



Packaging Film

A Common Goal: The Circular Economy

World premieres, technological advancements and joint projects: there was plenty of evidence at K of the impressive progress made in sustainable solutions in extrusion in many different directions over the past number of years.



During the daily machine show, Windmüller & Hölscher demonstrated a fast product changeover per autopilot. When K finished, the line was delivered to IsoFlex Packaging, in Nashville, TN/USA. © Hanser/Schröder

In the field of film extrusion and processing, too, the number one topic at this year's K was the circular economy and sustainability. Many of the halls were throbbing, not just on account of the hordes of visitors, but also because of the live demonstrations of various machines and lines. The live demonstrations of XXL lines in Hall 17 were a particular crowd puller and it was here that the manufacturers served up some world premieres.

If the approach in the past often focused on going "faster, higher, further", it is now about devising more holistic solutions. Energy efficiency of the lines

plays a major role, but so too does consideration of the entire value chain. Since the last K, developments in new machines and product concepts have occurred at breakneck speed.

Sustainable Thinking every which Way

What makes this all so exciting is that "sustainable thinking" has taken hold in every direction: be it in mono-material solutions, processing of recycled materials or the use of natural fibers or biomaterials. For visitors, there were plenty of opportunities to witness this for themselves in the form of live demonstrations

and sample articles that they could touch and hold.

Sustainability also featured prominently in a considerable number of booth designs. There were exhibitors who supplied information about the modular concepts behind their booth designs or about direct recycling of the extruded flooring. And there were some machine makers who opted not to present live demonstrations, yet who still managed to provide very deep insights into the technical subtleties through live feeds to technology centers, the use of large video screens, and virtual reality headsets. This form of

presentation also served to demonstrate what digitalized production or maintenance can look like today.

Of course, a world-leading trade fair such as K is also a great occasion for closing deals or announcing new projects or collaborations. At the closing press conference, Ulrich Reifenhäuser, Chairman of the Exhibitor Advisory Board for K 2022, showed that this year's show was no different: "K 2022, the world's leading trade fair, was eagerly awaited by the plastics and rubber industry and succeeded in providing new impetus across all areas of our industry. The many and, in some cases unexpected, concrete contract negotiations conducted at the fair speak for themselves."

Starting Signal for New Projects

TotalEnergies, Windmüller & Hölscher and the **Mitsubishi Chemical Group** announced the successful proof of concept for a fully recyclable high-barrier stand-up pouch for food applications. Between them, the partners have developed fully recyclable high-barrier packaging as a replacement for multi-material structures, such as metallized BOPP/PE or metallized BOPET/PE, that is intended to help brand owners meet their commitments to produce 100 % recyclable packaging by 2025. The new solution is 98 % polyethylene and less than 2 % EVOH, the latter being needed for the barrier properties. It has exactly the same performance characteristics, without compromising recyclability, and so can enter existing recycling streams.

The material consists of an MDO film and a sealing film supplied by **Dettmer Verpackungen**. Machine manufacturer **B&B Verpackungstechnik** converted this structure into a stand-up pouch that can be used for demanding applications, such as coffee packaging. The MDO PE film formulation, consisting of TotalEnergies Supertough and Lumicene High Density PE together with Mitsubishi's Soarnol, ran for four days on a Varex II line at Windmüller & Hölscher's booth during K 2022.

Heat-Resistant C-PET Light Cup

SML, together with its partners **Sukano** and **Kiefel Packaging**, presented a transparent alternative for hot-fill appli-



This transparent alternative for hot-fill applications was presented by development partners SML, Sukano and Kiefel.

© SML

cations. Their joint research and development yielded a cup made of C-PET light that combines transparency with recyclability and is suitable for thermoformed hot-fill or microwaveable products. Other advantages include short thermoforming cycle times and high rigidity. The newly developed C-PET light can thus be a viable option for manufacturers seeking an economical and easy-to-recycle alternative to PP and PS.

"Since ease of recycling is becoming increasingly important, we decided at an early stage of our joint research and development work to use a transparent C-PET solution," said Max-Phillip Lutz, product manager at SML. Compared with other colored PET or PP and PS products,

C-PET light is much easier to recycle.

C-PET light film can be readily recycled with other post-consumer or post-industrial PET materials in existing lines.

