SMLTECHREPORT

30 Years

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Think big – think efficiently

SML launches a new turret winder for jumbo rolls

High-volume film production at roll diameters of 1,500 mm

SML's brand-new turret winder W1300 comes fully equipped with powerful technical features and functions. Its ability to produce jumbo rolls with a mechanical diameter of 1,500 mm offers numerous benefits to manufacturers in downstream processes.

"Our new W1300 turret winder was designed for the winding of CPP, CPE, mono-oriented and barrier films of absolute premium quality. With winding speeds of up to 450 m/min and end film widths from 2,400 to 3,900 mm, the new winder boasts everything necessary to ensure high-volume production", Alexander Bruckmüller, the Product Manager at SML, confirms.

EFFICIENCY IN SUBSEQUENT PROCESSES

Thanks to the winder's large mechanical roll diameter of 1,500 mm, the running times of the individual rolls can be extended quite significantly. Extending the production runs primarily leads to a boost in efficiency in subsequent processes, such as printing or metallising. The following example demonstrates quite clearly the tremendous amount of cast film contained in a jumbo roll of 1,500 mm: When cast film with a thickness of 25 µm is wound onto a roll with a diameter of 1,200 mm, this roll contains 45,000 running metres of film. A jumbo roll with a diameter of 1,500 mm has 70,000 running metres of the same film – this is an increase of more than 50%!

ADJUSTING THE HARDNESS OF THE FILM ROLL

The W1300 winder can be adapted with ease to different production requirements. Two operational modes are available: Depending on the film, the winder either can work in gap mode or in contact mode. Before the film hits the contact roller, it runs over a continuously adjustable satellite roller to control the air intake between the individual film layers and to adjust the hardness of the film roll. Winding is possible either with or without winding shafts. The inlet section of the winder is prepared for the installation of a post cooling roller.

ROLL CHANGE WITH AUXILIARY CONTACT ROLLERS

Two different cross-cutting units are available for the winder W1300: One is a full-width twisting knife for thinner films and the second one is a flying knife for thicker films and oriented films. During a roll change, driven auxiliary contact rollers are engaged in order to keep the film on the roll in perfect condition up to the very last layer. A handling system is available both for shaftless winding and for winding with shafts. During shaftless operation, rolls can be also handled with an overhead crane.

SUITABLE FOR RETROFITS

The standalone nature of the winder makes it easy to install it on third-party cast film lines since it comes with its own control system and electrical components.

Extrusion lines – engineered to perform

Editorial

Karl Stöger
Managing Director

Dear Reader,

This issue of TechReport SML marks the 30th anniversary of our company. SML was founded on 1 July 1995, when it emerged from the plastics machinery division of Lenzing AG. The new SML company has been progressing steadily ever since it was incorporated. Through continuous development over three decades, SML has evolved into a clear market leader for high-quality film extrusion lines. In addition, we have gained significant recognition in other sectors like sheet extrusion, extrusion coating and multifilament spinning. This true success story surpasses all our expectations imagined 30 years ago. Celebrating an anniversary gives occasion to look back, but we shall also look forward. How are our prospects for the coming years? Can we maintain our growth path? Will our business stay prosperous? In my personal view, future success is not to be taken for granted. To stay on a successful track, we must continue to pursue ambitious goals, work with combined efforts and make the right decisions. Of course, every company is affected by its underlying business environment. The current geopolitical and economic conditions are far from perfect. But even in this somewhat confusing world order, there are great opportunities and potentialities for companies in our industry. Our product range continues to undergo further development. We have made great improvements and have added new applications for our customers. Please browse through the following pages and find some interesting articles about our various innovations. I imagine that some of the technologies described can bring further success to customers.

Yours sincerely

Karl Stöger

MDO-PE barrier film from 17µm up to 65 µm:

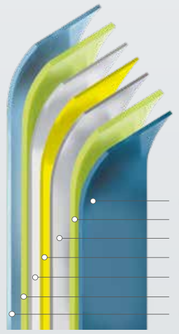
Advanced barrier solutions in mono-material packaging

SML's latest cast film lines with an integrated MDO unit are designed to manufacture a wide range of MDO-PE films with different thicknesses and excellent barrier functionalities. These mono-material films are characterised by their high transparency and very good mechanical properties. Further processing on conventional machinery is straightforward and was tested satisfactorily.

"MDO-PE film was developed to replace PET in PET-PE laminates to produce more environmentally-friendly, easy-to-recycle mono-material structures for a variety of flexible packaging products: from tubular bags for food packaging to side gusset bags, and from sealed bags to different types of pouches," Elias Mayerhofer, the Product Manager at SML, explains. Barrier properties that are precisely tailored to the respective purpose play a key role in many of these applications.

