2-component injection molding of PP and EVOH barrier – just one way to come up to the requirements posed to high-end barrier packagings
(photo: Waldorf Technik)

Packagings Doing the Balancing Act

Trend Report. The packaging industry is facing new challenges. The beautiful covers are expected to be thinner and thinner, while fulfilling more and more functions. As a result, conventional packaging materials are put to the test.

SUSANNA STOCK

A good half year ago, the K trade show revealed what will probably become more of a certainty at the interpack in May 2011. With the general challenges of globalized economy, packagings increasingly have to do the balancing act between consuming less material and providing enhanced and better functionalities. To satisfy this trend, especially plastics solutions are well-suited: Not only their great benefit – lightweight – but also their ability to protect goods in the long run, make plastics the no. 1 packaging material. This comes along with innovations in many stages: raw materials, material combinations and processing technologies help meet the major wishes of the users of packagings. The present economic environment – cost increases in all supply chains, up to supply bottlenecks for several raw materials – will induce many consumers of packagings to put their current packaging solutions to the test.

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Interpack 2011 Meets with Great Interest from Exhibitors

According to information from Messe Düsseldorf, interpack 2011 is due to repeat the successful 2008 fair. After the official deadline in February 2011, total bookings of exhibition space amount to a similar level. With its packaging and process solutions for enterprises from the sectors of food and drink, confectionery and bakery products, pharmaceutics and cosmetics, non-food consumer merchandise, and industrial goods, the latest interpack had utilized the trade show premise at full capacity.

This year, the leading trade show of the packaging sector will probably take place during a high price phase for all relevant packaging means and aids – apart from the high cost for plastics themselves, the prices for nearly all major raw materials and additives required for the manufacturing and processing of packagings are extraordinarily high. This fact is due to cause another wave of scrutinizing established packaging solutions, in order to find new options of reducing the consumption of material, and eventually save costs. Exhibitors from the packaging sector are facing a particular challenge, to provide new answers to these questions. For the second time within just six months, manufacturers of plastics packagings are at the very front in interpreting current and future demands from the market. The growth markets – flexible packagings and thermoformed or injection molded packagings and packaging parts from oil or biobased plastics – represent a key issue at the interpack.

In March, the German association of plastics manufacturers (Gesamtverband Kunststoffverarbeitende Industrie e.V. – GKV) published data on the share of →

Fig. 1. 3-D coating of hollow bodies, in particular of injection molded packagings and packaging parts with high barrier performances, is at the center of the business model of the newly founded Cavonic GmbH enterprise (photo: Cavonic)

packagings in the amounts produced and in turnovers of plastics. These figures once again show the significance of packagings to the overall plastics industry in Germany: Of the total 12.2 million tonnes of materials processed in 2010, 4.1 million tonnes were used for packaging applications, while of the overall turnover achieved by the enterprises of the branches represented by the association, i.e. EUR 51.3 billion, the packaging sector made up a share of EUR 12.2 billion (representing an increase by 14 %, as against the previous year). These figures underline the importance of the sector, if compared to construction, industrial parts or other applications.

Today plastics films represent roughly three thirds of the global consumption of flexible packagings already, with a tendency to increase, to the disadvantage of paper and aluminum foils. Following a study published by the Freedonia Group based in the U.S. last year, the global consumption of flexible packagings will rise by approx. 3.5 % each year, from a good 16 million tonnes in 2008 to reach almost 19.5 million tonnes in 2013.

Using flexible packagings for food and drinks, and in the pharmaceutics and cosmetics sector, includes benefits in terms of hygiene and long-term storage. Innovations in breathable films, and sheets suited for microwaves and freezers, further enhance their applications.

The big challenge to all types of food packagings is called at present: optimum barrier performance for the respective merchandise. In an increasing number of cases, it is essential to provide for the durability of food in terms of hygiene and quality, while offering packaging units in handy household sizes, due at the same time to meet consumer requirements of convenience.

