:
Tel: +49 211 834 2111 Fax: +49 211 834 2109
Email: reservation@nikko-hotel.de

Save €100*

Register before 15th May 2015

*+19% German VAT

FIVE GOOD REASONS WHY YOU SHOULD ATTEND:

1. **Identify new and emerging market opportunities**
2. **Learn how to modify electrical properties**
3. **Explore new thermal management options**
4. **Find out how to overcome processing challenges**
5. **Network with conductive plastics technology experts**

REGISTRATION FORM

Company: _____

Address: _____

_____

Country: _____

Tel: _____ Fax: _____

Email: _____

VAT No.: _____
(Must be completed by all EU Companies)

Company activity: _____

Purchase order No. *(if applicable)*: _____

Invoice address *(if different from above)*: _____

_____

_____

DELEGATE DETAILS

If more than one delegate please photocopy form

Title: _____ First name: _____

Surname: _____

Position: _____

Special dietary requirements: _____

Signature: _____ Date: _____

PAYMENT DETAILS

All payments to be made in Euros

Please tick box and write amount:

❑ Early bird admission fee: *(Until 15th May 2015)*	€890 + €169.10* = €1059.10	_____
❑ Admission fee thereafter:	€990 + €188.10* = €1178.10	_____
❑ Conference Dinner:	€79 + €15.01* = €94.01	_____
Table Top Exhibition Package (includes 1 delegate place)		
❑ German resident companies eur	€1500 + €285 = €1785	_____
❑ Non - German resident companies (***Only admission fee part of package is VAT chargeable at 19%*)	€1500 + €169.10 = €1669.10	_____

** German VAT charged at 19%* **Total:** _____

Please note all delegates have to pay the VAT stated above

METHOD OF PAYMENT

On receipt of this registration form your credit card will be debited.
You will be sent an invoice in 7-14 working days.

❑ **Bank transfer quoting:** 'Applied Market Information Ltd. - Conductive Plastics 2015' to: Commerzbank, Filiale Düsseldorf, Breite Straße 25, 40213 Düsseldorf, Germany
Account number: **1024710** Bank No. **300 400 00**
IBAN: **DE93 3004 0000 0102 4710 00** SWIFT: **COBADEFFXXX**

❑ Visa / Mastercard / Eurocard / JCB

				-					-					-				

If paying by card the following information **must** be given

Name of cardholder: _____

Expiry date: _____ 3-digit security code: _____

Cardholder's signature: _____

Card billing address: _____

Post / zip code: _____

Country: _____

Tel: _____ Fax: _____

Email: _____

CONDUCTIVE PLASTICS 2015
CONFERENCE INFORMATION

Date and location
29 June-1 July 2015
Hotel Nikko Düsseldorf
Immermannstraße 41
40210 Düsseldorf
Germany
Tel: +49 211 834 0
Fax: +49 211 161 216

Registration fee
The registration fee includes attendance at all conference sessions, the Welcome Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

- ***Early bird registration:*** Register before 15th May 2015 for only €890*. Thereafter the cost is €990*.
- ***Group rates:*** For companies wishing to register two or more delegates, group discounts are available. Please contact the Conference Organiser for more details. (Please note to qualify for the group discount delegates must be booked at the same time, otherwise additional delegates may be charged at full price.)

Conductive Plastics 2015 table top exhibition
A limited number of table top exhibition spaces are available in the registration area and coffee lounge directly outside the conference room. The table top exhibition fee is excellent value for money and **includes 1 delegate place**. Exhibitors may either use tables provided by the hotel or bring their own stand or display.

Sponsor this event and promote your company
A variety of sponsorship opportunities are available at this event that can help to promote and enhance your company's products and services to this highly targeted international audience. For further information, please contact the Conference Organiser on: +44 (0) 117 314 8111.

Social events
The social events organised for Conductive Plastics 2015 will provide an ideal setting for delegates and speakers to mix business with pleasure.

- ***Welcome Cocktail Reception:*** A welcoming cocktail reception will be held on the first evening. All delegates are invited to attend and it will offer an excellent opportunity to meet speakers and other colleagues. The Welcome Cocktail Reception will run approximately from 18:00 to 19:30 and is included in the delegate fee.
- ***Conference Dinner:*** All delegates are warmly invited to attend the Conference Dinner, which will take place at a local restaurant on the evening of 30th June 2015. The additional cost is €79*.

Hotel accommodation
Delegates are responsible for booking their own accommodation. AMI has negotiated a limited number of rooms at the rate of €123 for a single room and €153 for a double (breakfast, Wi-Fi and taxes included) at the Hotel Nikko in Düsseldorf until 29th May 2015 only. To reserve a room, please contact the reservation department and state that you are attending "AMI's Conductive Plastics 2015" conference on:
Tel: +49 211 834 2111 Fax: +49 211 834 2109
Email: reservation@nikko-hotel.de

Cancellations
Full refunds, less a cancellation charge of €200 will only be made on cancellations received prior to 29th May 2015. Thereafter we regret that no refunds can be made. Delegates may be substituted at any time. Please note that refunds will not be given on table top bookings, sponsorship packages or dinner places.

*+19% German VAT

CONFERENCE HOTLINE

KAT LANGNER, CONFERENCE ORGANISER
Applied Market Information Ltd.
6 Pritchard Street, Bristol, BS2 8RH, United Kingdom
Tel: +44 (0) 117 314 8111 Fax: +44 (0) 117 311 1534
Email: kl@amiplastics.com

The latest programme, including any new speakers or changes to the schedule can be viewed on our website: **www.amiconferences.com**

The goal for producers of thin wall parts is to make lighter products more quickly and without sacrificing performance. **Peter Mapleston** finds out how

Paring down the walls

Developers of machines, moulds and key equipment components continue to come up with new solutions and technologies designed to produce thin-wall packaging and technical parts more quickly and more cost-effectively—all without compromising on their performance. Processors that take heed may have to make some substantial investments at the outset, but some of the claimed payback times are surprisingly short. Several new developments were on show at the Fakuma exhibition in Germany last October, and more will be presented in March at the NPE in Orlando, Florida.

At Fakuma, **Arburg** used a 130 tonne packaging specification hybrid Allrounder 520H unit to demonstrate high-speed production of thin-walled 'SKET' yoghurt tubs, developed by major dairy packaging producer Uniplast Knauer and mould maker H Müller-Fabrique de Moules. The polypropylene tubs feature a special geometry that makes it possible to get the wall thickness down to below 0.2 mm while retaining a relatively thick sealing edge measuring 0.7mm to ensure reliable sealing of the lid. The tubs were decorated with peel-off cardboard labels. The plastic component of the total weight was 4.7g, which is around a quarter less than conventional yoghurt tubs.

The machine at Fakuma was running with a single-cavity mould and a robotic IML system. The cycle time was 3.7 s, with a filling time of just 0.12 s. The modular injection mould is based on a multifunctional design with heated needle-type shut-off nozzles. These can be changed quickly, depending on whether the lid or the tub is being produced and whether injection is to be from the inside or outside.

Grooves arranged in a spiral in the mould act as flow aids during injection, ensuring that the melt reaches the thick sealing edge before it freezes. Cardboard labels of different thicknesses are applied to the side walls and base of the tub to provide greater stability. The labels are easy to remove after use to assist recycling.

Main image: Thin wall containers produced on a 650-tonne Engel e-Speed hybrid packaging machine

Electrics gain ground

Thin-wall packaging production requires a very high power density from the injection moulding machine, which must be able to provide high forces and speeds within an extremely short time. Traditionally the realm of accumulator-supported hydraulic machines, the thin wall packaging world is changing and electric technology is gaining ground.

Italian machinery maker **BMB** was among the first to

Above and right: Arburg showed production of SKET PP yoghurt tubs with peel-off card labels at Fakuma. The tubs feature a wall less than 0.2mm thick

commit to all-electric technology for packaging moulding, using direct drive servo technology in its eKW machine range. Nigel Baker, managing director of BMB's operation in the UK, says he believes it is the only injection machine maker able to offer a full electric packaging option up to 1,000 tonnes (customers can choose an electric, hydraulic or hybrid injection unit to pair with the electric clamp in its eKW series machines). Baker cites a UK customer with an 850 tonne eKW machine producing thin-wall 500g containers on cycle times of less than 6s.

Engel also sees electric technology making headway. It says its e-Speed hybrid machine provides the performance required by the packaging industry, even in versions with clamp forces over 400 tonnes. The company presented its first e-Speed - a 650 tonne toggle machine - at K 2013. It says that in the first applications, the new machine concept is saving over 50 % energy in comparison to conventional accumulator-driven machines. "With an electrical clamping unit and a hydraulic injection unit, the machine is ideal for thin-wall injection moulding," the company says.

The e-Speed design incorporates a novel energy accumulator concept that uses a flywheel to recover the braking energy from the mould mounting platens and then make it available again as needed. Any energy that is not required is fed back into the grid. Load peaks, such as those that commonly occur when large electrical injection moulding machines are employed with high dynamics, are avoided. Drawn electrical power only accounts for 30 % of the load peak.

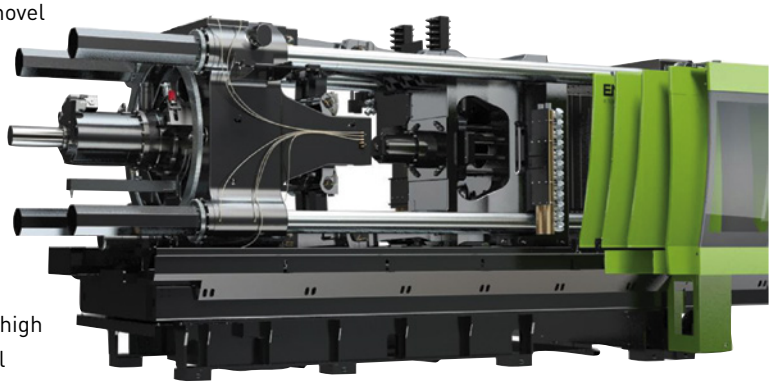
At K 2013, the Engel e-Speed 650 was demonstrated with a 90 mm barrier screw producing thin-wall PP food containers using an 8+8-cavity stack mould (from StackTeck). Overall cycle time was 3.6s and the specific energy consumption was 0.52 kWh/kg. Since then, the company says one of its customers has been producing 4-litre PP pails on a four-cavity mould (shot weight 560 g) at a cycle time of 7.4s and a specific energy consumption of 0.39 kWh/kg.

Nordson Xaloy is focusing on the thin wall packaging sector with its new barrier screw plasticising development. Quantum is claimed to provide increased plasticising rates with minimal shear generation and polymer degradation and faster recovery. The system will be launched at the NPE show in the US next month (see our NPE preview on page 43 of this edition for more details)

Machine maker **Sumitomo SHI Demag** also adopts a hybrid solution for the most demanding packaging applications in the form of its El-Exis SP series machines. The hybrid drive system with energy recycling saves up to 40% of energy. "Although the production rate is the focus in most cases, the quality of the parts and a more energy-efficient overall process are essential for the economic production of packaging," the company says. "IML often used for thin walls additionally increases the complexity of the injection moulding process."

At Fakuma, the company demonstrated a 200 tonne El-Exis SP 200-920 making PP food containers with IML. The 6.2g cups were produced in a four-cavity mould from Otto Hofstetter and the compact manufacturing cell was running with a cycle time of under 3.5s.

Sumitomo (SHI) Demag says the decentralised electric drive of the clamping unit on the El-Exis SP design allows fast and sensitive opening and closing of the tool. "This ensures the precise positioning of the labels and correct removal of the finished cups," the company says.



Right: The electric clamp on Engel's e-Speed packaging machine

Mould innovations

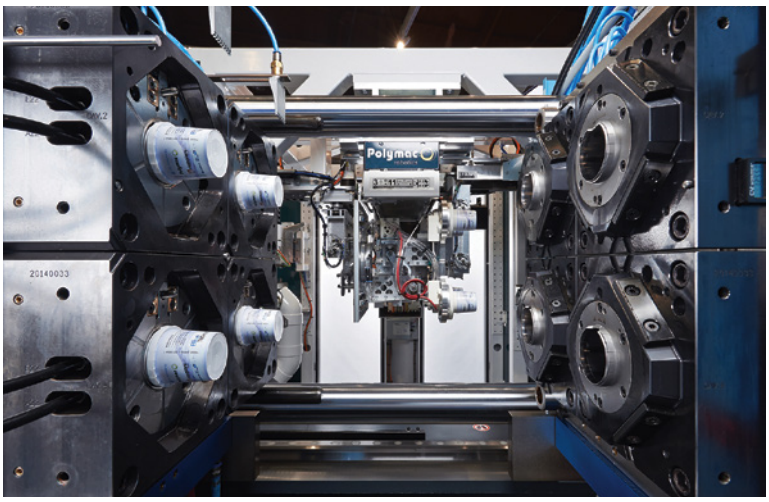
StackTeck Systems picked up the Gold Award for 'Best Thin Wall Package' at the recent In-Mold Decorating Association's Parts Competition. Developed for brand owner Kentucky Fried Chicken, the 64oz carry-out pail used StackTeck's Thin Recess Injection Molding (TRIM) technology, previously described in *Injection World* **here**.

The pail, moulded by SriThai Superware of Bangkok, Thailand for KFC, was the first commercial application of the TRIM technology. StackTeck says that SriThai Superware challenged StackTeck to find a way to reduce the weight of the pail, used for popcorn at movie theatres, that was already at the limit of conventional thin-wall packaging. "By pushing the TRIM part design to the limit, covering approximately 90% of the part with ultra-thin panels, a weight saving of approximately 40% was achieved," says Jordan Robertson, StackTeck's general manager for business development and marketing. "Most of the surface of this part has a wall thickness that corresponds to an L/T ratio of 550."

More innovative mould technology for thin-wall packaging is being developed at UK-based **GR8 Engineering**, which is headed by Peter Clarke. He is currently at an advanced stage of development with a process he calls two-stage injection compression moulding (ICM), which is intended for production of flat preforms to be used in the company's proprietary EcoForm process. GR8's initial target is to produce amorphous PET container preforms with an L/T of 250:1, but the ultimate goal is 500:1. Using polypropylene, Clarke says L/T ratios of 1000:1 are possible (by comparison, he says standard PET preforms for bottles have L/T ratios of around 50).

The two-stage ICM technology is the latest from Clarke's 16-year involvement in the multi-cavity thin wall ICM sector, which included development of the Im-Pak ICM process. This used external shooting pots to control melt delivery, one of the key challenges in implementing a multi-cavity ICM mould. Two-stage ICM incorporates a pre-dosing step to control the amount of material injected into the cavity.

"The process uses internal movement in the mould to accelerate the material to the end of flow. Hydraulics are built into the mould to control the movement. There is nothing special about the machine, this is a mould technology," he says. "Two-stage ICM accelerates the flow way beyond anything achieved to date, by anyone."



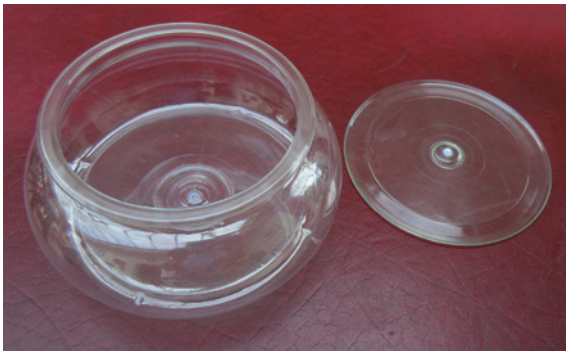
Above: IML container production on a 200 tonne El-Exis SP hybrid machine from Sumitomo Demag

The two-stage ICM preforms are intended to be used in GR8's EcoForm hybrid stretch-blow moulding process, which is similar to two-stage stretch-blow moulding for PET bottles but can handle containers and jars that have dimensions beyond the capability of current ISBM technology. "It fits between thermoforming and stretch blow moulding, overlapping both processes," Clarke says.