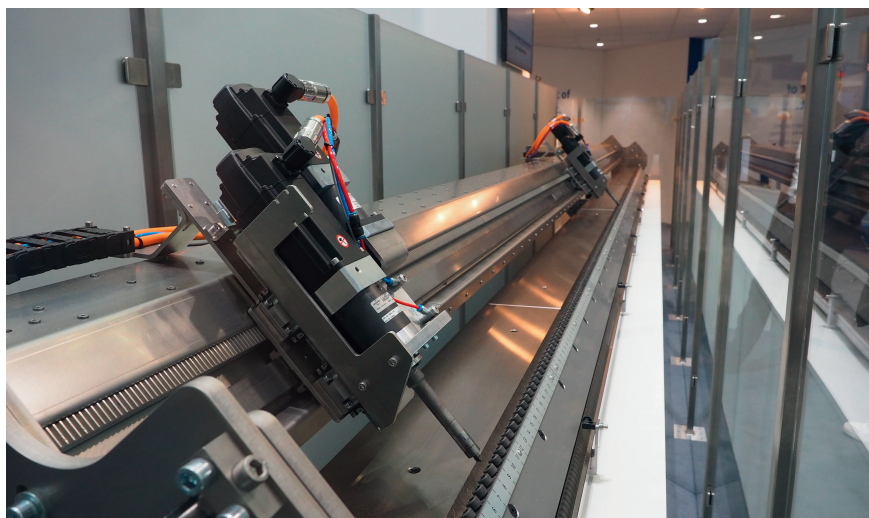
All three project partners contributed their specific expertise in their respective fields to improve each step of the process. The key technical challenges were identifying the optimal dosage of additives, adapting the formulations and process technology during film production, and finding the right parameters for the thermoforming process.

New Slot Die for Precision Control of Coextrusion

Reifenhäuser Extrusion Systems (RES), the Reifenhäuser Group's business unit specializing in extrusion components, announced a strategic partnership with **Maku** at K 2022. The aim of the partnership is to jointly market and advance the automation system designed by Maku for coextrusion adapters and slot dies, which were on display at K for the first time.

The PAM system (precise, autonomous, mechatronic) is available immediately and exclusively as an automation option for new Reifenhäuser dies and adapters, as well as for aftermarket dies across all manufacturers. PAM enables producers in the flat film and sheet production and extrusion coating sectors to precisely control the entire hot part (coextrusion adapter and die) via the line's control panel. This is said to work much faster and more accu-

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Featuring two motorized screws, the PAM slot die from Reifenhäuser combines energy efficiency with ease of use. © Hanser/Schröder



A.J. Plast Managing Director Kittiphat Suthisamphat (right) and Helmut Huber, CSO at Brückner Maschinenbau, seal the deal on their new project in South East Asia. © Brückner

rately than conventional control by hand or expansion bolt automation. The technology enables faster start-up of good production, is said to provide higher output with lower energy consumption – and thus significantly improved overall line efficiency.

High-Speed BOPP Line with Low Energy Consumption

A.J. Plast and **Brückner Maschinenbau** signed a contract in Düsseldorf, Germany, for another joint project: a high-speed BOPP production line, the 15th for A.J. Plast, one of South East Asia's

leading film producers. The new line can process five layers and more in a width of 10.4 m and output 7.5 t/h at a speed of 600 m/min.

The project represents high production efficiency and takes an important step toward zero emissions, energy saving and carbon reduction. The technology is expected to not only slash energy consumption, but also reduce water usage. The newly designed dual air heat exchanger in the oven process preheats fresh air, thereby taking energy recycling to a new level. Xaver Sedlmeier, Sales Director at Brückner Group Asia-Pacific, said: "We are very proud of this



Wafer-thin thermoforming film produced on a triple-bubble line from Kuhne. © Kuhne

new project. We have cooperated closely to design a film-stretching line that is completely tailored to A.J. Plast's needs and market requirements."