Thanks to this sustained trend, enterprises such as Waldorf Technik GmbH & Co. KG in Engen, Germany, enjoy continuous demand from the market: the specialist in downstream automation of injection molding processes offers three different approaches to cope with the need for optimized barrier concepts. Main markets are the laboratory and cleanroom sectors in medical technology, as well as packaging industry, for instance large series production of solid thin-walled plastics packagings for applications in the pharmaceutics, food and health sectors. The company operates in the areas of innovative high technology, e.g. parts-removal systems with extremely short times of intervention, optimized solution concepts for single-face and stack molds, in-mold labeling modules, and integrated quality control systems.

Wolfgang Czizegg, managing director at Waldorf Technik: "We design and produce equipment that is suited to handle medical articles, for instance contact lenses, containers, insulin pens, pipettes, and petri dishes – plastics parts produced in large quantities. Our pioneering design concepts helped us open up new markets in packaging industry, by replacing glass and tin by plastics containers with a hermetic barrier function". The major fields of activity of Waldorf Technik thus are:

In-mold labeling (IML), mainly suited for small and average-size requirements of production, is a well-proven industrial process, for applications such as wrapping and bottom labeling with perfect covering of all label seams. The barrier labels either consist of a) a filmy multi-layer structure with EVOH, b) a SIOx coated barrier film, or c) an aluminum foil. All three of these represent a packaging solution with a sterilization option.

2-component injection molding with EVOH barrier: Being well-suited for large series packaging applications, this production process is currently entering the market in areas where glass and metal containers are traditionally the main competitors. Applying the 2-component injection molding technique to produce a sterilizable, filmy three-layer structure (PP-EVOH-PP), including adhesive agent, means a reproducible process without any effect on cycle times, ideal for barrier applications with a high degree of tooling, e.g. 32- or 64-cavity molds **(Title photo)**. This technique has been known for some years. No proof has been at hand, however, for the perfectly homogenous distribution of the EVOH barrier layer throughout the entire container body. Waldorf Technik has recently remedied this shortcoming by the newly developed Check'n Pack EVOH system, which is unique all over the world. This special downstream automation unit identifies the EVOH barrier in a consistent and comprehensive way down to the closure edge layer, at e.g. 64 cavities within six seconds. The process thus guarantees 100 % monitoring inside the mold, along with 100 % in-line removal of possible scrap, and fully automatic packing of the cups in transport packagings.

3-D in-line barrier coating for thin-walled packagings: This third approach to generate reliable barrier layers includes 3-D in-line vacuum coating with various cavonic coating substrates.

Cavonic GmbH is the name of a company founded in December 2010. The enterprise is mainly concerned with coating techniques (PE-CVD – plasma aided chemical coating, and PVD – physical vapor deposition). Three-dimensional coating of packaging materials and parts is its main business activity. "3-D coating is ideally suited for injection molded packagings, with their variety of product geometries from low-cost primary mono materials such as PE, PP, PS, PET, PLA etc. (subject to application, demand and number of units). We offer affordable solutions for plastics containers with excellent barrier properties." This is how co-founder Helmut Spaeter explains the enterprise's philosophy.

The barrier function is obtained by applying the "cavonic layer". This 3-D coating technique is recommended especially

Fig. 2. The new FSL 48 form, fill and seal line was designed for the hygienic filling and packing of dairy products mainly, while at the same time providing for brilliant IML decoration of thermoformed cups in the most diverse geometries (photo: Illig)

for containers, cups and similar three-dimensional and complex packaging elements **(Fig. 1)**. The company designs process equipment that allows for continuous in-line processes, thanks to state-of-the-art robot automation. The equipment can be connected directly to the injection molding plant, thus passing the parts to be coated directly on to the 3-D coating unit.