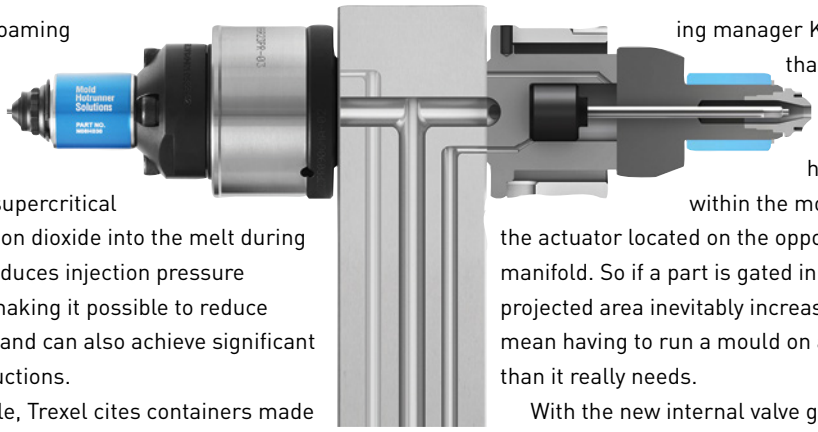
EcoForm has already been used to make jars using preforms produced with another thin-wall process moulding developed by Clarke, called Active Flow Moulding (AFM). This involves moving a 20-mm diameter pin positioned opposite the gate back 3mm during injection and then re-setting it at the end of packing. It reduces stress in the preform and therefore warpage, according to Clarke. "AFM is a gentle process that just allows easier flow, faster injection rate and less stress," he says.

Left: Mucell foaming technology cut part weight by more than 10% for this IML tub by Coveris Rigid

Another way of improving flow of polymer in thin wall moulds could be to use foam, according to US-based **Trexel**, which has been supplying its MuCell



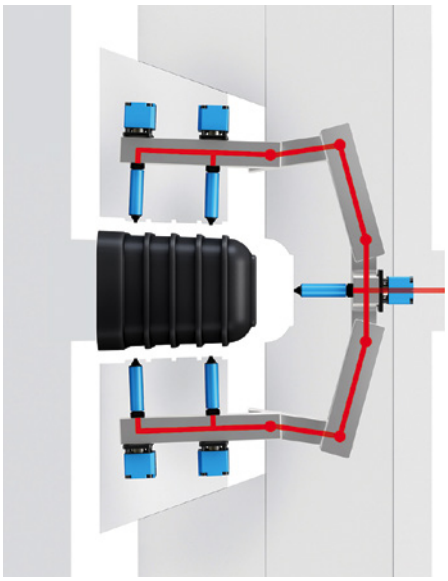
Left: The flat flanged preform (right) used to produce this Ecoform PET container is produced using Active Flow Moulding (AFM) technology



Right: IVG nozzles from MHS can be arranged back-to-back with no offset in stack moulds to save space

micro-cellular foaming technology for more than 20 years. MuCell involves the introduction of supercritical nitrogen or carbon dioxide into the melt during processing. It reduces injection pressure requirements, making it possible to reduce clamp tonnage, and can also achieve significant part weight reductions.

As an example, Trexel cites containers made by Coveris Rigid (previously part of Autobar) for Unilever using its SLIM (Super Light Injection Moulding). Trexel says the goal was to reduce package weight by 12-15 % while using the company's existing 300 tonne injection moulding machines and incorporating the thinnest IML labels available on the market. With the help of MuCell, it was possible to reduce wall thickness of the base and sidewalls to 0.35 mm, cut weight by 13%, and reduce clamp tonnage by 35%. The fact that packing force is provided by the foam expansion in the Mucell process also helps fill the thicker seal surface. The parts are made on 4+4 stack moulds that would otherwise have had to be mounted on machines with more than 450 tonne of clamp force.



Centre: Rheo-Slide articulated hotrunners can simplify filling of large thin wall mouldings with moving cores

Melt management

Meanwhile, Canadian melt delivery systems supplier **Mold Hotrunner Solutions** (MHS) is claiming what it says are "unique and revolutionary" solutions in two areas of thin-wall moulding. The first relates to production of thin-wall packaging with walls of less than 0.6mm, for which the company has developed an internal valve gate nozzle. Engineering manager Kay Thielen says that in stack moulds, valve gate nozzles typically have to be offset within the mould because of the actuator located on the opposite site of the manifold. So if a part is gated in the centre, the projected area inevitably increases and this may mean having to run a mould on a larger machine than it really needs.

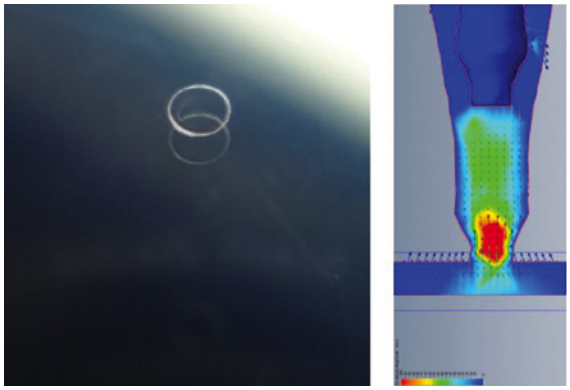
With the new internal valve gate (IVG) nozzles, no offset is necessary since the actuator is located in the nozzle body, and the cavities can be set exactly back to back. "With the actuator in the body of the nozzle, rather than behind it, there is free space to put a second nozzle on exactly the opposite side of the manifold,"he says.

Thielen adds that an important benefit of using valve gates on stack moulds for moulding PP, for example, is that the gate size can be increased and (unlike with hot tips) it is not necessary to wait for the material to freeze before opening the mould to avoid drool. "With valve gates, the process window opens up in an interesting fashion," he says. "Instead of having a melt temperature of, say, 240°C for a thin-wall food container it can drop down to 210°C, which is still within the processing window of the resin, and this obviously translates into reduced cooling time."

So, for a PP part with a 0.6mm wall thickness, instead of a typical cooling time of 1.0s in a total cycle time of around 4.0s or less it can be 0.9s. And in the field of thin wall packaging, it is not every second that counts but every tenth of a second, Thielen explains. Alternatively, the cooling time can be kept the same but shrinkage and warp behaviour can be improved.

Thielen also claims that the reduced heating and cooling can result in an energy saving in the region of 7.5 kWh per kg of resin processed.

The second MHS solution relates to production of very large thin-wall parts. The company has developed a jointed moveable manifold that makes it possible to place nozzles not only on the bottom of the A side of the mould, but also on the walls. The Rheo-Pro Slide Manifold features rotating melt transfer joints that allow linked manifold segments to move freely between



Right: Synventive's nuGate pneumatic technology can improve gate quality and improve process stability

THIN WALL PACKAGING 2015

International conference on lightweight plastic tubs, trays, jars, containers and cups for food packaging

CLICK HERE FOR DETAILS

HEADLINE SPONSOR

MARBACH®

May 6-7, 2015

The Westin Chicago North Shore, Wheeling, Illinois, USA

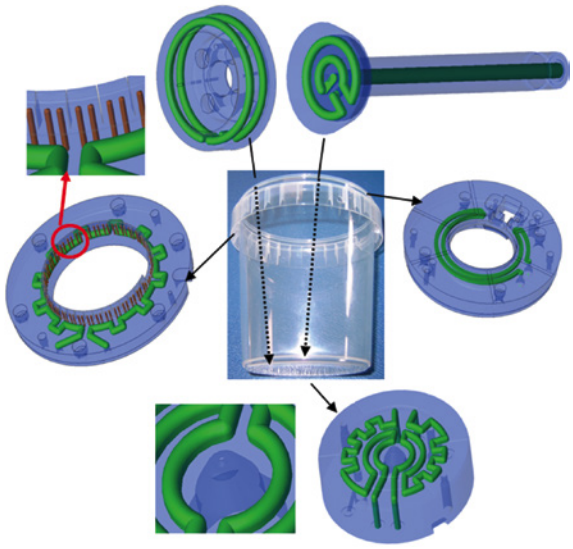
SPECIAL OFFER: Save $200 if you register before March 6, 2015

Organized by:
Applied Market Information LLC

Sponsored by:
KIEFEL TECHNOLOGIES
ILLIG Tradition forms future
ml Labels CHICAGO
inland Quality Labels • Innovative Solutions
KORTEC

Media supporters:
film and sheet EXTRUSION
injection WORLD

Amanda Schaeffer – Conference Coordinator as@amiplastics-na.com Ph: +1 610 478 0800 Fx: +1 610 478 0900



Right: Up to 35% cycle time reductions have been achieved using GWK's Integrat 4D conformal cooilng technology for thin wall production

or during cycles in order to distribute plastic anywhere inside the mould. Gates can be located directly inside the moving slides of a mould.

Thielen explains the benefits of the technology in production by citing the example of a large PP container with a volume of one cubic metre and walls 0.8mm thick. Using a conventional hot runner mould, the mould designer would face big problems in getting the melt to flow all the way to the rim of the cavity. A moveable manifold can overcome these issues, he says.

"In such a large container, you would probably have undercuts and ribs," says Thielen. "The mould walls need to be able to move so that the core can come away with the part on it." This movement is always a problem for cooling and feeding, he says. Using the slide technology it is possible to arrange nozzles so that the melt can go all the way to the rim, even when moulding a very large part with very thin walls. Thielen sees the technology being used for production of parts such as refrigerator liners as well as for large houseware items. The Slide Manifold technology is already in commercial use but applications are confidential. However, MHS has previously shown a schematic of a commercial system comprising 94 valve gates arranged over five moving elements with 49 individual injection control zones.

Meanwhile, another major player in the melt delivery sector, **Synventive**, says its new nuGate gate control for pneumatically controlled hot runner systems allows the user to define the valve pin's position, speed, acceleration and stroke. The company says this delivers unparalleled accuracy and repeatability while the high level of control facilitates a stable process and solves a variety of part cosmetic issues or system balance challenges.

Synventive says nuGate can prevent moulding defects such as marks opposite direct gating, and sink marks. By proportionally regulating the pneumatic flow of the actuator's opening and closing ports, nuGate is able to control the complete movement of the pin. "Users gain a level of control that allows for a regulated release of melt pressure into the cavity," says executive vice president Mark Moss.

Targeting cooling

Temperature control specialist **GWK** says that for applications such as production of thin-wall PP tubs, segmented mould cooling with adjusted flow control using its integrat 4D segmented temperature control system can cut some 35% off total cycle time. Segmented cooling with the cooling channels placed as close as possible to the cavity surface (conformal cooling) provides a more homogeneous temperature on the mould surface, yields significant energy savings, broadens the process window, and can even extend the lifetime of the mould, says Thomas Leng, head of system engineering at the company.

Using such a system, production of 500ml containers on a two-cavity mould takes just 2.7s, for example. While the use of the Integrat 4D technology ups the investment cost, Leng says in this example the additional investment would be recovered in just four months. GWK's integrat 4D system includes segmented cooling inserts, which are made to order, as well as the temperature control system.

Learn more at these conferences

Learn more about thin wall packaging moulding and network with leading players and sector suppliers at Applied Market Information's North American and European Thin Wall Packaging conferences. The North American event takes place on 6-7 May 2015 in Chicago in the US; while the European conference will be held in Cologne in Germany on 1-3 December 2013.

Thin Wall Packaging 2015 - North America

Thin Wall Packaging 2015 – Europe

Thin wall moulding technology also features in Applied Market Information's third **Plastic Closure Innovations** conference, which takes place in Berlin in Germany on 9-11 June 2015.

Click on the links for more information:

- **www.arburg.com**
- **www.bmb-spa.it**
- **www.engelglobal.com**
- **www.xaloy.com**
- **www.sumitomo-shi-demag.eu**
- **www.stackteck.com**
- **www.gr8eng.com**
- **www.trexel.com**
- **www.moldhotrunnersolutions.com**
- **www.synventive.com**
- **www.gwk.com**

compounding WORLD

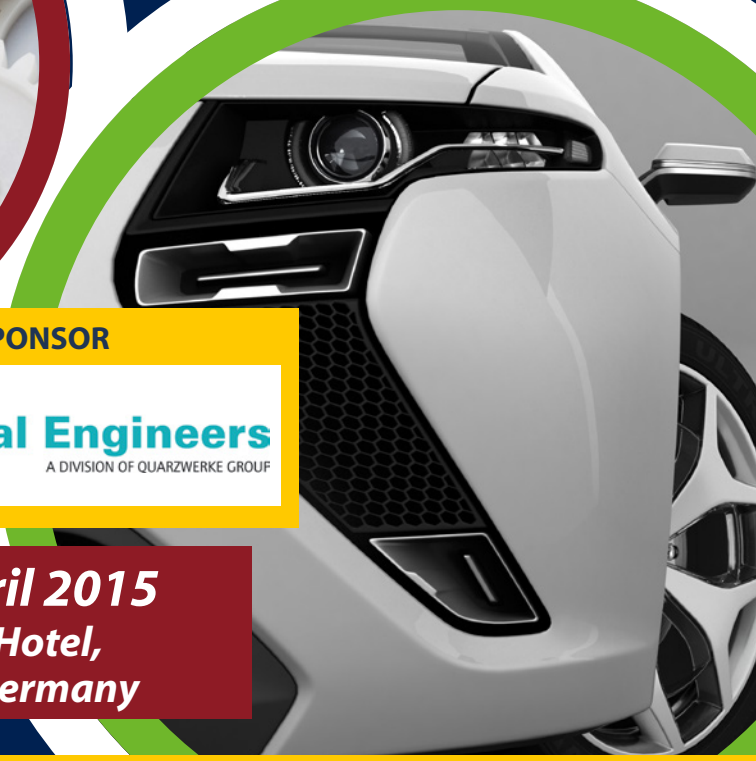
Congress 2015

The international conference on business strategies, innovative additives and process optimisation for thermoplastics compounders

Compounding World's new European event.

CLICK HERE FOR DETAILS

images courtesy of: **Shutterstock**



HEADLINE SPONSOR

HPF The Mineral Engineers
A DIVISION OF QUARZWERKE GROUP

21-23 April 2015
Maritim Hotel, Cologne, Germany

Organised by:
Applied Market Information Ltd. & Compounding World

Sponsored by:

IMERYS Graphite & Carbon

AMI PUBLISHING

Worldwide market data for the plastics industry

We know downstream plastics processing better than anybody else and we can provide you with the answer faster.

Click here for more details

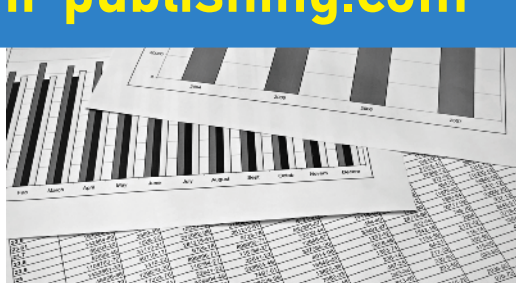
NEW

A database of over 1600 injection moulding sites in Poland, Hungary, Czech and Slovak republics.

- Full addresses
- Key contacts
- Polymers processed
- Markets served
- Machinery details

Reliable data to find, new partners or potential clients

www.ami-publishing.com



AMI House, 45-47 Stokes Croft, Bristol BS1 3QP, United Kingdom

Tel: +44 (0) 117 924 9442
Fax: +44 (0) 117 989 2128

sales@amiplastics.com
www.amiplastics.com

Horticultural plastics company Desch Plantpak has overhauled its UK operation with a £2m investment that includes energy-efficient all-electric thin wall moulding equipment. **Chris Smith** reports

Investing for efficiency

Management at Desch Plantpak's horticultural plastics operation at Mundon in the UK describe the completion of a £2m investment in new manufacturing technology as a 'rebirth' for the business. That may seem a big claim, but the targeted campaign of plant improvement and equipment renewal has seen a manufacturing operation characterised by more than a decade of under-investment not only lift productivity but set on course to become one of the most efficient producers in its market.