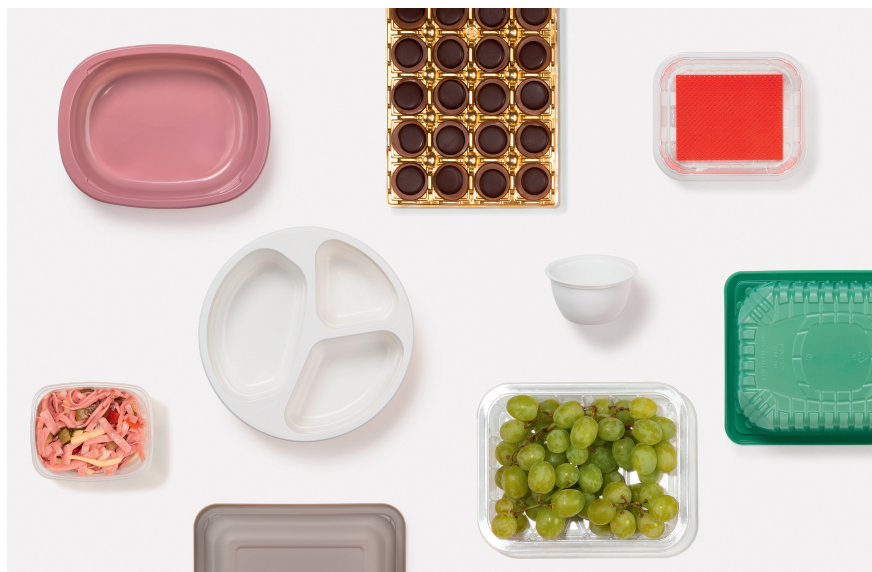
In the field of BOPP, the most popular packaging film, Brückner presented a world first at K: a PP-film-stretching line with an output of up to 90,000 t/a. The current benchmark is 60,000 to 70,000 t/a. According to the manufacturer, this translates to around 12 % lower energy consumption, based on 1 kg of film.

Triple Bubble for More Sustainable Food Packaging

At K, **Kuhne Anlagenbau** exhibited for the first time as a manufacturer of large-scale lines for blow molding simultaneously biaxially oriented thermoforming films by the triple bubble process. Without compromising on service properties, at 80 to 120 µm these are only about half as thick as the conventional cast films used in this application, according to the manufacturer. The maximum attainable thermoforming ratio is 1:10. This means a reduction in material consumption and thus an approx. 50 % reduction in the associated greenhouse gas emissions. Thanks to optimized cooling rates, the large-scale lines can achieve throughputs of up to 2000 t/h. Reportedly, their productivity and profitability can thus match or even exceed that of cast film lines. Furthermore, inventory in downstream processing is also reduced while the much lower energy consumption of thermoforming conduces to a further reduction in the carbon footprint whilst



Collin's CEO Dr. Friedrich Kastner (left) and CSO Corné Verstraten in front of the Pilot Line 600 Professional blown film tower. © Hanser/Schröder



Contributing to tray-to-tray recycling: packaging can be made from classic, bio-based or recycled plastics on machines from Kiefel. © Kiefel

simultaneously ensuring very good machine processability. For manufacturers and distributors, the reduced thickness of the films means lower extended producer responsibility (EPR) charges and also supports compliance with the Ceflex (Circular Economy for Flexible Packaging) sustainability guidelines drawn up by the industry.

Triple-bubble technology involves three bubbles arranged in series. In the first, the film is rapidly cooled using cold water quench technology. This very effectively prevents crystallization processes, which is a precondition for uniform orienting in the second stage.

Thermal relaxation in the third bubble is used to set the thermoforming behavior to the desired level. The systems are suitable for processing PE, PP, PET, PA, EVOH, COC, EVA and EMA. In addition, mono-material solutions based on PET, PA, polyolefins and other polymers can also be processed.

Optimum Processing of Recycled Material

The exhibition highlight at the **Collin Lab & Pilot Solutions** booth was the live operation of a Pilot Line BL 600 Professional blown film line. "With the new, five meter high blown film line, we have managed to improve on the performance of its predecessor. Customers are now able to produce 5-layer films and more in widths of up to 600 mm.

The pilot line for multi-layer coextrusion is ideal for processing metallocene, but is also eminently suitable for processing recycled material. With the help of the multi-layer die with optimized distributor disk design, our customers can also use metallocene polyolefins, which are often difficult to process," explained Collin CEO Dr. Friedrich Kastner and CSO Corné Verstraten.

A total of four extruders are used in the blown film line – one of them has an adjustable melt splitter that feeds the melt into two different distributor disks



All of Hosokawa's components are designed to process recycled materials, among other things. And so is the newly introduced cooling system featuring VarDAR aftercooling.

© Hosokawa Alpine

of the die, thus producing two layers. A high level of flexibility is also provided by a Collin Extruder E 30 PL, which was presented for the first time and features extended height adjustment from 350 mm up to 1500 mm extrusion height. Further modules of the blown film line include an extruder with BritAS screen changer and the new ZK 25 P Compounder fitted with online viscometer for continuous monitoring of material quality – this is advantageous, among other things, when grades of varying quality, such as recycled materials, are used.