The most diverse types of laboratory tests have been carried out with great success. If compared to untreated cups, the barrier against oxygen permeation is higher than 99 %, even after sterilization. While combining thin wall performance to outstanding barrier behavior and low production costs, this technique stands for an extraordinarily attractive and economic perspective. In addition, bio-degradable polymers can be processed too, as was stated by the company.

Consumer Packagings Withstand the Crisis

There is an increased demand for flexible and other packagings conquering the markets in ever-changing designs. This has helped established manufacturers overcome the crisis with few problems, in comparison. However, competition is severe – in the material area, and due to globalized markets. This is why innovations are still a major premise of good business in 2011, too. Visitors can therefore expect to see a variety of new concepts for bowls, bags, tubes, closures and – increasingly important – variants of reclosable seals.

Report on interpack Exhibitors

In the following, preliminary reports will be given on some selected exhibitors, to show how the producers of packagings and machinery respond to the identical challenges posed by the market.

Nordenia Deutschland

Flexible Goods for Consumers and Constructors

Nordenia Deutschland will present its FlexZiBox, NorSpoutBag, and NorVenting, all of them examples of state-of-the-art flexible packaging solutions. The FlexZiBox is due to fulfill the highest demands placed on convenience packaging. The ready-for-use side gusset bag offers a wide variety of consumer applications. Seal seams along the sides make the FlexZiBox stable and help it retain its shape. The sides and bottom can be printed all around for optimum presentation at the point of sale. Air-tight reclosure systems keep the packaging content fresh for a long time and allow for easy opening, pouring, and closing. All FlexZiBox sizes can be equipped with zippers or sliders, which are attached on top or in the front as needed. The FlexZiBox is made of two- and multi-layer composites (PET, PE, PA, or PP), barrier layer composites (aluminum, EVOH), or metalized laminates. It is suited for product contents at filling volumes up to 20 kilograms, and can serve for food (dry products and cereals), pet food, garden mold and products.

The company will also present its NorSpoutBag stand-up pouch. Along with all of the usual benefits included in a high-quality, flexible packaging solution, the bag also features an opening with a screw-cap placed at the center of the pouch top. The convenient handle on the back also makes it easy to pour liquids from the pouch with just one hand. NorSpoutBag can be used for a wide range of applications ranging from olive oil via detergents and fertilizers, up to motor oils or windshield washing fluids.

Nordenia offers the first flexible type of plastic packaging for building material up to five kilograms. It is called NorVenting, and is the first such packaging globally. The novel packaging features even two patent ventilation systems. Building materials, e. g. cement-based adhesive agents, can thus be transported a lot more safely and be stored for a longer time than those packed in alternative paper packagings. Other than with hybrid paper/PE bags, the NorVenting packaging prevents oxygen from reaching the product inside. The possible time of storage is thus significantly longer. Reclosure seals and handles make the packaging easy to handle, too.

Hall 10, booth A68

Illig

Dairy Products Packed with Hygiene and Decorated with Brilliance

The main focus in the presentation of mechanical engineering company **Illig GmbH & Co. KG** of Heilbronn, Germany, at the trade show will be on novel and economic concepts of technology for food packagings made by thermoforming. For the first time, the enterprise will present its FSL 48 form, fill and seal line with its new conceptual design. It is suited to meet the requirements of food and especially dairy industry **(Fig. 2)**, and can be equipped in order to make it comply with a variety of hygienic demands, thus enabling the plant to come up to hygiene class IV according to VDMA (hygienic filling machines). At the same time packs with brilliant decoration can be achieved by employing an IML (In-Mold Labeling) station which can be integrated in the production unit. This station was given a new conceptual design, too. There is a wide variety of cup shape options since walls do not have to be vertical to enable IML decoration.