The 18-month investment programme included a complete overhaul of the site's injection moulding capabilities. The company scrapped 15 elderly hydraulic Netstal moulding machines and replaced them with four highly energy-efficient all-electric models from BMB of Italy. It also updated its thermoforming capacity with new equipment from Turkish manufacturer Yeniyurt Makina, again using fully-electric drive, and updated its sheet extrusion line control and raw material testing capabilities.

It was an investment that so nearly did not happen, according to Jim Binch, managing director at US-based private equity company Lincolnshire Management. It has owned Netherlands-headquartered Desch Plantpak, which operates two manufacturing plants in the Netherlands and two in the UK, since 2006 and its initial financial assessment of the Mundon plant pointed to closure.

"This company has not been the hallmark of British manufacturing over the past 25 years. The UK business had undergone multiple owners and at least 15 years of investment neglect," says Binch, who prior to joining Lincolnshire Management spent 15 years at the helm of US specialist medical component maker Memry Corporation then managed the investment group's US horticultural products firm Summit Plastic.

"The financial people said 'close it'. If the market share had been 10% I would have said 'yes' but with a 50% share of the market? When you have that sort of market share, a customer base that is very loyal, and a product range that is different from the rest of Europe it makes sense to carry on," he says.

The UK horticultural plastics market is the third largest in Europe and even in 2012, when Binch came to the UK to investigate reinvesting in the business, Desch Plantpak had a more than 70% share in thermoformed products and a near 30% share in injection moulding.

The big obstacle to re-equipping the plant, says Binch, was the estimated £4.5m cost of replacing the ageing machinery with modern equipment such as used in the Netherlands facilities. The need to reduce that figure meant embarking on detailed

Main image: Desch Plantpak staff in the newly equipped moulding shop at Mundon in the UK, where it produces horticultural plastic products

Right: More than 70% of materials used in the Mundon plant are recycled; the company compounds on site

evaluation of alternative options for both thermoforming and injection moulding. "I wanted the best available technology from people that would support us and at the best possible price – not just to buy but over 10 years," he says.

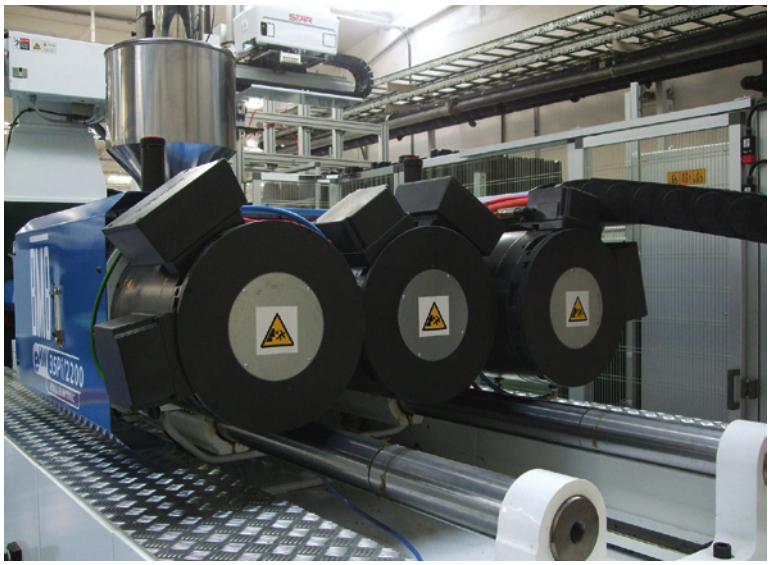
In depth process trials were carried out with potential suppliers using the company's own moulds and material, most of which is recycled. "We were in the process here of transforming how we managed and produced materials so we wanted to be sure the grades we were producing would be suitable for the machines. And the people financing the investment wanted application data – it had to be exhaustive."

For the injection moulding side of the business, the decision was made to buy all-electric moulding machines from BMB of Italy equipped with robotics from Star Automation. Two 250 tonne and two 350 tonne machines from BMB's packaging specification eKW all-electric range (25Pi1300 and 35Pi2200 respectively) replaced 15 old hydraulic units. Binch also embarked on a rationalisation of the product range, reducing the number of lines by 60% and scrapping 120 tonnes of moulds.

Despite the drastic reduction in machine numbers, the increased uptime and outputs achievable from the new automated moulding machinery means total plant production capacity is increased. "One of the things we plan to do is to run the injection moulding room lights-out at the weekend. We are not quite there yet but we aim to be one of the best in the horticultural area," he says.

Key attractions of the BMB machines included the energy-efficient all-electric drive technology. BMB uses direct servo drive technology on all machine axes, while energy recovery and full energy monitoring and reporting are standard features across the eKW range. As an example of the energy efficiency, the 350 tonne model processing recycled PP on a 7.4s cycle consumes just 20.2kW of electricity (including barrel heating, which is equivalent to a consumption of 0.5 kWh/kg of resin.

Below: The BMB eKW machines feature direct servo drive, in this case using one motor for plasticising and two for injection



The mould shop was also completely overhauled as part of the investment programme and a new materials handling system installed to support automated manufacturing. Binch says to keep cost down much of this work was done by the company's employees, who he says were enthusiastic supporters of the project.

Like many companies running thermoforming equipment, Desch Plantpak extrudes its own sheet and runs its own compounding plant. As it uses more than 75% recycled resin, Binch says this on-site compounding capability also gives it a big advantage over its competitors on the injection moulding side of its operations. "In our business, margins are very low but our material expertise gives us an advantage. We buy PCR waste but produce a quality product, which is really cost effective," he says.

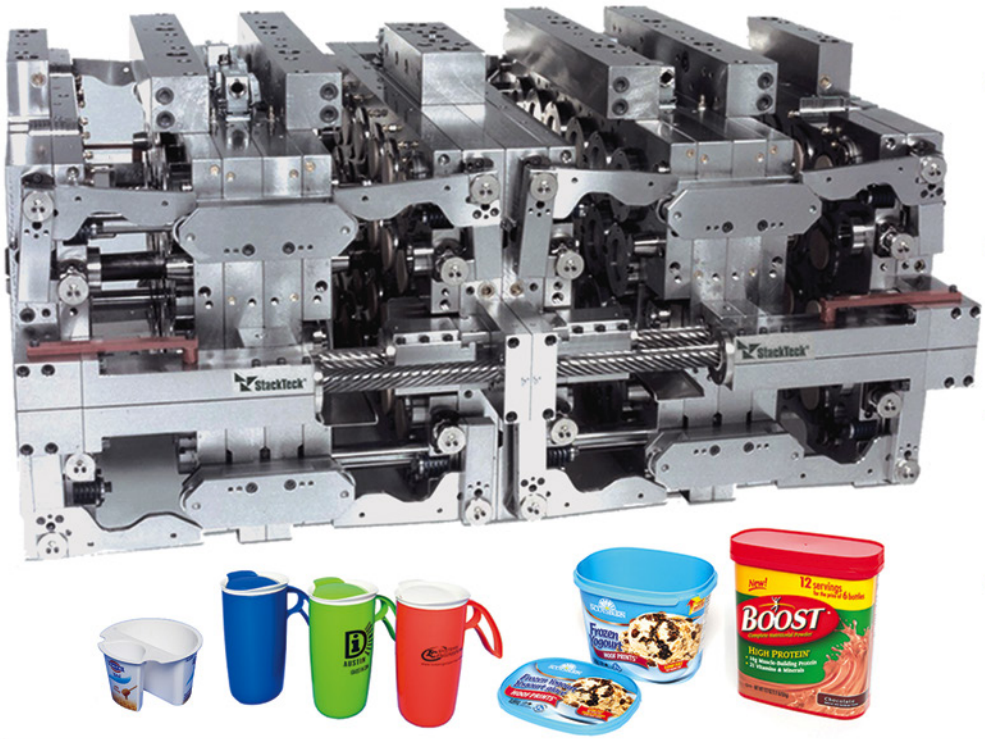
The company tests every batch of incoming recycled material and grades it before determining a recipe to meet the performance it requires for any particular applications (it also now supplies a growing volume of compounded pellet and sheet to its sister plants in the Netherlands). "Our recipes are all data driven. We can characterise a polymer material as well as anyone in the UK and if we feel the material is weak in a particular area we can correct it," he says.

Binch says the work at the Mundon plant is still ongoing, but the results achieved to date show great promise for the future of the facility. "This is essentially a new company," he says. "The people here are on a learning curve and there is still a long way to go. But the financial success in 2014 and 2015 will reflect the work the people have done here."

Click on the links for more information:

- **www.desch-plantpak.com**
- **www.bmb-spa.com**
- **www.star-europe.com**

Focused Expertise. Benchmark Performance.



- Over 8,000 high performance packaging molds built
- Award winning stack mold technology
- Up to 128 cavities in 1x128, 2x64, and 4x32 configurations
- Recipient of 4 IMDA Awards

NPE2015
produced by spi
STAND W-1375

www.stackteck.com
1-888-700-8555

StackTeck

AMI at NPE 2015

Stand W8283

Orange County Convention Center, Orlando from 23-27 March

Stop by to find out more about our conferences, publications and free magazines

Contact Matt Wherlock, mjw@amiplastics.com for more information

injection WORLD bookshelf

BROUGHT TO YOU BY Plastics Information Direct Online Bookshop

Plastics INFORMATION DIRECT

RECOMMENDED READING

Our selection of the latest titles and essential reference works for the injection moulding industry

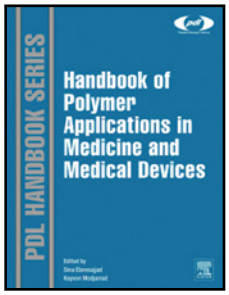
PLASTICS IN MEDICAL DEVICES, PROPERTIES, REQUIREMENTS, AND APPLICATIONS, 2ND EDITION

2013, by Sastri,
€180.00 or £150.00 or $240.00

Revised and expanded including new information on process validation and regulation.

➤ More info/Buy here

HANDBOOK OF POLYMER APPLICATIONS IN MEDICINE AND MEDICAL DEVICES

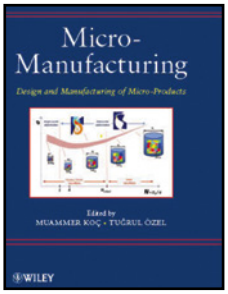


2013, by Modjarrad & Ebnesajjad,
€335.00 or £279.00 or $450.00

A broad examination of diverse applications, including clinical outcomes and regulatory issues.

➤ More info/Buy here

MICRO-MANUFACTURING: DESIGN AND MANUFACTURING OF MICRO-PRODUCTS

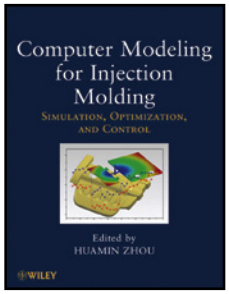


2012, by Koc & Ozel,
€100.00 or £85.00 or $135.00

Including design and materials selection as well as manufacturing techniques for micro-scale components and products.

➤ More info/Buy here

COMPUTER MODELING FOR INJECTION MOLDING: SIMULATION, OPTIMIZATION AND CONTROL

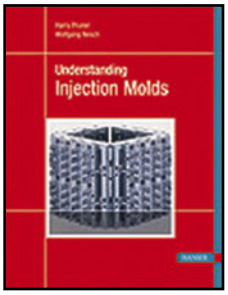


2013, by Zhou,
€105.00 or £90.00 or $145.00

Covers all aspects of computer usage to improve design and moulding.

➤ More info/Buy here

UNDERSTANDING INJECTION MOLDS



2013, by Pruner & Nesch,
€70.00 or £60.00 or $95.00

Introductory guide for the non-specialist or industry newcomer.

➤ More info/Buy here

MOULDING MASTERCLASS

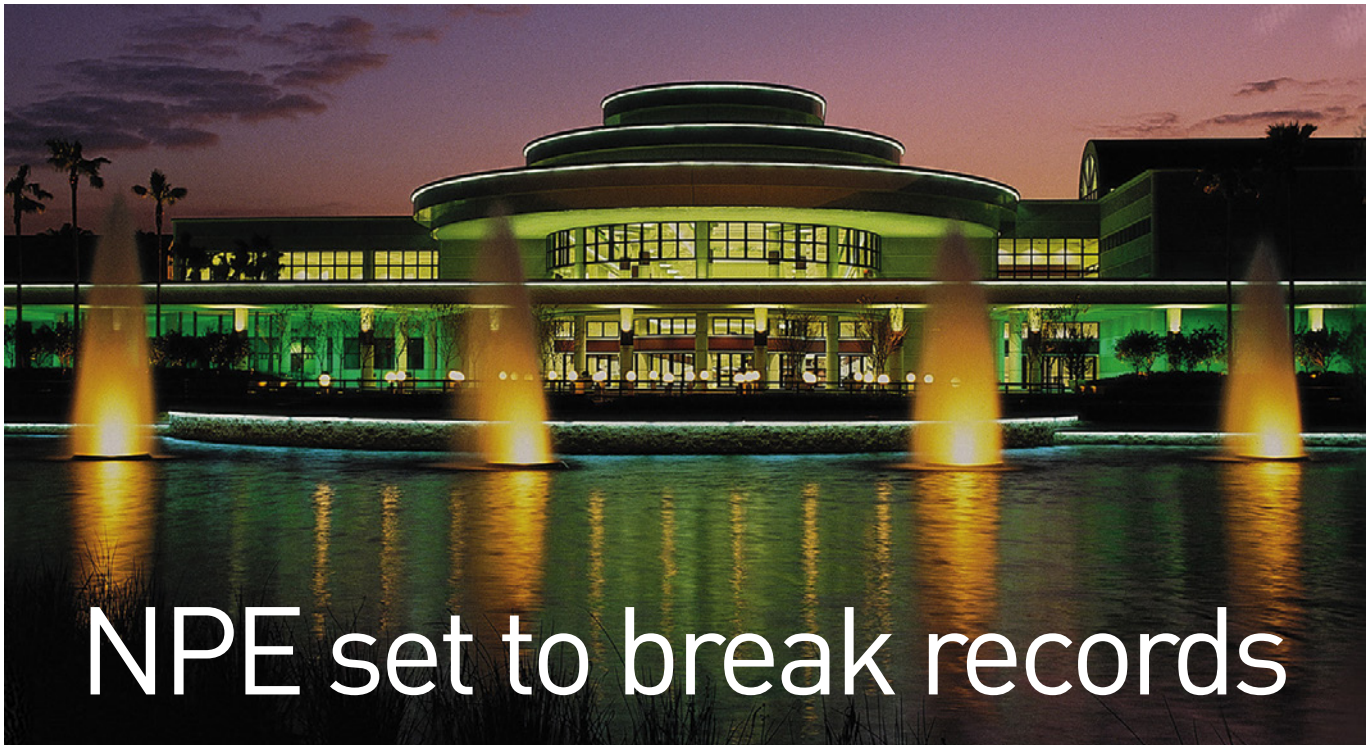
2013, by Goff,
€60.00 or £50.00 or $75.00

A compilation of technical articles from Injection World magazine.

➤ More info/Buy here

Visit www.pidbooks.com for hundreds of recent titles, easy online ordering, special offers and clearance bargains!

Order online or by telephone, fax or email. Contact Matt Wherlock,
Tel: +44 (0)117 924 9442 Fax: +44 (0)117 311 1534 email: mjw@amiplastics.com
All prices are correct at the time of publication but may be subject to change.
Please check the Plastics Information Direct website for current prices and shipping charges.



NPE set to break records

The US NPE plastics trade fair takes place on 23-27 March and it is likely to be the largest ever, with more than 60,000 visitors expected to view displays by some 2,000 exhibitors over more than 106,000m^2 of exhibition space. And according to show organiser, the US Society of the Plastics Industry (SPI), more than 400 of those exhibitors will have equipment running on their stands.

The five-day event will be the 28th NPE, but only the second to be held in its new home at the Orange County Convention Centre in Orlando, Florida. Expectations for the show are high - and with good reason. The relocation after 40 years from Chicago to Orlando in 2012 – principally to control escalating exhibitor costs – was a risky move on SPI's part but one that paid off well. The Orlando exhibition centre together with the city authorities pulled out all the stops to make NPE 2012 a success. There's no reason to assume Orlando will be any less welcoming this time around.