Full-PE, Bio and PCR for Flexible Packaging

Hosokawa Alpine is banking on the circular economy and alternative raw materials. The Augsburg/Germany-based machinery maker is convinced that flexible packaging of the future must take the circular economy route. A pioneer in MDO technology, it develops film solutions that can be recycled and reused at the same level.

"What our customers want most from flexible packaging is good mechanical properties. But it is these very properties that pose a problem during disposal. Which is why we have been working on forward-looking technologies for years: the focus of our development work is on sustainable packaging made of full-PE material and the efficient reuse of production scrap. In pursuing this approach, we work together with partners along the entire value chain," explains Dr. Holger Niemeier, Executive Vice President at Hosokawa Alpine.

Mono-material solutions aside, Hosokawa also works with raw material partners in the field of bio-films. The latest bio-film solutions brought to »

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market are very thin plastic wrap or barrier film for packaging meat and fish. In addition to new packaging solutions, the lines from Augsburg are also suitable for processing PCR material. Hosokawa Alpine's line components cope superbly with the varying raw material quality of PCR pellets. Slovenian film producer **Plasta** knows this only too well: it produces blown film from recycled material on machinery shipped from Augsburg. The proportion of fossil raw materials is significantly reduced

and CO₂ emissions are slashed by as much as 85 %.

An All-Rounder for Thermoforming Processes Plastic and Paper

In addition to traditional, bio-based and recycled plastics, paper can also be processed on **Kiefel** machines. Live demonstrations by the company on the KMD 78.2 Speed steel rule machine showed how recycled films can be used to manufacture high-quality, sustainable

packaging products – and thus make a contribution to tray-to-tray recycling. This is made possible with the aid of in-house, customized tool technology and smart automation concepts.

In addition, a laboratory machine at the booth demonstrated Kiefel's latest packaging technology, namely fiber thermoforming of natural fibers, which is now in high demand. The associated Natureformer KFT 90 machine is already in operation worldwide. ■

Susanne Schröder, editor

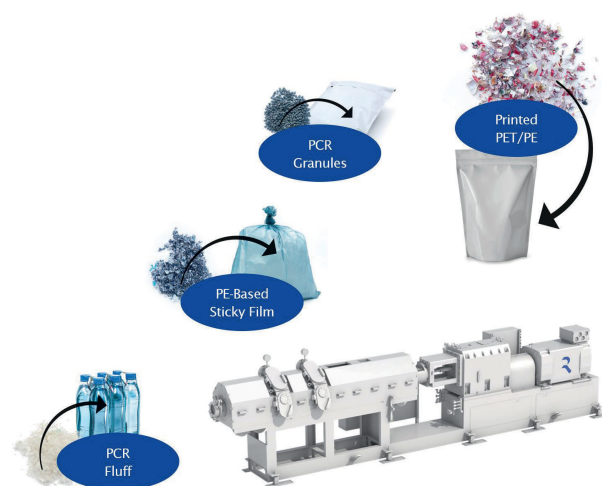
EVO Fusion

Extruding Waste Directly into Film

Reifenhäuser presented a new extrusion process at K that makes blown film producers independent of highly fluctuating recycle qualities and ensures a stable production process – even when processing low-quality input material. The so-called EVO Fusion process relies on direct extrusion, which eliminates the need for energy- and cost-intensive regranulation of the raw material. This means that even fluff (film shreds) and all types of production waste and PCR material can be processed directly.

This is made possible by the twin-screw technology, which improves the homogenization of the melt. In addition, processors can degas the system very easily and effectively, thus removing unwanted components in the recycle.

www.reifenhäuser.com/en



With EVO Fusion, even low-quality recycle can be extruded with process reliability. © Reifenhäuser

Plasma as a Sustainable Alternative

Bonding, Coating and Printing



With the help of an open-air plasma pretreatment, a durable and high-quality printing of drinking cups made of rPP can be achieved.

© Plasmatreteat

The inhomogeneous surface of recycled plastics creates new challenges for the industry. That's why Plasmatreteat presented in Düsseldorf how plasma works as an efficient, environmentally friendly alternative in surface pretreatment: during treatment with Openair-Plasma, groupings containing oxygen and nitrogen are introduced into the mostly non-polar plastics to increase the surface energy, thus optimally preparing them for further processing. At K, an example was presented how Openair-Plasma pretreatment can be used to achieve durable, high-quality printing on drinking cups made of recycled polypropylene (PP). The cups were printed using UV digital printing with solvent-free inks without the use of additional adhesion promoters – and produced a brilliant print result.

www.plasmatreteat.com