Additionally, Illig will show solutions for thermoforming of containers with pronounced undercuts, which could only be produced by injection molding and blow molding so far. Moreover, the numerous possibilities provided by skin and blister packaging will be presented. The multi-lane filler, also newly developed for FSL 48, is suitable for CIP (Cleaning In Place) and SIP (Sterilization In Place) and consequently can be generally used as a device for aseptic filling. The machine's hygiene levels range from forming with sterile air, complete covering of filling section (also available in CIP/SIP version) through to lid material sterilization by means of UV radiation. The machine is connected to a so-called sterile module designed to generate sterile air and hot steam as well as spray the filling tunnel with peroxide.

All FSL 48 stations are equipped with energy-efficient state-of-the-art servo motors. Thus controlling the motion provides for smooth running and high operating speed at the same time. Subject to the processed material, up to 32 cycles/min speed are achieved. The new →

Fig. 3. The ergonomic HMI panel standardizes operation of all machines, by means of standardized hard- and software (photo: Oystar)

FSL 48 can process all conventional plastic film materials suited for processing on FFS lines, such as PS, PP, multilayer materials (e.g. PS/EVOH/PE), APET, and even foils made of biopolymer PLA (polylactic acid). This also applies to heat-sealable lid foils.

Hall 11, booth C54

Oystar Holding

Easier Operation for all Machine Models

Oystar Holding GmbH, producer of packaging machines from Stutensee, Germany, will present an ergonomically designed HMI panel with future-oriented technology which will be part of every Oystar machine from now on. The panel standardizes operation of all of the company's machines because it uses uniform hardware and software so that customers – no matter which Oystar machines they use for manufacturing – only have to adhere to a single concept **(Fig. 3)**. Handling of the panel is intuitive and is carried out using a modern multi-touch system on widescreen displays (10 to 21 inches). Machine workflows and current messages are systematically structured and visible at one glance. In order to pay account for specific customer requirements, the standard HMI can be configured with optional widgets. Moreover, the new Oystar panel is compatible with all standard holding fixtures. All subsidiaries of the company worked together in the development of this control technology.

Oystar will present a wide range of machine concepts, among them the new Oystar IWK designed for tubes in different shapes, most of all boosting format flexibility. The new machine fills metal and plastics tubes of 10 to 52 mm diameter and 50 to 250 mm length. Filling volumes range from 1 to 300 ml. The machine can fill up to 110 tubes in one minute.

Additionally, the FP 2X8 cup filling and sealing machine designed for use in the food and dairy industries will be shown. Built according to 3A specifications and fitted with servo drives, the machine can fill up to 38,400 cups per hour and convey them along eight tracks. The FP 2X8 is also equipped with a servo-driven CIP filler as well as a servo hot-sealing station and a MAP system (Modified Atmosphere Packaging).

Moreover, Oystar Hassia will present an exhibit that is relevant for the dairy industry. The THM 8/48 form, filling and sealing machine (FFS) packs up to 12,000 yogurt cups per hour and is equipped with a multi-function stamping machine. It is adjustable for both single and duo units as well as for quartet, sextet and octet units with a crease line. Cup decoration is carried out by means of in-line labeling, while the cover foil is fed laterally, thus enabling quick and easy roll change.

Hall 6, booth C80

! "Save Food"

The organizers of the interpack trade show, Messe Düsseldorf, together with the United Nations Food & Agriculture Organization (FAO) will start an initiative named "Save Food", to show how the individual elements of the value chain in terms of packaging, logistics and transport can contribute to fighting the global waste of food. In co-operation with FAO and the associations supporting interpack, Messe Düsseldorf has worked out the special topic. It will be concerned with providing some information on the current situation, and will present solutions and concepts on how the protective function of packaging can effectively counteract the premature perishing of foodstuffs. In the run-up, FAO drew up three studies, which will be presented on May 16 and 17, at an international congress held at the CCD Ost in Düsseldorf. They will look into the subjects of:

- Food loss in countries with average and high incomes
- Food loss in countries with low incomes
- Investments in customized packaging technology in countries with low income

In addition, there will be an exhibition at the Save Food pavilion during the interpack from May 12 to 18.

www.save-food.org

Krones

Packaging Design Preserves Environment and Resources

Just in time for interpack 2011, **Krones AG** of Neutraubling, Germany, will premier an entirely new packaging design. Developed from an approach that is different from shrink-wrap packages, the new design is a response to ongoing market trends for PET container secondary packaging: eco-compatibility plus resource and energy savings. With the new design, users will achieve substantial cost savings compared to shrink films.