NPE 2012 took place as the US economy began its recovery from the downturn. Exhibitor mood was optimistic then and is even better now. While the IMF recently downgraded its forecast for global growth for 2015 to 3.5%, the US was the sole major world economy to see its economic performance expectation lifted (from 3.1% to 3.6%).

US Bureau of Economic Analysis (BEA) data released last month showed real US GDP increased at an annual rate of 5% during the third quarter of last year. In addition, the BEA data showed industry's contribution to GDP increased by more than 21% during the quarter, following a 6% increase in the second quarter.

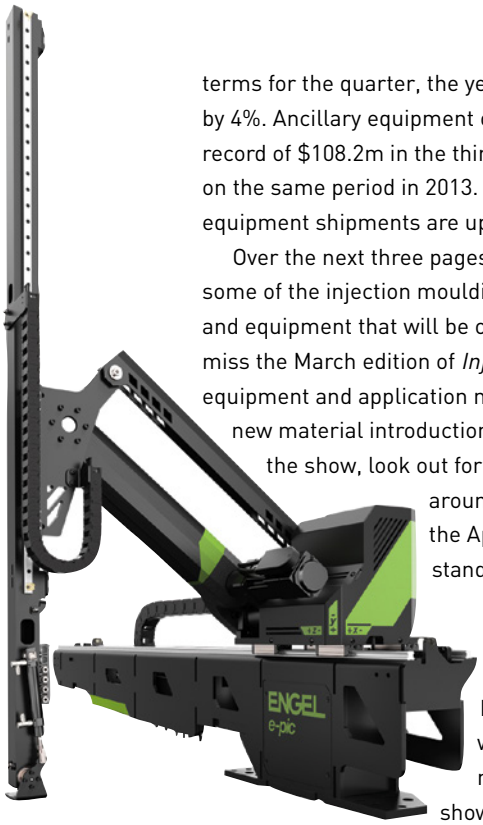
NPE 2015 returns to Orlando's Orange County Centre next month. Organiser SPI says this 28th event will be the biggest ever

US manufacturers are also investing to support future growth. BEA's data shows investment in industrial equipment was up 16% in the third quarter of last year compared to the same period in 2013. And data from the US Census Bureau shows the value of industrial machinery orders for the first nine months of 2014 to be 34% ahead of the 2013 period.

If you take the view that visitors go to plastics trade shows primarily to see and buy machinery and equipment then the scene is set for a great NPE. The most recent data from the SPI's Committee on Equipment Statistics (CES) shows US quarterly plastics machinery shipments have been running at near record levels now for close to three years.

In the third quarter of last year, shipments of primary processing equipment (injection moulding, extrusion and blow moulding equipment) totalled $304.1m. That was only 2% below the 10-year record result for the same period in 2013 and 6% ahead of the second quarter 2014 figures. While shipments of injection moulding machinery were down by 4% in value

Main image: Orlando's Orange County Convention Center will host the 28th NPE show next month



Above: Engel's entry-level e-Pic robot gets its first US showing

terms for the quarter, the year-to date value is ahead by 4%. Ancillary equipment orders reached an all-time record of $108.2m in the third quarter of 2014, up by 8% on the same period in 2013. Year-to-date ancillary equipment shipments are up 12%.

Over the next three pages, we take a brief look at some of the injection moulding machinery equipment and equipment that will be on show in Orlando. Don't miss the March edition of *Injection World* for more equipment and application news, as well as a line-up of new material introductions. And if you are going to the show, look out for the AMI Magazines team around the exhibition centre or at the Applied Market Information stand (W8283).

Machinery innovations

Designed for integration with any injection moulding machine, **Boy** will be showing its 2C XS auxiliary injection unit for the first time in North America at NPE. The 2C XS is intended to provide a low-cost entry into multi-component moulding by allowing a standard moulding machine to be converted to two-component operation. It will be demonstrated on a Boy 25E machine producing 'marbled' dishes. Supplied with its own standalone drive and control, the 2C XS can be configured to deliver shot volumes up to 76.4cm^3 and injection pressures up to 3,128 bar.

Efficient and economical manufacturing is the theme of the **Engel** stand, where the company will be demonstrating eight different application examples. Prime among these will be production of a thermoplastic composite automotive brake pedal in a system developed with German automotive components group ZF Friedrichshafen. Built around a 230 US ton Engel vertical moulding machine equipped with the company's Easix robot, the process involves forming a pre-heated continuous fibre reinforced thermoplastic composite sheet in the mould before over-moulding with PA to produce a final part that requires no trimming or finishing.

Below: Absolute Haitian will run a 730 US ton Jupiter two-platen machine

The company will also demonstrate a 610 US ton Duo two-platen machine producing an automotive centre console with a top-class surface using a combination of Trexel's Mucell microcellular foam moulding and variothermal (heat-cool) mould technology from Roctool. Plus, visitors will get their first chance to see the company's new e-Pic low cost pick-and-place robot, which uses a novel swing arm movement to provide fast, energy efficient part removal.

Absolute Haitian will show a 730 US ton moulding machine from Haitian's recently extended Jupiter II range of servo-hydraulic two-platen machines. Originally offered from 1,350 to 4,500 US tons, Haitain has extended the energy-efficient Jupiter product line to include five new models from 440 to 1,070 US tons. It has also introduced a wide platen option for 1,070, 1,350 and 1,800 US ton variants.

The company will also show the latest addition to the Zhafir all-electric injection machine family. Aimed particularly at moulders needing to run moulds with core-pulls, the new Zeres machine uses electric servodrive on all main axes but includes an integrated accumulator-supported hydraulic power pack to power nozzle contact, ejectors and core pulls. The Zeres is said to be more cost effective than an all-electric machine with standalone hydraulic power pack. It is available in sizes from 45 to 259 US ton.

The centre-piece of the **Husky Injection Molding Systems** display at NPE will be the introduction of its new system for production of barrier PET preforms. The Barrier Module is based on the company's latest HyPET HPP5 machine platform and is said to open up new cost saving opportunities in barrier packaging applications. The company will demonstrate an HPP5 system in Orlando running the latest version of its Shotscope NX process and production monitoring system.

On display for the first time in North America, **KraussMaffei**'s GXH multi-component moulding machine will be shown in a 550 tonne version equipped with an LRX linear robot producing covers for automotive fog lights in a mould supplied by Proper Group. The GXH is configured with two horizontal injection units mounted side-by-side. The company will also show a 900 tonne GX Series machine for the first time in the US, while it will demonstrate production of a thermoplastic composite automotive airbag cover using its FiberForm moulding technology on a 300 tonne CX Series machine.

Conjection moulding will be a key theme on the **Milacron** stand, where the company will be demonstrating its recently acquired Kortec co-injection moulding technology producing PP-

EVOH-PP barrier plastic cans on a Ferromatik F-280 moulding machine. The company will also launch the M-PET series of servo-hydraulic machines for production of mono and multi-layer PET preforms. Key exhibits from the Mold-Masters side of the business include the new SmartMold contact-less system for monitoring mould activity and the premium Summit Series of hot runners.

Sodick's North American injection machinery division **Plustech** will launch the HC03VRE vertical high precision micromoulding machine, which offers a 0.9s dry cycle time due to its belt-driven turntable and hybrid-drive clamping system. The unit uses Sodick's V-Line two stage injection system with a 14mm plasticising screw and 8mm diameter injection plunger. It will be producing a direct-gated micro-bobbin weighing 0.09g in a 2-cavity mould on a 1.9s cycle.

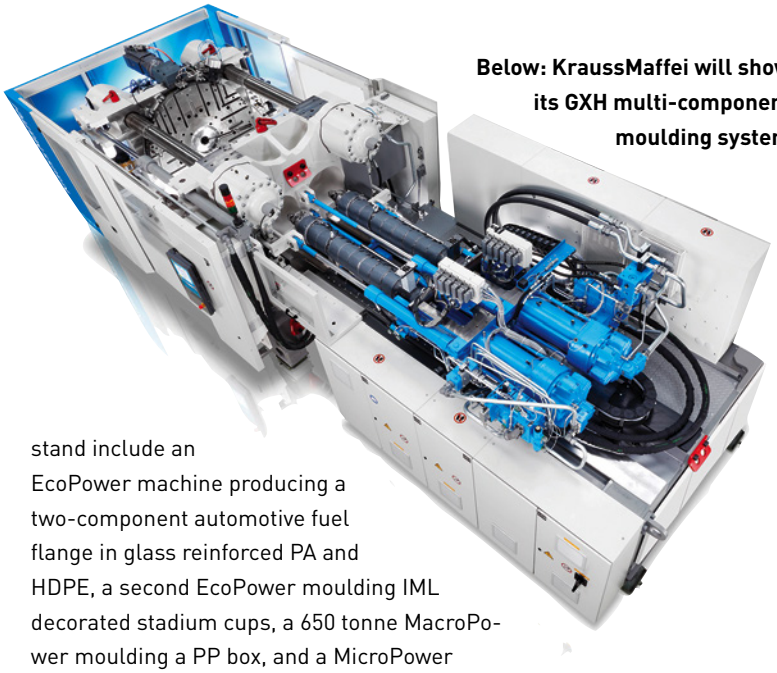
Italian machinery maker **SIPA** will show its XForm 300 preform injection moulding system, developed in partnership with Canada's Athena Automation. The 300 tonne machine will be running a 72-cavity SIPA preform mould and will be equipped with a novel six-cycle post-moulding cooling system. SIPA, which manufactures its own 500 tonne XForm machine, has global marketing rights for Athena's 150 and 300 tonne machines in PET preform applications.

Hybrid moulding technology features on the **Sumitomo SHI Demag** booth, where the company will demonstrate production of a 1.3g HDPE 29/25 water bottle cap on a 96-cavity mould by Plastisud of France at a rate of more than 180,000 parts per hour using an El-Exis SP 420 tonne machine. The mould includes mechanical slides to produce the tamper-evident band within the moulding cycle. The production system includes a Frigel chiller, SISE hot runner controller and Eisbar Trockentechnik mould dehumidification system. An IMD-Vista optical inspection system provides 100% quality control.

UBE Machinery will show a 950 US ton example from its Ultima UN series of large all-electric moulding machines. Extending from 720 to 3,300 US tons clamping force, the UN machines are claimed to provide energy savings of up to 85% over conventional hydraulic alternatives. The company will also demonstrate a 1,000 US ton machine from its Servomax UU II servo-hydraulic product line.

Six fully-automated production cells will be in operation on the **Wittmann Battenfeld** booth, including the first North American showing of the company's latest SmartPower servo-hydraulic moulding machine. The SmartPower machine will be producing a jeweller's magnifying glass.

Other demonstrations on the Wittmann Battenfeld stand include an EcoPower machine producing a two-component automotive fuel flange in glass reinforced PA and HDPE, a second EcoPower moulding IML decorated stadium cups, a 650 tonne MacroPower moulding a PP box, and a MicroPower machine producing medical tear duct plugs in LSR. The company will also be producing a high surface quality ABS automotive bezel using its Cellmould physical foam technology and Variotherm mould temperature control.



Below: KraussMaffei will show its GXH multi-component moulding system

Ancillary equipment

A new multi-tip hot runner nozzle for axial injection of small tubular components will be introduced on the **ALBA Enterprises** booth (representative in North America for Italian not runner manufacturer Thermoplay). The DN5/3 Series nozzles can be used for direct lengthwise injection on the wall of parts and are said to provide balanced filling with minimal risk of flow lines or core bending. The new nozzles are suitable for use with high flow materials such as ABS, PE, PP and PS.

High speed part removal systems specialist **CBW Automation** will introduce its newest robot at the show. Claimed to be its most advanced design to date, the SSE combines CBW's proven high flow vacuum technology with a stripping stroke, allowing it to handle more complex part geometries and parts with undercuts. It also means the robot can be programmed to follow the mould for unscrewing or complex ejection operations. CBW claims a mould in-out time of less than 0.5s for the SSE robot, with recognition of vacuum part transfer achieved in as little as 60ms.

New additions to the **Conair** range will include a material handling proofing system that

Below: Plastic cap production at more than 180,000 parts/hour will feature on the Sumitomo Demag booth

Right: Wittmann Battenfeld's latest SmartPower servo-hydraulic will be on display

employs machine vision technology to help prevent risk of material contamination due to operator error. The Material Vision Proofing (MVP) system uses a motorised camera to confirm that the correct connection between material source and destination has been made before conveying commences. Other new products from the company include the ESE Series EarthSmart scalable central chillers, EarthSmart adiabatic cooling towers, and MicroWheel Desiccant dryers.

DynaCon conveying systems developer **Dynamic Conveyor** will show its recently introduced Vertical Z Conveyor design, which is intended to provide a compact solution where it is necessary to raise parts to a higher level. The company will also show its Variable Height Adjustment option, which is available on all straight, inclined or Z-style conveyors.

Canadian company **Mold Hotrunner Solutions** introduces its new Rheo-Pro Black Box actuators and second generation iVG internal valve gate nozzles at NPE. The company says the durable actuators and nozzles are designed for operation directly inside the mould at temperatures up to 450°C without risk of seal wear or the need for cooling. The compact form factor also simplifies incorporation into the mould, especially for back-to-back stack arrangements.

Nordson Corporation will launch its Xaloy Quantum barrier screw plasticising system, which is claimed to reduce screw recovery times by 10-15% compared to current high-performance systems. Aside from the barrier screw, the Quantum system uses a special poppet-style non-return valve with free-flow channels to provide fast shut-off and minimal material degradation.

Liquid colour dosing company **Riverdale Global** will demonstrate its new RGS Gravimetric Stand, which includes a self-calibrating loss-in-weight scale that continually reports to the dosing controller to maintain the target let-down ratio at all times. The company claims the RSG stand allows colour delivery tolerances to be held to within 0.1% and can save colorant use through tighter limit setting. For an injection moulding application, the company says it is only necessary to enter the shot weight and let-down ratio into the controller to ensure accurate production.

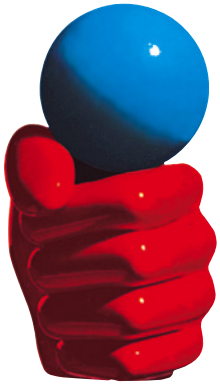
Right: ALBA will show Thermoplay's latest hot runner design

The **Sepro America** display in Orlando will include 10 of its latest robot designs extending from its S3 servo-driven sprue picker through to the 6X Visual robots, which combine a Staubli 6-axis articulated robot with Sepro's Visual 3 control system. A key feature of the display will be Sepro's 5X line, which combines the company's proven 3-axis S-Series beam robot with a 2-axis Staubli servo wrist to handle the most complex part removal movements. Aside from the 10 robots on the Sepro booth, the company will have a further 10 units on operation at partner stands around the exhibition.

Wittmann's robot display includes a number of new additions to its Pro Series robots, including the W832 and W843. Features of the Pro series include increased axis stiffness, ambiLED indication of robot operation mode, high efficiency proDrive system, and use of the company's latest R8.3 Control. The new pneumatic sprue picker with Net 8 control system will also be on display.

Click on the links for more information:

- **www.boymachines.com**
- **www.engelglobal.com**
- **www.absolutehaitian.com**
- **www.husky.co**
- **www.kraussmaffei.com**
- **www.milacron.com**
- **www.plustech-inc.com**
- **www.sipa.it**
- **www.sumitomo-shi-demag.com**
- **www.ubemachinery.com**
- **www.wittmann-group.com**
- **www.albaent.com**
- **www.cbwautomation.com**
- **www.conairgroup.com**
- **www.dynamicconveyor.com**
- **www.moldhotrunnersolutions.com**
- **www.xaloy.com**
- **www.riverdaleglobal.com**
- **www.sepro-america.com**



plast 2015

INTERNATIONAL EXHIBITION FOR PLASTICS AND RUBBER INDUSTRIES

MILAN - May 5/9

Three satellite-shows in the largest exhibition for plastics and rubber in Europe in 2015

Rubber 2015 — rubber

3D plast — 3D printing and related technologies

Start plast — innovative startup companies

plastonline.org

FIERA MILANO

EUROMAP

ufi Approved Event

ISF CERT

This month's free brochure downloads

Simply click on the brochure cover or link to download a PDF of the full publication

Engel: Flomo control

The Flomo smart water manifold system is designed to improve part quality and cost effectiveness by reducing or excluding the influence of changing conditions. Flomo is suitable for all moulding machines. Find out more in this 16-page brochure.