When it comes to deciding on secondary packaging for PET containers, more and more customers choose shrink packaging, which currently accounts for more than 30 % of the total market. However, producing the shrink film requires fossil raw materials. In addition, during the shrink-on process inside the shrink tunnel, energy consumption is relatively high. This is why Krone's designers aimed to create a resource-economical alternative to shrink-wrapped packs that includes a complete packaging system, including both material and machinery. The system on display at interpack 2011 might prove to be the packaging concept of the future.

Hall 14, booth D14/E29

Milliken

Additives for Brilliance and Transparency

Supplier of additives **Milliken** will show how producers can step up the efficiencies of their processing stages, and achieve

Fig. 4. Millad NX8000 makes it possible to manufacture caps and closures of brilliant colors, which are nevertheless highly transparent
(photo: Milliken)

higher performances of their final products, by employing Millad Clarifier and Hyperform HPN nucleation agents. These optimized additives are applied with the most diverse technologies to process various polypropylene and polyethylene types. Details of the benefits involved in these products are due to show in detail at the Milliken booth, for the application in thin-wall injection molding, cap and closure production, bottle and container blow molding, thermoforming and film extrusion.

The latest Millad NX8000 clarifier is designed for polypropylene types with improved flow properties, enabling reductions in cycle times and processing temperatures. For the production of highly transparent containers, processing temperatures have hitherto been restricted to a certain minimum, which processors were not allowed to fall below, due to the restricted solubility of conventional clarifiers. Thanks to the improved solubility of MilladNX8000, this temperature value is now lower. Subject to the respective application, this means a reduction in cycle times of approx. 15 %, and a decrease in process-related energy costs of up to 20 %.

The Hyperform HPN-20E nucleation agent is suited for non-transparent PP types, especially block copolymers, designed for thin-walled containers. It offers improved balance between stiffness and impact resistance. Several tests showed that Hyperform HPN-20E does not affect impact resistance – in some cases it even improves this property. Moreover, it leads to a high degree of isotropic shrinkage, which means minimum warpage.

Millad and Hyperform additives offer a series of benefits to manufacturers of caps and closures, no matter if applied in injection molding, extrusion, or compression molding. PP parts produced with Millad NX8000 feature optical properties that are so outstanding that processors can dispense with expensive "crystal-clear" plastics, with no reduction in product quality, Milliken explains. What is more, if used in packagings for aggressive liquids, PP offers the benefit of high chemical resistance. If processed together with the ClearTint dye by Milliken, Millad NX8000 can also be used to manufacture caps and closures in brilliant colors, which are highly transparent at the same time **(Fig. 4)**.

The Millad clarifiers provide various benefits for all types of blow molding – extrusion blow molding, injection and stretch blow molding. Millad NX8500E is the latest development in the Milliken →

portfolio. Developed on the basis of Millad NX8000, the clarifier is designed especially for extrusion blow molding application, and is said to meet even highest demands in terms of brilliance and transparency. Using Millad NX8500E, the user is able to "finely tune" the properties of random PP copolymers to fit a wide range of solutions and quality stages. These stages start from "ultimate clarity" – particular transparency and brilliance – ranging up to "enhanced quality". The latter includes an additive content that is similar to conventional additives – Millad NX8500E, however, enables the user to improve surface quality and inner haze, while also enhancing processing window and productivity, according to supplier information.