➤ **Click here to download**

Maguire: Gravimetric blenders

This interactive product guide covers Maguire's full range of WSB gravimetric blenders. It explains how the blenders operate and includes technical specifications, key benefits, plus options and accessories.

➤ **Click here to download**

Moretto: Eureka dryer

Moretto claims its Eureka system is a drying revolution. Based on the company's X Technology, the system offers capacities up to 20,000 m^3/hr, a -65˚C dewpoint and energy consumption of just 54 Wh/kg in PET applications. Download the brochure to find out more.

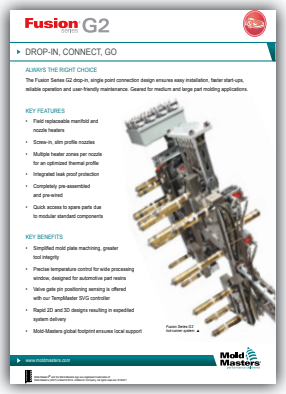
➤ **Click here to download**

Arburg – Clean technology

This 12-page brochure explores Arburg's complete range of injection machinery and optional special equipment for production of technical and medical components in clean room environments, along with selection advice and application examples.

➤ **Click here to download**

Mold-Masters – Fusion G2



Developed for demanding markets such as automotive and teletronics, the Fusion Series G2 system from Mold-Masters offers easy installation, fast start-up, reliable operation and simplified maintenance. This two-page brochure details the key technical features.

➤ **Click here to download**

Advertise in this magazine

You can use Injection World to promote your products and services to our global audience: Email distribution 30,452; App downloads 14,028; Twitter followers 9,153. Find the feature programme, full circulation details and advertising rates in our new 2015 media pack.

➤ **Click here to download**

If you would like your brochure to be included on this page, please contact Claire Bishop. claire@amimagazines.com. Tel: +44 (0) 1732 605976

PHOTO: SUMITOMO SHI DEMAG

The metering zone of the screw plays a critical part in the melt preparation process. Moulding expert **John Goff** explains how to steer clear of problems

Understanding melt metering

Main image: Consistent moulding begins in the plasticising screw

The main function of the metering (or melt delivery zone) of the plasticising screw is to ensure a uniform temperature is established throughout the mass of molten polymer material being delivered from the compression zone (discussed in the previous instalment in this series). Temperature uniformity of the polymer melt is of prime importance for consistent moulding as variation in temperature often results in changes in its melt density value, causing inconsistency in the shot volume contained in front of the screw tip assembly. As this volume of polymer is what is ultimately injected into the cavity within the mould, any variation from cycle to cycle will inevitably be reflected in changes in part quality.

The flight depth in the metering section of the screw is usually the shallowest of the three sections. The reason for its shallow depth is to allow the applied heat energy to permeate through the molten polymer contained between the flights and so create the basis for achieving a homogeneous thermal distribution through the melt.

The actual depth will be related to the diameter of the screw and the designated compression ratio selected for the type of generic screw design. However, in general, the depth of flight in the metering section (zone) ranges from 2mm to 6mm for plasticising screws of 20 to 160mm in diameter. The length of the metering section varies from between 3D to 6D, where such a selection of length is used for the processing of a wide range of thermoplastics materials.

Most General Purpose or GP screws will have a compression ratio (ratio of feed channel depth to metering channel depth) of between 2.1 to 2.5:1. This means the performance of conversion of the solid granule to liquid melt will vary considerably across the range of GP screws available.

An area regularly discussed when melt preparation problems are encountered is the amount of screw stroke (or shot volume) that should be utilised for effective component manufacture. Many process specialists advocate that the most proficient screw stroke should be between 1D to 3D, with the proviso of increasing to 4D in particular circumstances.

Following this guideline means that for a screw of 30mm diameter (D), the recommended screw stroke to be used will range from 30mm to 90mm. Similarly, for a screw of 110mm diameter (D) the recommended screw stroke to be used is between 110mm and 330mm.

We can correlate this 1D to 3D recommendation to the more common approach of shot capacity (or percentage) utilisation. For the example of the 30mm diameter plasticising screw specified in Figure1, the optimum screw stroke to be used when calculated in terms of shot capacity percentage is as follows:

The maximum available screw stroke for the 150 tonne (1,500kN) moulding machine equipped with a 320 size injection unit and 30mm screw is 175mm and the total shot volume (cylinder head volume) is 124cm^3. Therefore, for every 1mm of screw stroke an equivalent

shot volume of 0.7086cm^3 is obtained (calculated by dividing the total shot volume by the screw stroke). So it follows that for the recommended screw stroke value range of 30mm to 90mm, the respective shot volume range will be 21.26cm^3 to 63.77cm^3 (calculated by multiplying the volume per mm of screw by the screw stroke limits of 30 and 90mm).

We can easily convert these shot volumes into percentage shot capacities (calculated by dividing the recommended upper and lower shot volume limits by the total shot volume) to obtain the values of 17.1% and 51.42%. It can be seen that the recommended values hold up very well for good process capability. If the ratio of 4D is used, then the shot capacity is 120 mm of stroke (4 x 30mm) which is equal to 85.032cm^3 (120 x 0.7086cm^3) and subsequently corresponds to 68.57% (85.032cm^3/124cm^3).

Looking at the data for the 110mm diameter screw, the maximum available stroke is 460mm and the total shot volume (cylinder head volume) is 4,372cm^3. Therefore, the available shot volume per mm of screw stroke is 9.504 cm^3 (4,372cm^3/460mm). Given the recommended ratio of 1D to 3D (and using the same calculations as previously) then the equivalent shot volume ranges from 1,045.44cm^3 to 3,136.32cm^3, or 24% to 72% of the barrel. It can be seen from this result that for the larger screw diameters the 1D to 3D 'rule of thumb' approach becomes a less compliant tool for assessing good process capability regarding effective component manufacture. It is, therefore, recommended that a simple calculation be carried out.

It is also important to consider that, for moulding applications using screw diameters of 80mm and above, the typical cycle times are likely to be in the region of 45 to 120 seconds. At such cycle durations, the residence time is sufficient to allow the material to absorb the required heat energy and to fully homogenise so a more effective melt conversion is likely to be achieved than with a smaller screw operating at the same shot capacity.

A shot value of 4D is often regarded as too high for good moulding capability due to over utilisation of the effective screw length, meaning that melt inhomogeneity is likely to be present within the injected shot volume. This problem is likely to be particularly evident when moulding polypropylene. Many moulders are likely to disagree and say that they regularly produce mouldings using shot capacities of 69% or even greater with no problems. That may be the case in some circumstances as the cycle time used for component manufacture can also have an important influence. In general, the longer the cycle time, the greater the likelihood of producing components of the required quality standard.

Within our own moulding shop at G&A Moulding Technology, however, we have carried out exhaustive trials with respect to process capability analysis over a range of shot capacities. Our finding is that at shot capacities of 60% and above it is likely that reductions in shot-to-shot consistency and part quality will be encountered. As the shot capacity value approaches 70%, increased variability prevails and process capability is significantly reduced. This does not mean that mouldings cannot be effectively produced, but rather that there will be a greater number of defective parts.

When moulding components using relatively short cycle times and high shot capacities, particularly when processing semi-crystalline polymers, it is often found that the residence time for the material in the screw and barrel assembly is too short. This prevents the polymer material from fully absorbing the available conductive heat energy and results in temperature non-uniformity and the presence of solid particles within the semi-crystalline material.

Such inhomogeneity can result in spasmodic production of short mouldings as a result of solid particles becoming trapped between the pressure back ring and the sliding sleeve within the screw tip assembly, causing the polymer melt to flow back up the screw rather than into the mould cavity. These partially plasticised particles will eventually melt due to the additional absorption time and the screw tip will then continue to operate normally, producing fully packed mouldings to the required dimensional and visual requirements. Short mouldings can also be caused by solid particles causing gate blockages in thermal or fixed probe hot runner systems .

Figure 1: Key technical data for 300mm and 110mm diameter screws

Machine clamp capacity	1,500	13,000	kN
Injection unit classification	320	8,000	
Screw diameter	30	110	mm
L/D ratio	20	20	
Injection pressure	2,420	1,815	bar
Cylinder head volume	124	4,372	cm^3
Shot weight	110	3,900	g (PS)
Injection rate (without accumulator)	120/170	850	g/s (PS)
Injection rate (with accumulator)	460	2,260	g/s (PS)
Plasticising rate, Motor I (120 bar)	20/29	140	g/s (PS)
Plasticising rate, Motor II (120 bar)	16/23	95	g/s (PS)
Electric screw drive	19	141	g/s (PS)
Maximum screw stroke	175	460	mm
Maximum nozzle retraction	350	860	mm
Nozzle dipping depth	20	45	mm
Nozzle sealing force	80	110	kN

Data courtesy of Sumitomo SHI Demag

Have you missed any instalments?

The first 32 articles published in the Moulding Masterclass series by John Goff between 2009 and August 2013 have been compiled into one convenient volume. You can now benefit from his experience and practical advice by keeping a copy on your desk or the shopfloor. Re-read early articles on the influence of screw design, and the choice of injection time, holding pressure, gate sizes and much more. To find out more, and to purchase a copy of this essential guide to process optimisation and high quality cost-effective moulding for just €60, follow the link: **http://bit.ly/1dM2Yhx**

Partially plasticised particles are not typically encountered when processing amorphous type materials (PC, SAN, PMMA, PSU, PES) as these soften upon the introduction of heat energy rather than exhibiting a defined melting point. What is often a problem when processing amorphous polymers, however, is mouldings showing surface streak defects commonly identified as 'silvering'. Often mistakenly considered to be due to moisture in the polymer, these streaks are a clear indication of the presence of poorly plasticised or inhomogeneous material.

This discussion will be continued in the next instalment in the Moulding Masterclass series.

About the author:

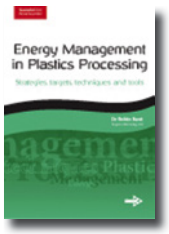
Moulding Masterclass series author John Goff is a chartered engineer (CEng), Fellow of the Institute of Materials, Mining and Metallurgy (FIMMM), and CEO of UK-based injection moulding process consultancy and training company G&A Moulding Technology (**www.gandamoulding.co.uk**), which provides consultancy services on all aspects of process setting, optimisation and control, including hot runner technology. The company also developed and markets its own Pro-Op process optimisation software tool.

You can read the most recent instalments in this series **here**, **here** and **here**.

PLASTICS INFORMATION DIRECT

Best Selling Books in 2014

What have your colleagues and competitors been reading this year?



1

Energy Management in Plastics Processing: Strategies, Targets, Techniques and Tools, 2nd Edition

Kent, 2013

€155.00 or £130.00 or $205.00

MORE INFO/BUY NOW

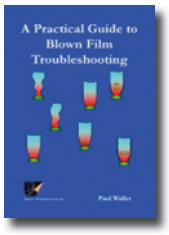
2

Cost Management in Plastics Processing: Strategies, targets, techniques and tools, 3rd edition

Kent, 2012

€130.00 or £110.00 or $175.00

MORE INFO/BUY NOW



3

A Practical Guide to Blown Film Troubleshooting, 2nd Edition

Waller, 2011

€120.00 or £100.00 or $150.00

MORE INFO/BUY NOW

4

Extrusion Coating, Lamination and Coextrusion: The complete process manual

Gregory, 2012

€150.00 or £125.00 or $200.00

MORE INFO/BUY NOW

5

PVC Formulary, 2nd Edition

Wypych, 2014

€215.00 or £175.00 or $285.00

MORE INFO/BUY NOW

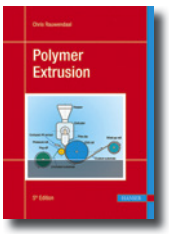
6

Moulding Masterclass

Goff, 2013

€60.00 or £50.00 or $75.00

MORE INFO/BUY NOW



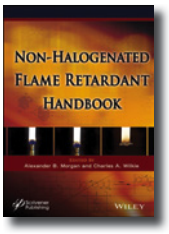
7

Polymer Extrusion, 5th Edition

Rauwendaal, 2014

€140.00 or £115.00 or $180.00

MORE INFO/BUY NOW



8

The Non-halogenated Flame Retardant Handbook

Morgan & Wilkie, 2014

€156.00 or £130.00 or $210.00

MORE INFO/BUY NOW

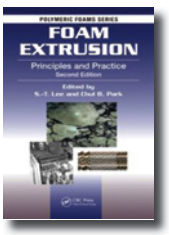
9

Trends in packaging of food, beverages and other fast-moving consumer goods (FMCG)

Farmer, 2013

€170.00 or £140.00 or $225.00

MORE INFO/BUY NOW



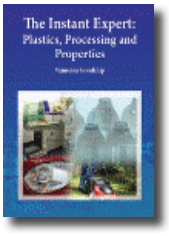
10

Foam Extrusion: Principles and Practice, Second Edition

Lee & Park, 2014

€190.00 or £159.00 or $255.00

MORE INFO/BUY NOW



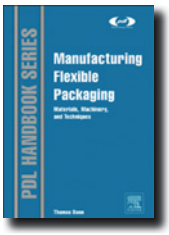
11

The Instant Expert: Plastics, Processing and Properties

Goodship, 2010

€100.00 or £82.50 or $125.00

MORE INFO/BUY NOW



12

Manufacturing Flexible Packaging: Materials, Machinery, and Techniques

Dunn, 2014

€162.00 or £135.00 or $216.00

MORE INFO/BUY NOW

Visit www.pidbooks.com for hundreds of recent titles, easy online ordering, special offers and clearance bargains!

Order online or by telephone, fax or email. Contact Matt Wherlock,
Tel: +44 (0)117 924 9442 Fax: +44 (0)117 311 1534 email: mjw@amiplastics.com
All prices are correct at the time of publication but may be subject to change.
Please check the Plastics Information Direct website for current prices and shipping charges.

PHOTO: ARBURG

Industry 4.0 – the Internet of Things – promises to connect entire manufacturing supply chains to provide instant real-time data capture. Arburg demonstrated two "Smart Factory" examples last year

Moving towards the "Smart Factory"

We are living and working in an increasingly connected world. IT consultancy Gartner forecasts by the end of this year there will be 4.9bn internet-connected devices in use worldwide and this will rise to 25bn by 2020. That's three devices for every person on the planet. While today the bulk of these connected devices are consumer-focused, the future is expected to see internet-connected devices become commonplace in business and manufacturing environments.

The "Internet of Things"- as this trend to connected smart products has been named in much of the English-speaking world – brings together devices (things) and communication networks (the internet) with software applications and data analysis tools. For consumers, it could mean refrigerators that automatically re-order fresh groceries or heating systems that adapt to the use of the home. For manufacturers, it opens the way for instant real-time capture of process data from every point in the supply chain to provide continuous sharing of information such as stock levels, production problems, demand levels and capacity utilisation.

The creation of this "Smart Factory" concept has led to some describing the application of this technology in manufacturing as the fourth industrial revolution and has given birth to the term in Europe of Industry 4.0.

German machinery maker Arburg has been promoting the benefits of Industry 4.0 connectivity in the plastics manufacturing environment in recent months, demonstrating how "smart" connectivity can be used in conjunction with tools such as its ALS production management system to provide instantly-accessible part-specific data capture. The company's most recent demonstration example was shown running at the Fakuma fair in Germany in October last year, where it produced uniquely-identified office scissors using a combination of an Allrounder injection moulding machine, Multilift robotic automation and Freeformer 3D printing equipment.