In addition the company will have on display a novelty for polyethylene films. Hyperform HPN-20E is a nucleation agent for linear PE of low and high densities. It favorably affects the barrier properties of HDPE films, and improves the clarity of C4 gas phase LLDPE. Hyperform HPN-20E enables a significant rise in crystallization temperature, and greatly affects the orientation of crystals. Subject to the technique of PE processing applied, this means a 20 to 50 % increase in the efficiency of the barrier against oxygen and humidity.

Hall 10, booth C32

Windmöller & Hölscher

Moveable Bagging Machine

In view of the continuing trend to use contract packagers for bulk goods logistics, **Windmöller & Hölscher KG** in Lengerich, Germany, developed the high-performance Topas FFS-line. It is so flexible it enables "mobilization" to solve challenging situations in the bagging of a wide range of free-flowing bulk goods in silos in an efficient and flexible way. Interpack 2011 marks the trade show debut of the moveable W&H Topas machine. Visitors can see simulations of the unit in operation **(Fig. 5)**, moving "under the silos", entering the docking position, packing the contents discharged from the silos, then exiting the docking position. The exhibit, which has been sold to Dutch logistics company Katoen Natie (KTN), is the 750th FFS-machine W&H has manufactured.

Fig. 5. A unit designed for mobile operation at bagging terminals: Windmöller & Hölscher present a movable high-performance Topas FFS machine in operation (photo: W&H)

The manufacturer has meanwhile upgraded the Topas machine into an FFS bagging unit, which reaches more than 2,400 bags/h performance today, and can be universally applied in the product segment of free-flowing bulk goods. Covering a wide range of formats, as well as several customized product-specific solutions, the plant is suited for filling weights ranging from 5 to 50 kg. In addition to the classical product weighing devices, such as the W&H high-performance net weighing system – which can be seen at interpack, too – the company also offers volumetric dosing units for materials with fluctuating densities. Further examples of how customers can tailor the performance and flexibility of the Topas to meet their packaging requirements are, for instance, automatic roll change moving along with the machine if desired, air evacuation features, mitered corner and/or edge weld sealing, a grip hole punch unit or an explosion-proof design that meets all ATEX guidelines. W&H offers mobility solutions, from rails to wheels or air cushion systems, tailored to meet the individual requirements of infrastructure inside the bagging terminal.

Hall 15, booth C41/D42

Fig. 6. Multi-layer film made of Bio-Flex A 4100 CL / F 2201 CL / A 4100 CL (photo: FKuR)

FKuR Kunststoff

Transparent Bioplastics for Blown Film Extrusion

FKuR Kunststoff GmbH in Willich, Germany, have added a transparent and extremely flexible bioplastic to their range of products. The material is named Bio-Flex F 2201 CL, and includes a large share of renewable raw materials. The product is well suited for processing on LDPE blow molding machines and compounding units **(Fig. 6)**.

With a share of nearly 60 %, this type represents a consistent upgrade to the Bio-Flex product family. Bio-Flex F 2201 CL is outstanding, not only for its good properties of elongation and flexibility, but also for its high penetration resistance. Thanks to its excellent layer adhesion, it is particularly suited to serve as interlayer in multi-layer applications. This material type is thus able to provide for optimum support to the mechanical properties of the transparent, but less flexible Bio-Flex A 4100 CL in a three-layer film, according to supplier information. By combining these two types of Bio-Flex materials, it is possible to make a film that is flexible and tough at the same time, with high transparency and with a high share of renewable raw materials. Because both types of Bio-Flex materials are transparent, 91 % transmittance can be achieved in a 20 µm three-layer film. Toughness and resistance to tear propagation of the film result from the interlayer of Bio-Flex F 2201 CL, making it suitable for VFFS applications. In this exemplary film, with a 20/60/20 % structure, the share of renewable raw materials is almost 70 %.

Hall 9, booth F14

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SUSANNA STOCK, born in 1961, is a free-lance journalist specialized in packaging subjects.