The production example started with an individual visitor choosing the metal scissor blanks they wanted from a selection that included left and right hand versions with either rounded or pointed tips. That selection was then recorded to a smart card and a DMC code generated to identify that individual product before the manufacturing process commenced.

A human operator then loaded the selected scissor blades into a robot gripper, which loaded the blank into the 1+1 cavity mould ready for overmoulding of the PP handles (the mould was configured to accept both left and right handed scissors). The handle overmoulding was carried out on a standard Allrounder 370E all-electric machine on a cycle time of 60s. On removal from the mould, the previously assigned DMC code was applied to

Main image: Industry 4.0 promises high level intelligent data capture, according to Arburg

PHOTO: ARBURG

Above: Arburg demonstrated "single-unit batch" production of customised scissors using Industry 4.0 principles at last year's Fakuma

the part using a laser marking system. This machine-readable code allowed the individual moulding to be identified and all process and subsequent measurement and test data to be recorded to an individual web page, accessible via any web-connected device.

The next step in the process involved transferring the scissors to a Freeformer 3D printer, where personalised three-dimensional lettering was applied to customise the parts (customisation is a key attraction of Industry 4.0 production). It took around two minutes to apply the 0.21mm high raised lettering to the surface of the handles using the Freeformer's 3Dprinting technology.

The Arburg ALS host computer system provided the link between the autonomous stations and recorded all the relevant production data and test results before transmitting them to the central web server. The end result of the production process is described by the company as a "single-unit batch".

Arburg demonstrated a similar "smart factory" solution at its annual Technology Days open house event at its factory at Lossburg in Germany in March last year involving moulding, assembly and testing of a uniquely-identified toy car. The process, which will be demonstrated at the NPE show in the US in March, again started out by assigning the part an individual machine-readable QR code before going on to record all associated process and test data via the ALS system to an individual part web page.

A standard QR code reading app allowed access to the part web page to view all recorded process data, including time of production, cycle counter, cycle time, ambient temperature and humidity at the time of moulding, together with recorded dimensions and photos captured by a camera-based inspection system.

"We are manufacturing a part that is collecting data throughout the process – and it is all stored," explained Dr Thomas Walther, head of Arburg's Application Centre in Lossburg. "This is data integration at the highest intelligence level. If this was a safety critical part for the automotive industry, for example, this would be really valuable."

The collection of data within an Industry 4.0 environment can involve a lot more than just the factory floor, potentially linking in all the way to point of sale and perhaps beyond. This does present some potential challenges, however, not the least at a legal level.

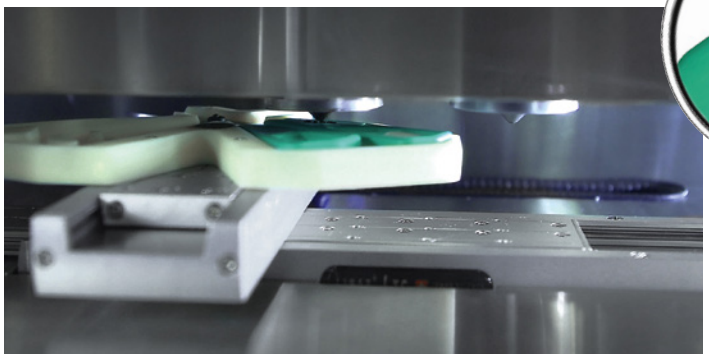
Speaking at an European Union event held last year in Germany to promote EU adoption of Industry 4.0 manufacturing methods, Manfred Wittenstein, chairman of the supervisory board at German industrial automation specialist Wittenstein and former president of the VDMA engineering trade association, said politicians and law-makers must be aware that the digitalisation of industry will be totally different to the spread of digital products in society we have seen up to now.

Much more data will be created in industrial manufacturing environments than we are used to seeing from private users, Wittenstein said, so law makers will not be able to simply replicate today's approach when regulating companies in the future. And the legal position on who owns data created by interconnected machines and machine components must also be determined.

Click on the links for more information:

- **www.arburg.com**
- **www.vdma.org**
- **www.wittenstein.de**

PHOTO: ARBURG



Below: Application of custom decoration to these PP scissor handles using Arburg 3Dprint technology

Office scissors showing customised 3D printed decoration and unique laser coding

AMI'S 2013 INDIAN SUBCONTINENT PLASTICS INDUSTRY REPORT

This report gives invaluable data and market analysis to ensure your company is aware of the latest investment opportunities in the world's most dynamic polymer market.

Click here to view sample pages and to order this brand NEW report

Designed to be quick and easy to use the AMI report is packed with key figures, tables and graphs, covering:

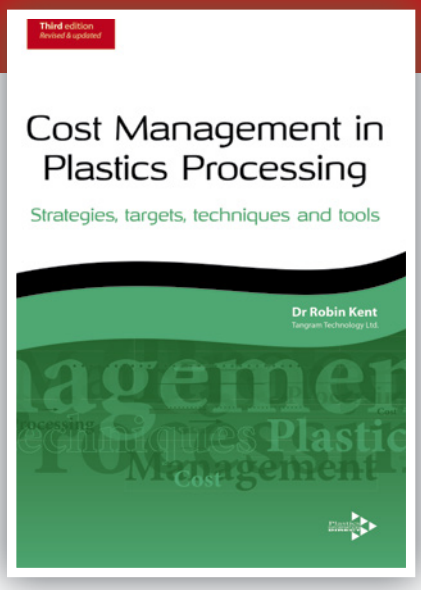
- ✓ **Commodity polymers**
- ✓ **Engineering polymers**
- ✓ **Analysis by processing sectors**
- ✓ **Statistical data for country demand by polymer**

This unique AMI report is the most comprehensive report on the Indian subcontinent plastics industry. It analyses supply, demand and end use applications to provide a reliable insight into this promising market and its trends.

Applied Market Information Ltd. **www.ami-publishing.com**

NEW PUBLICATION

From Plastics Information Direct: the publisher and bookseller for the plastics industry



Cost Management in Plastics Processing: Strategies, targets, techniques and tools

Revised and expanded third edition of a best-seller

- Practical advice applicable to all plastics processors
- Re-evaluates how and where savings can be made
- A structured route-map with simple tasks and achievable goals
- Increased focus on environmental impacts and energy costs

For more information and to order your copy, please CLICK HERE

Visit www.pidbooks.com for hundreds of recent titles, easy online ordering, special offers and clearance bargains!

Order online or by telephone, fax or email. Contact Matt Wherlock,
Tel: +44 (0)117 924 9442 Fax: +44 (0)117 311 1534 email: mjw@amiplastics.com
All prices are correct at the time of publication but may be subject to change.
Please check the Plastics Information Direct website for current prices and shipping charges.

AMI's Directory

INJECTION MOULDERS IN THE UNITED KINGDOM

LOCATION AND PRODUCTION DETAILS OF 980 INJECTION MOULDING SITES

Polymers processed

Addresses & contacts

Products manufactured & markets served

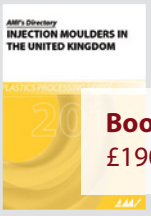
Available as a fully searchable database

Click here for more details

Despite consolidation of the market, this edition includes new sites; find new suppliers, customers or review the competition.

What will you find in this directory?

- *Full addresses and numbers*
- *Managerial contacts*
- *Polymers processed*
- *Products manufactured*
- *Markets served*
- *Post-moulding services offered*
- *Machinery information*

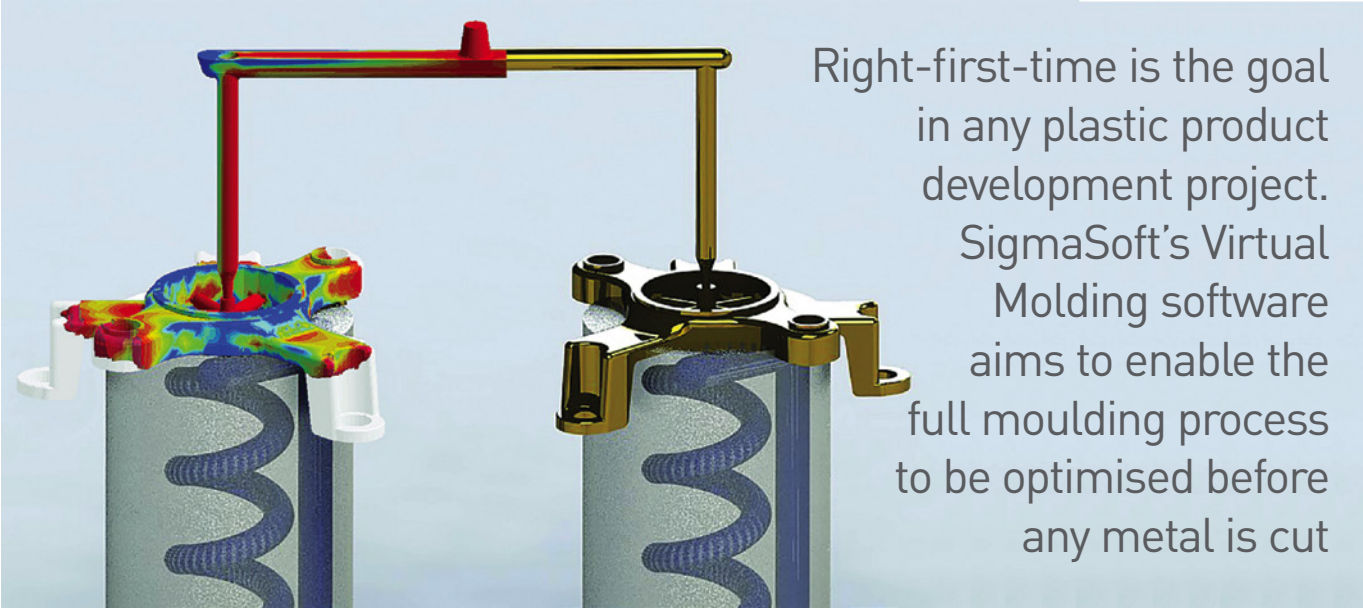


Book:
£190/€230/$300

Standard database:
£540/ €650/$845
Gold database:
£815/ €975/$1270

For more information contact us on **sales@amiplastics.com** or Tel: **+44 (0) 117 9249442**

www.ami-publishing.com



Right-first-time is the goal in any plastic product development project. SigmaSoft's Virtual Molding software aims to enable the full moulding process to be optimised before any metal is cut

The virtual approach to moulding optimisation

Even today, it is still quite common to find moulding facilities where most production set ups are determined by trial and error. In the absence of any better information, the process window is established based on previous experience and, once an acceptable quality part is achieved, the mould put into production. However, this process window is often far from optimised and the cycle time often much longer than it could be.

Traditional product development follows a sequential process: the part is designed, then the cavity designed, the mould is built, the process defined, and finally the mould goes into production. If a mistake or incorrect assumption is made at any stage in this process, it only becomes evident once the mould is mounted on the machine. By that stage the production pressure is on and there is little opportunity – for reasons of cost or time – to change anything.

Virtual Molding software takes a different approach. Designed to work as a 'virtual injection moulding machine' it is intended to reproduce the outcome of a given mould and process configuration. Allowing a mould to be 'built' and 'run' in a virtual computer environment means potential problems can be identified within hours and alternative production or design concepts can be evaluated inexpensively.

The following example explains how the Virtual Molding approach can be used to support the complete design process of a new mould.

First, an injection moulding simulation is used to determine the basic flow behavior of the melt, to identify the best position for the injection point, to evaluate the pressure drop in each cavity, and to get an early understanding of how the part will solidify. For this first evaluation of the solidification process a perfectly tempered mold is assumed (meaning a mould with a homogeneous temperature). This allows the theoretical cycle time to be established and the regions of late solidification to be identified. In this case, the mould temperature is set at 20°C.

Once this initial information about part behaviour is gathered, a mould is designed within the Virtual Molding software and used to perform a moulding analysis. The mould is run virtually using all its components and the same process conditions that would be experienced in reality. For this example, a four-cavity hot runner mould was modelled with tempering channels assumed to be at 20°C.

The simulation allows the temperature distribution in the cavities to be calculated (Figure 1). At the beginning of the start-up phase, the mould temperature is indeed homogeneous and very near to the theoretic

Main image: US company Kalypso used Virtual Molding techniques to optimise this dimensionally-challenging motor mount in 30% glass reinforced PA6,6

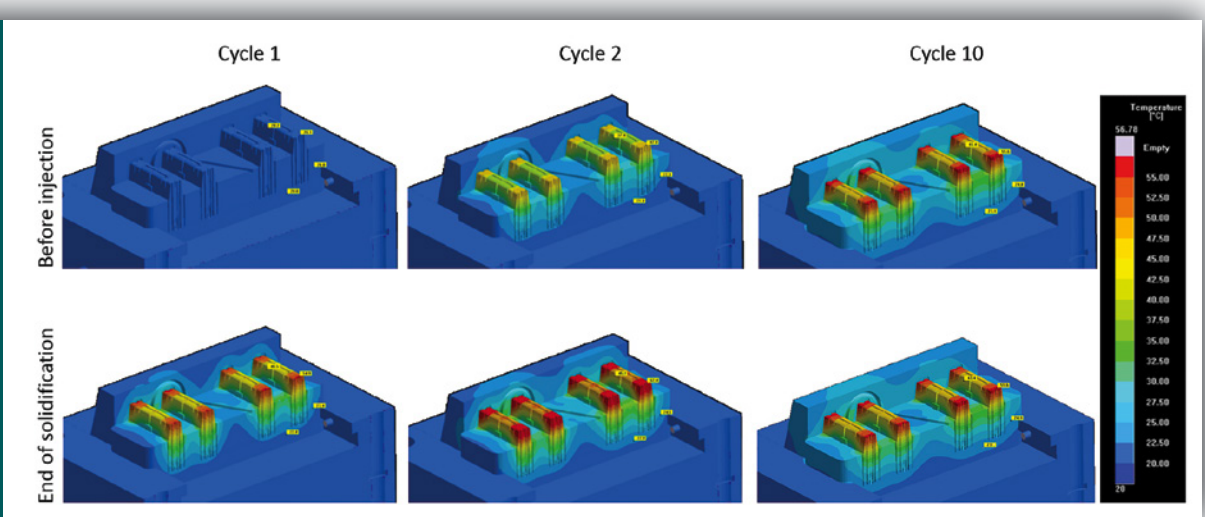


Figure 1: Temperature distribution on the cavity surface at the beginning (top) and end (bottom) of cycles 1, 2 and 10

value of 20°C. However, once the hot thermoplastic melt starts to flow in the cavity, it begins to heat the mould steel. Some of this heat is dissipated over several moulding cycles, but some is retained. Eventually, the mould will reach a quasi-stable thermal state.

The theoretic solidification time determined over the cross section of the part in the initial analysis can now be compared with the time actually required for the 'virtual' real mould. As the 'virtual' mould temperature is actually some way away from the homogenous 20°C assumed in the first simulation, the actual cooling time of the part is longer. If the mould temperature was at a uniform 20°C the part would solidify after 30s. However, as the temperature in some regions of the cavity reaches as high as 50°C, the virtual molding analysis shows that a considerable volume of material remains liquid after 30s.

Armed with this 'real' process data it is possible to test alternative process optimisation options in the virtual environment. In this example, the first modification is to place the water cooling channels closer to the cavity walls. The second option is to use a more costly high conductivity steel for the mould cavities. The resulting data shows while the high conductivity steel increases the mould cost by 5%, it reduces the cycle time by 25%.

Part removal time also has an impact on cycle time – for every second the mould is open it is dissipating heat into the mould shop environment. The graphs in Figure 2 show the effect that part removal times of 3s and 8s have on the temperature of the mould and the solidification time of the part. It this example it can be seen that reducing the part removal time by 5s from 8s to 3s results in a significantly higher mould temperature. However, this higher mould temperature only increases the solidification time by 1s, resulting in a net cycle time saving of 4s through faster part removal.

One company to successfully apply the Virtual Molding approach is US-based Kalypso Ultra Technologies, which used the software to develop the moulds for production of a 100mm diameter thick-wall motor mounting in 30% glass reinforced PA6,6. The combination of the material, the complex geometry, and tolerances around each mounting diameter of +0.07/-0.00mm made it a challenging part that the company did not want to approach using 'trial and error'.

Instead, it used a 20 cycle Virtual Molding analysis where the predicted process parameters revealed hot spots on the mould once steady-state conditions were obtained. Hot spots result in variations in crystallinity in semi-crystalline polymers such as PA6,6, leading to non-uniform shrinkage and potential distortion. Kalypso used the SigmaSoft software to evaluate the use of conformally cooled mould cores, solving both the temperature issues and reducing cycle time.

www.sigmasoft.de

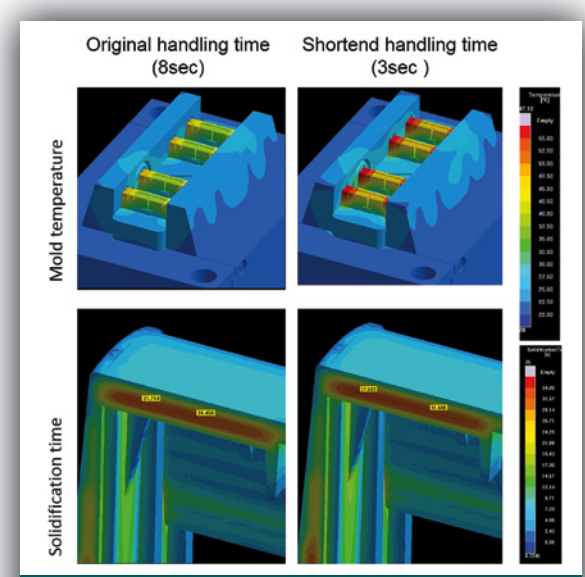
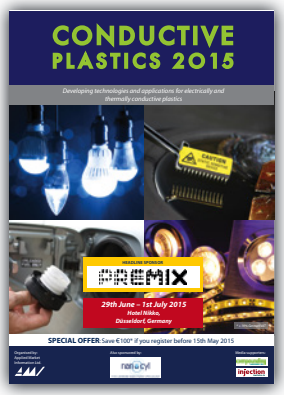


Figure 2 – Shortening part removal time by 5s results in a net cycle reduction of 4s as less heat is dissipated from the open mould

Download the programmes for these forthcoming conferences

Simply click on the brochure cover or link to download a PDF of the full publication

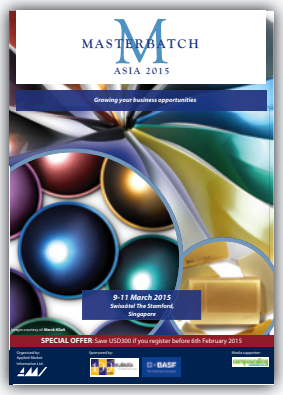
Conductive Plastics



Taking place in Dusseldorf, Germany, between 29 June and 1 July, this brand new event takes a detailed look at the application, development and processing of electrically and thermally conductive plastics.

➤ Click here to download

Masterbatch Asia



AMI's 11th Masterbatch Asia conference returns to Singapore on 9-11 March. Download the programme which includes an impressive line-up of speakers including representatives from Sony and PolyOne.

➤ Click here to download

Compounding World Congress

Following the considerable success of the Compounding World Forum in the USA, *Compounding World* magazine and AMI are launching this new event in Europe. The programme features a selection of the industry's most influential leaders.

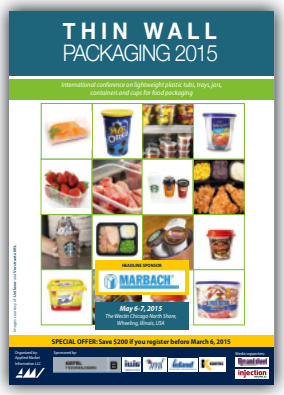
➤ Click here to download

Plastic Closure Innovations

Now in its third year, Plastic Closure Innovations takes place in Berlin, Germany, on 9-11 June 2015. It is the networking and learning event for users and producers of plastic caps and closures, technology developers and materials suppliers.

➤ Click here to download

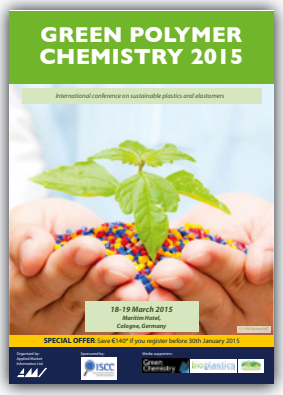
Thin Wall Packaging



Thin wall Packaging 2015 is the leading conference for the North American thin wall packaging industry. The event will be held in Chicago, USA, on 6-7 May. Download the brochure to view the line-up of expert speakers.

➤ Click here to download

Green Polymer Chemistry



The next international conference on sustainable plastics and elastomers is being held on 18-19 March 2015 in Cologne, Germany. Download the programme which covers leading edge biobased materials and their applications.

➤ Click here to download

To see our full line-up of more than 25 plastics industry events over the next 12 months, please visit www.amiconferences.com

Cimatron expands simulation

The latest version of Cimatron's integrated CADCAM software includes a Moldex3D cooling simulation, which can be used together with the current Moldex3D flow analysis module to improve simulation accuracy and better optimise cooling circuit performance, including conformal cooling systems.

Cimatron, which was acquired by 3D Systems at the end of 2014, has also enhanced the motion simulation tools in this latest version, allowing mould movements to be simulated and checks for collisions to be made.

www.cimatron.com

Smart monitoring from Wittmann Battenfeld

Wittmann Battenfeld has introduced a new process data acquisition system – SmartMonitoring – that integrates the Authentig monitoring module developed by Austrian manufacturing execution system (MES) developer TIG into its Unilog B6 machine controller.

Intended to simplify networking and monitoring of the injection moulding plant, the Authentig integration means Wittmann Battenfeld customers can pull up a complete overview of their manufacturing plant from any Unilog B6-equipped moulding machine.

The Authentig MES software offers 10 modules, allowing users to configure a system to present a range of data extending from a simple overview of production to detailed planning, maintenance programming and process optimisation.

Wittmann Battenfeld says the SmartMonitoring integration is a low-cost entry level MES option that opens up plant and production data acquisition.

www.wittmann-group.com

Moulding data on the move

Smartphone users can now take advantage of two new apps designed to help simplify mould setting and process troubleshooting.

US-based Routsis Training has made its Injection Molding Guide available as an app for Apple and Android devices. It includes a wide variety of processing data, such as material properties, basic mould and part design guidelines, and some frequently used calculations.

"Our free app is updated on a frequent basis and includes a great amount of useful and practical information that can be located easily in the palm of your hand." says Andy Routsis, President of Routsis Training.

Moulders without a smartphone can download a free PDF version of the Routsis Injection Molding Reference Guide from the company's website.

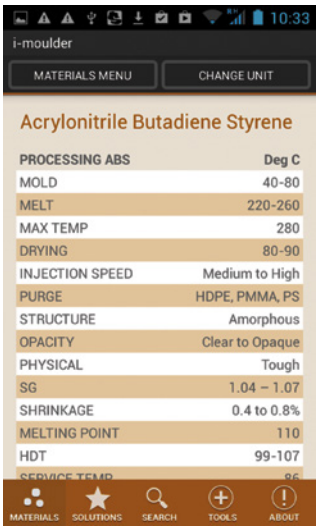
Don't forget that Injection World is also available as an app for Apple and Android devices. And because it is sponsored by plastics ancillaries maker Maguire, it is available free of charge.

ANDROID APP ON Google play

Download on the App Store

Meanwhile, Moldflow consultancy Imtech Design has released an updated version of its i-Moulder app. The new edition includes an expanded database of materials information (including a larger trade name reference) and an enhanced troubleshooting section, both of which can be used free of charge.

The company has also added a new Tools section to the app, available via a $3 upgrade. This contains 10 useful injection moulding calculations allowing users to quickly determine values such as part weight, material consumption, production rate, masterbatch percentage, actual shrinkage and screw speed. It also includes 14 conversion formulas.



Imtech's i-Moulder

www.traininteractive.com

www.imtechdesign.com

Delcam adds capabilities

CAD CAM software specialist Delcam, which was acquired by Moldflow-developer Autodesk early last year, has upgraded its PowerShape Pro CAD, PowerMill CAM and Delcam Electrode products.

The key addition to the 2015 version of PowerShape Pro is its Smart Feature Selector. This allows multiple similar features to be found and selected using either a specific value or a range of values. Once the particular group has been selected, all the features within it can be edited simultaneously.

The company says the feature can speed up model preparation considerably, citing the example of fillet sizing where it can be used to identify and correct any fillets below the required radius.

The new release of the PowerMILL programming system for high-speed and five-axis machining includes improvements to the Vortex high-efficiency area-clearance strategy, expanded collision, and more efficient raster finishing. Vortex uses a controlled engagement angle to maintain the optimum cutting conditions for the whole toolpath and is claimed to reduce cutting time by up to 70%.

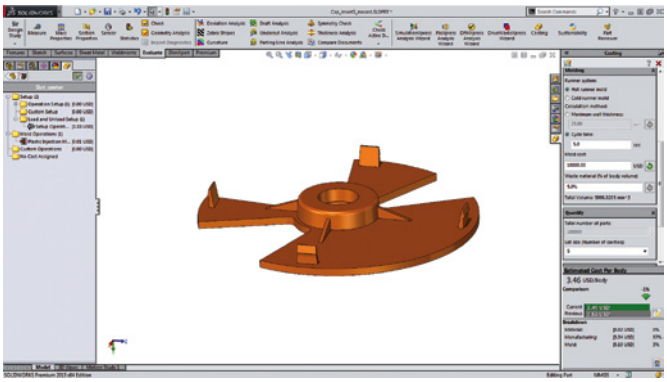
The company has also added a new rib-machining module to the PowerMILL software. Designed to simplify the complex programming required to set up a rib machining strategy, the new module calculates a sequence for a single rib in a part design that can be optimised then applied automatically to the remaining ribs.

Delcam Electrode provides improved data management tools, including the ability to output a complete electrode schedule in HTML, Excel or CSV formats. The company says this will be an advantage in production of complex mould tools requiring a large number of electrodes.

www.delcam.com

SolidWorks hits the cloud

SolidWorks 2015 3D design software from Dassault Systèmes incorporates a wide range of new features for product designers, including collaborative sharing and process organisational tools designed to speed up the development process.



According to the company, the new collaborative sharing feature provides access to Dassault Systèmes' 3DExperience platform, which uses cloud-based technologies to enable multiple engineering teams to work better together.

"With the 3DExperience platform now accessible, users can connect their existing SolidWorks desktop applications to the cloud and begin developing new business processes and enjoy 3DExperience powered new generation apps, such as SolidWorks' upcoming Industrial Design application," says CEO Bertrand Sicot.

The new version also offers improved model-based definition, which is claimed to make geometry creation a much faster process and allows faster communication of product and manufacturing information. It can also simulate multiple design scenarios, allowing faster evaluation of different load combinations.

Other new features include Treehouse, which allows assemblies and product structures to be created at the earliest stage of the development process, and enhanced documentation creation, cost analysis and web connectivity tools.

www.solidworks.com

Back-to-basics for Moldex

Core Tech System says it has taken a back-to-basics approach to development of the latest version of its plastic injection moulding validation and simulation software, Moldex3D R13.0.

"Quality and cost are two of the most significant success factors in product development and manufacturing," says CoreTech System president Dr Venny Yang. "The release of Modex3D R13.0 has emphasised back-to-basics problem analysis and troubleshooting capabilities. This is helping our customers tackle critical moulding issues to reach optimal production efficiency."

According to the company, the new version provides more user-friendly rapid modelling and meshing tools that simplify pre-processing and help speed up geometric modelling. Troubleshooting capabilities in injection moulding simulations have also been extended to provide improved visualisation of potential manufacturing problems.

The improved post-processing optimisation interface is said to be more intuitive and convenient to use, while the materials database has been expanded to include more than 6,500 thermoplastic and thermoset materials.

www.moldex3D.com

Catch up on our recent issues for FREE

Simply click on the cover to see the full magazine, or download the issue in the relevant Apple or Android app

Injection World – Nov/Dec
The Nov/Dec issue of Injection World has a special focus on automotive applications, an in-depth report on engineering thermoplastics, a practical guide to plating plastics, plus news and analysis from Fakuma 2014.

➤ Click here to view

Injection World – Oct
Injection World's October edition is packed full of features on electrical and electronics applications, computer simulation of moulding processes, and designing sustainable products. Plus there's a guide to the injection moulding highlights at Fakuma.

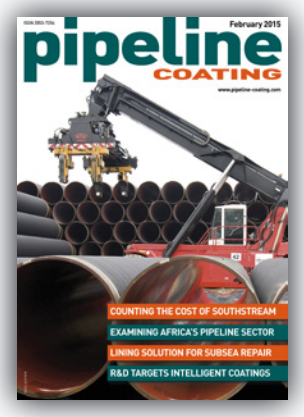
➤ Click here to view

Compounding World – Jan
The January edition of Compounding World contains special reports on chemical foaming agents, pelletizing systems, and additives for films. Plus there's coverage of industry events in India, the USA and Germany.

➤ Click here to view

Pipeline Coating – Feb
The February edition of Pipeline Coating takes an in depth look at investment in the African pipeline industry. Plus the latest oil and gas market outlook, offshore lining technology and smart coating developments.

➤ Click here to view



Pipe and Profile - Jan/Feb
The January/February 2015 edition of Pipe and Profile Extrusion looks at the latest developments in screenchangers, developments in the titanium dioxide market, and innovation in ETP and composite pipe.

➤ Click here to view

Film and Sheet – Dec
Film and Sheet's December issue has a special focus on recycling equipment and applications. Plus it includes features on masterbatch developments, melt filtration systems and converting equipment.

➤ Click here to view

Take out your own FREE subscriptions to any of the magazines. Click on the logos below to simply register on-line.

compounding WORLD injection WORLD pipe and profile EXTRUSION film and sheet EXTRUSION

Global exhibition guide

2015		
10-14 March	Koplas, Seoul, South Korea	www.koplas.com
12-14 March	3P Plas Print Pack, Lahore, Pakistan	www.plasprintpack.com.pk
23-27 March	NPE, Orlando, FL, USA	www.npe.org
26-28 March	Eurostampi & Plastixexpo, Parma, Italy	www.mecspe.com
8-10 April	Plastic Japan, Tokyo, Japan	www.plas.jp/en
21-24 April	Elmia Polymer, Jönköping, Sweden	www.elmia.se/en/polymer
28-30 April	PlastPrinkPack Nigeria, Lagos, Nigeria	www.ppp-nigeria.com
4-8 May	Feiplastic, Sao Paulo, Brazil	www.feiplastic.com.br
5-9 May	Plast, Milan, Italy	www.plastonline.org/en
20-22 May	Afriplast Expo, Johannesburg, South Africa	www.exhibitionsafrica.com
20-23 May	Chinaplas, Guangzhou, China	www.chinaplasonline.com
26-29 May	Plastpol, Kielce, Poland	www.targikielce.pl/en
10-12 June	Kenya Plast, Nairobi, Kenya	www.kenyaplast.in
16-17 June	PDM/PRE/PPS, Telford, UK	www.pdmevent.com
16-18 June	Plast-Ex, Toronto, Canada	www.plast-ex.org
9-12 July	InterPlas Thailand, Bangkok, Thailand	www.interplasthailand.com
23-25 July	Plastics Vietnam, Ho Chi Minh City, Vietnam	www.plastics-vietnam.in
26-29 August	T-Plas / Tiprex, Bangkok, Thailand	www.tplas.com
21-24 September	Plastics and Rubber Fair, Poznan, Poland	www.epla.pl/en
6-9 October	Euromold, Dusseldorf, Germany	www.euromold.com
7-9 October	Plastic Osaka, Osaka, Japan	www.plas-kansai.jp/en
13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
2016		
19-26 October	K 2016, Dusseldorf, Germany	www.k-tradefair.com

AMI conferences

18-19 March 2015	Green Polymer Chemistry 2015, Cologne, Germany
21-23 April 2015	Compounding World Congress, Cologne, Germany
6-7 May 2015	Thin Wall Packaging 2015, Chicago, IL, USA
12-13 May 2015	Fire retardants in Plastics 2015, Denver, CO, USA
9-11 June 2015	Plastic Closure Innovations 2015, Berlin, Germany
29 June - 1 July	Conductive Plastics 2015, Dusseldorf, Germany

For information on all these events and other AMI conferences and seminars, see

www.amiplastics.com

Turn page for the full programme ➤

PLASTIC CLOSURE INNOVATIONS 2015

Trends and technical developments in the international closures industry

Images courtesy of: **Global Closure Systems, LINDAL Group Holding GmbH** and **Spadel Group**

HEADLINE SPONSOR

THE CRAFT OF VTC PRECISION MOULD MAKING
Vasantha Tool Crafts Pvt.Ltd.
AN ISO 2001-2008 CERTIFIED COMPANY
www.vasanthatools.com

9-11 June 2015
Sofitel Kurfürstendamm, Berlin, Germany

** + 19% German VAT*

SPECIAL OFFER: Save €200* if you register before 24th April 2015

Organised by:
Applied Market Information Ltd.

Sponsored by:
BOREALIS
sabic
INglass HRS Flow — Led by your challenge

Media supporter:
injection WORLD

PLASTIC CLOSURE INNOVATIONS 2015

9-11 June 2015, Sofitel Kurfürstendamm, Berlin, Germany

AMI is pleased to announce Plastic Closure Innovations 2015, the third international conference focused on innovation in the development and production of plastic closures and product delivery mechanisms for both food and non-food markets. This high level event will take place from the 9-11 June 2015 at the Sofitel Kurfürstendamm in Berlin, Germany, and will once again bring together leading brand owners, closure makers, and materials and technology suppliers.

New packaging trends and initiatives, together with increasing penetration of plastic bottles and ongoing product innovation, are fuelling the development of novel closure solutions. Key market drivers include improved functionality, convenience and increased shelf impact - plastic closures are valued by brand owners for their aesthetic contribution to product image as well as for consumer appeal in terms of ease-of-use and dosing management.

Some 55% of European closure production is destined for beverage applications. Bottled water continues to drive growth in this sector, while an increasing focus on health has seen CSD consumption slow. However, the trend to smaller beverage containers and development of water flavour enhancers are creating new opportunities for closure makers. In the non-beverage sector, toiletries and cosmetics lead the European market in polymer consumption terms. Product concentration is driving innovation in areas such as household.

For many moulders, the focus today is on capturing more value through optimised operations, lean manufacturing and cost reduction, while working ever closer with customers to create unique, more specialist designs for ultimate product differentiation. All this is taking place against a background of growing environmental awareness.

Plastic Closure Innovations 2015 provides a unique learning and networking opportunity within which leading brand owners and fillers, closures producers, packaging manufacturers, designers and suppliers to the industry can explore all the latest developments in the plastics closures industry and identify the future strategies for adding value across the supply chain.

EARLY BIRD REGISTRATION OFFER

Register before 24th April 2015 and pay €890* saving €200* on the full price of €1090*. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Welcome Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

SPONSOR THIS EVENT

A variety of sponsorship opportunities are available at this conference to help to promote and enhance your company's products and services to this highly targeted international audience. Contact the conference hotline for further information.

*+19% German VAT

CONFERENCE HOTLINE

Contact: Rocio Martinez, Conference Organiser
Tel: +44 (0) 117 314 8111
Fax: +44 (0) 117 311 1534
Email: rmm@amiplastics.com

See the latest programme and confirmed speakers at:
www.amiconferences.com

HEADLINE SPONSOR

CONFERENCE

Tuesday 9th June 2015

18.00-19.30 Registration and Welcome Cocktail Reception

There are no conference sessions on this day

Wednesday 10th June 2015

08.00 Registration and welcome coffee
09.00 Opening announcements

MARKET OVERVIEW

09.10 **An overview of the Eurpoean caps and closures market**
Mr. Chris Smith, Editor Injection World,
AMI MAGAZINES, United Kingdom

09.40 **Global opportunities for plastic closures in foods: the need to add value**
Ms. Karine Dussimon, Senior Packaging Analyst,
EUROMONITOR INTERNATIONAL, United Kingdom

SESSION 1 – CLOSURE INNOVATIONS

10.10 **Think functional, act innovative**
Mr. Roger F. Wilfinger, CEO
VICAP SYTEMS EUROPE ASIA Ltd., Switzerland

10.40-11.10 Morning coffee

11.10 **A lego approach coupled with lean development**
Mr. Dennis Broberg, R&D Manager,
NOLATO CERBO, Sweden

11.40 **Building brand loyalty and appeal through novel added-value closure design**
Mr. Arno Rabie, Managing Director,
SMOOTH HIP Ltd., United Kingdom

SESSION 2 – MOULDS AND AUTOMATION

12.10 **Global mould manufacturing technologies in India**
Mr. Dayanand Reddy Anugu, Managing Director
VASANTHA TOOL CRAFTS Pvt. Ltd., India

12.40-14.10 Lunch sponsored by: BOREALIS

14.10 **Planning for automation in closure design: improving part quality and uptime**
Mr. Philippe McNally, President,
MMC PACKAGING, Canada

14.40 **Collapsible core moulds result in design-optimized, cost-effective closures**
Mr. Carlos Saboga,Technical Sales Manager Europe,
ROEHR TOOL CORPORATION, United States

SESSION 3 – IMPROVING PROCESS EFFICIENCY

15.10 **High output injection moulding systems for 2C closures**
Mr. Andreas Reich, Senior Sales Manager Packaging,
ARBURG GmbH & Co.KG, Germany and
Mr. Hansjörg Keusgen, Head Sales and Marketing,
FOBOHA, (GERMANY) GmbH, Germany

15.40-16.10 Afternoon tea

16.10 **Intelligent process cooling engineered for plastic caps and closure industry**
Mr. Fabio Ferrari, Strategic Accounts Director (EMEA),
FRIGEL FIRENZE SpA, Italy

16.40 **Smoothing the transition from prototype to production closure tooling**
Mr. John Goff, CEO
G&A MOULDING TECHNOLOGY, United Kingdom

20.00 Conference Dinner

Turn page for booking details ➤

PROGRAMME

Thursday 11th June 2015

08.30 Registration and welcome coffee
09.00 Opening announcements

SESSION 4 – THE END USER VIEWPOINT

09.10 **Development of a new easy to open closure dedicated for a bottle of water**
Mr. Philippe Henon, Group Packaging Manager, SPADEL SA, Belgium

09.40 **Requirements towards closures in hair care**
Mr. Daniel Nebe, Senior Packaging Development Engineer and Mr. Sebastian Kraus, Senior Manager Packaging Development, KAO GERMANY GmbH, Germany

SESSION 5 – SUSTAINABLE CLOSURE PRODUCTION

10.10 **Sustainability approach for caps and closures**
Mr. Nicholas Thorne, Vice President Research & Develpment GLOBAL CLOSURE SYSTEMS, France

10.40-11.10 Morning coffee

11.10 **Life cycle analysis of sustainable PP closure solutions**
Ms. Meta Cigon, Application Marketing Manager Caps and Closure, BOREALIS AG, Austria and Mr. Luc Monnissen, Application Development Engineer, BOREALIS POLYMERS NV, Belgium

11.40 **New packaging opportunities based on new technologies**
Mr. Jorge García, Business Director, ITENE RESEARCH CENTER, Spain

SESSION 6 – MATERIAL DEVELOPMENTS

12.10 **Whatever the colour: cost-efficient dimensional control of caps and closures**
Mr. Bernard Vermeersch, Sr. Development Engineer, MILLIKEN & COMPANY, United States

12.40-14.10 Lunch

14.10 **Additives supporting performance of HDPE caps**
Dr. David Ribour, Technical Service Engineer Rigid Packaging, TOTAL, Belgium

SESSION 7 – QUALITY AND REGULATION

14.40 **3D inspection of plastic closures**
Mr. Stefano Severi, Sales Area Manager, SACMI IMOLA S.C., Italy

15.10 **Making packaging easy to open for elderly people while maintaining its integrity and if relevant child resistantce**
Mr. Stephen Wilkins, CEO, CHILDSAFE PACKAGING GROUP, United Kingdom

15.40 Afternoon tea and conference ends

Conference bag sponsored by:

Conference CD sponsored by:

AMI reserves the right to alter the programme without notice.
The latest programme including any new speakers or changes to schedules can be viewed on our website ***www.amiconferences.com***

HEADLINE SPONSOR

VASANTHA TOOL CRAFTS PRIVATE LIMITED has successfully designed and manufactured more than 1600 moulds for various applications like caps and closures for FMCG and pharmaceuticals, precision moulds for medical, electrical switch gear and electronics. These high cavity moulds are fully hot runner moulds, including valve gates, bi-injection technology and in-mould closing for flip top caps. With highly qualified tool design engineers, high end infrastructure of fully automated machining centre, laser sintering and in-house vacuum heat treatment and years of tool room experience it has a proven track record of supplying superior products to international standards for global and Indian customers such as Unilever, L'Oreal, P&G, Schneider, Tupperware, Colgate and many more. Today VASANTHA TOOL CRAFTS PRIVATE LIMITED can manufacture more than 250 moulds annually with a mix of high cavitation, bi-injection, multistack moulds and high precision moulds to global standards.

PLASTIC CLOSURE INNOVATIONS 2015: EXHIBITION SPACE

Make it easy for the delegates to find you at this busy event with your own table top exhibition space. Bring your own display stand, or just use the space to have literature and samples available and ensure that you make an impact. The table top exhibition will run throughout the conference in the spacious lobby next to the main meeting room.

Registration includes 1 delegate place!

Space is limited so to avoid disappointment please register for this service as soon as possible.

HOTEL ACCOMMODATION

Delegates are responsible for booking their own accommodation. AMI has negotiated limited number of rooms at a rate of €160 for a single room and €180 for a double (breakfast and Wi-Fi included) at the Sofitel Kurfürstendamm in Berlin for attendees who make their reservations by 12th May 2015.

The hotel only accepts reservation on the official booking form which can be downloaded from our website:www.amiconferences.com (Click on Plastic Closure Innovations 2015 followed by Accommodation). Fill in the form and fax/email to the reservation department.
Tel: +49 30 800 999 25 Fax: +49 30 800 999 36

Save €200*

Register before 24th April 2015

*+19% German VAT

FIVE GOOD REASONS WHY YOU SHOULD ATTEND:

1. Review the latest market trends for end-use applications
2. Track changes in the closures industry
3. Assess the latest caps and closures innovations
4. Keep up with new materials and technology
5. Network with top international experts and industry participants

Click here for a PDF of the brochure

REGISTRATION FORM

Company: _____

Address: _____

_____

Country: _____

Tel: _____ Fax: _____

Email: _____

VAT No.: _____
(Must be completed by all EU Companies)

Company activity: _____

Purchase order No. *(if applicable)*: _____

Invoice address *(if different from above)*: _____

_____

_____

DELEGATE DETAILS

If more than one delegate please photocopy form

Title: _____ First name: _____

Surname: _____

Position: _____

Special dietary requirements: _____

Signature: _____ Date: _____

PAYMENT DETAILS

All payments to be made in Euros

Please tick box and write amount:

❑ Early bird admission fee: *(Until 24th April 2015)*	€890 + €169.10* = €1059.10	_____
❑ Admission fee thereafter:	€1090 + €207.10* = €1297.10	_____
❑ Conference Dinner:	€79 + €15.01* = €94.01	_____
Table Top Exhibition Package (includes 1 delegate place)		
❑ German resident companies	€1500 + €285* = €1785	_____
❑ Non - German resident companies (***Only admission fee part of package is VAT chargeable at 19%*)	€1500 + €169.10** = €1669.10	_____

** German VAT charged at 19%* **Total:** _____

Please note all delegates have to pay the VAT stated above

METHOD OF PAYMENT

On receipt of this registration form your credit card will be debited.
You will be sent an invoice in 7-14 working days.

❑ **Bank transfer quoting:** 'Applied Market Information Ltd. - Plastic Closure Innovations 2015' to: Commerzbank, Filiale Düsseldorf
Breite Straße 25, 40213 Düsseldorf, Germany
Account number: **1024710** Bank No. **300 400 00**
IBAN: **DE93 3004 0000 0102 4710 00** SWIFT: **COBADEFFXXX**

❑ Visa / Mastercard / Eurocard / JCB

				-					-					-				

If paying by card the following information **must** be given

Name of cardholder: _____

Expiry date: _____ 3-digit security code: _____

Cardholder's signature: _____

Card billing address: _____

Post / zip code: _____

Country: _____

Tel: _____ Fax: _____

Email: _____

PLASTIC CLOSURE INNOVATIONS 2015
CONFERENCE INFORMATION

Date and location
9-11 June 2015
Sofitel Berlin Kurfürstendamm
Augsburger Strasse 41
10789 Berlin
Germany

Tel: +49 30 800 999 0
Fax: +49 30 800 999 99

Registration fee
The registration fee includes attendance at all conference sessions, the Welcome Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

- ***Early bird registration:*** Register before 24th April 2015 for only €890*. Thereafter the cost is €1090*.
- ***Group rates:*** For companies wishing to register two or more delegates, group discounts are available. Please contact the Conference Organiser for more details. (Please note to qualify for the group discount delegates must be booked at the same time, otherwise additional delegates may be charged at full price.)

Plastic Closure Innovations 2015 table top exhibition
A limited number of table top exhibition spaces are available in the registration area and coffee lounge directly outside the conference room. The table top exhibition fee is excellent value for money and **includes 1 delegate place**. Exhibitors may either use tables provided by the hotel or bring their own stand or display.

Sponsor this event and promote your company
A variety of sponsorship opportunities are available at this event that can help to promote and enhance your company's products and services to this highly targeted international audience. For further information, please contact the Conference Organiser on: +44 (0) 117 314 8111.

Social events
The social events organised for Plastic Closure Innovations 2015 will provide an ideal setting for delegates and speakers to mix business with pleasure.

- ***Welcome Cocktail Reception:*** A welcoming cocktail reception will be held on the first evening. All delegates are invited to attend and it will offer an excellent opportunity to meet speakers and other colleagues. The Welcome Cocktail Reception will run approximately from 18:00 to 19:30 and is included in the delegate fee.
- ***Conference Dinner:*** All delegates are warmly invited to attend the Conference Dinner, which will take place at a local restaurant on the evening of 10th June 2015. The additional cost is €79*.

Hotel accommodation
Delegates are responsible for booking their own accommodation. AMI has negotiated a limited number of rooms at a rate of €160 for a single room and €180 for a double (breakfast and Wi-Fi included) at the Sofitel Kurfürstendamm in Berlin for attendees who make their reservations by 12th May 2015.

The hotel only accepts reservation on the official booking form which can be downloaded from our website: www.amiconferences.com (Click on Plastic Closure Innovations 2015 followed by Accommodation). Fill in the form and fax/email to the reservation department.

Tel: +49 30 800 999 25 Fax: +49 30 800 999 36
Email: H9387-re1@sofitel.com

Cancellations
Full refunds, less a cancellation charge of €200 will only be made on cancellations received prior to 8th May 2015. Thereafter we regret that no refunds can be made. Delegates may be substituted at any time. Please note that refunds will not be given on table top bookings, sponsorship packages or dinner places.

*+19% German VAT

CONFERENCE HOTLINE

ROCIO MARTINEZ, CONFERENCE ORGANISER
Applied Market Information Ltd.
6 Pritchard Street, Bristol, BS2 8RH, United Kingdom
Tel: +44 (0) 117 314 8111 Fax: +44 (0) 117 311 1534
Email: rmm@amiplastics.com

The latest programme, including any new speakers or changes to the schedule can be viewed on our website: **www.amiconferences.com**

Fax back to: +44 (0) 117 311 1534 or Email: rmm@amiplastics.com