17 µm FILM WITH AN EVOH BARRIER LAYER OF LESS THAN 1 µm

SML has now developed a 17 µm MDO-PE barrier film to market maturity featuring the following layer distribution:



7-layer-structure MDO-PE barrier film

- mLLDPE ~ 17%
- LLDPE/HDPE ~ 20%
- Tie layer~ 10%
- EVOH ~ 6%
- Tie layer ~ 10%
- LLDPE/HDPE ~ 20%
- mLLDPE ~ 17%

The resulting 17 µm MDO-PE barrier film has the following barrier properties given a stretching ratio of 1:5:

OTR: 1 – 3 $cm^3/m^2/24hr$

Water vapour transmission rate at 38 °C; 90% RH, testing method: ASTM F1249-06

WVTR: 5 – 8 $g^2/m^2/24hr$

Oxygen transmission rate at 23 °C; 50% RH, testing method: ASTM F1927-07

UP TO 65 µm: MDO-PE BARRIER FILM FOR EXTENDED APPLICATION AREAS

The production of ultra-thin MDO-PE films is not the only possible application. Fully stretched MDO-PE films can reach up to 65 µm in thickness, opening up further possibilities for film manufacturers. "Especially for packaging goods that require higher barrier functions or mechanical properties," Elias Mayerhofer continues.

INTEGRATED SEALING LAYER

A further functional advantage for MDO-PE standard and barrier film is the option to directly integrate a sealing layer. This allows for the production of a fully ready-to-use film straight from the cast film line, making it ideal for applications such as stand-up pouches.

CONVINCING IN METALLISATION AND PRINTING

Both SML's cast MDO-PE barrier film and conventional blown MDO-PE film can be processed further with ease on lines for coating and laminating, for example with the FlexPack system from SML. In addition, cast MDO-PE films exhibit excellent printability and have been successfully tested on both Flexographic and Rotogravure printing systems. Metallisation is possible without any complications even with ultra-thin MDO-PE films of 17 µm.

To give an example: A 25 µm metallised MDO-PE barrier film comes with the following barrier properties:

OTR: 0.30 – 1 $cm^3/m^2/24hr$

Oxygen transmission rate at 23 °C; 50% RH, testing method: ASTM F1927-07

WVTR: 0.90 – 3 $g^2/m^2/24hr$

Water vapour transmission rate at 38 °C; 90% RH, testing method: ASTM F1249-06

ONE LINE, MULTIPLE FILMS

SML's cast film lines with an integrated MDO unit were designed to manufacture multiple film types: MDO-PE film as well as MDO-PP, CPE, CPP and Cast-PET film. "The wide range of possible films and very fast product changeovers without the need for technical adjustments allow manufacturers to increase capacity utilisation and profitability," Elias Mayerhofer confirms.

HIGH TRANSPARENCY AND OPTIMUM FILM FLATNESS

Generally, films produced in a cast process attain an excellent level of transparency. Superior film quality is reached through optimum flatness and the ideal distribution of thickness during production. Direct edge trim re-feeding is possible with all film types, even for ultra-thin 15 µm MDO-PE film.

CLOSE COLLABORATION WITH DOW AND KURARAY

For the recent development of the 17 µm barrier film, SML joined forces with the polymer supplier and long-term partner Dow Packaging & Specialty Plastics, who supplied ELITETM resins, and EVAL Europe N.V. (a Kuraray company), who provided the best-in-class EVALTM oxygen barrier. "The close collaboration with such competent and experienced partners marks a significant step towards sustainable, high-performance flexible packaging solutions," Elias Mayrhofer concludes.

Simple processing

PCR in stretch film for hand rolls

Post-consumer resin (PCR) is well suited to the production of stretch film for hand rolls since the requirements for elongation are much less demanding compared to machine film. At the same time, there is a huge market for environmentally-friendly hand-stretch film.

SML has played a pioneering role in developing the usability of post-industrial resin (PIR) and post-consumer resin in stretch film production. Over the past few years, SML has explored various approaches and successfully developed new processes for the industrial-scale production of more eco-friendly products on its stretch film lines.

HAND STRETCH FILM VERSUS MACHINE STRETCH FILM

However, most of the recent product developments have focused on premium quality films for machine rolls, emphasising high elongation and tear propagation. "Achieving a consistent stretch film performance with PCR for high-speed wrapping can be extremely challenging. This is not the case with hand film production. Therefore, it is worth considering the market for hand rolls, which accounts for a significant proportion of all stretch film in use. In Europe, around 50% of all of the stretch film produced is, in fact, for manual use," Thomas Rauscher, the Product Manager at SML, explains.

PCR IN SUPERSTIFF FILM AND FILM WITH MODIFIED EDGES

High elongation is not quite as critical in hand films since these typically stretch by only 30-80%. This means that PCR gels are also less problematic, and the film is less prone to breakage. "SML has conducted several trials using 30% PCR for hand film with very promising results," Thomas Rauscher says. A PCR content of 30% can be successfully utilised in both the standard hand film and the SuperStiff version, as well as for manual rolls with Modified-Edges. A thickness range of 8 - 12 µm presents no challenges in terms of the film quality or processability during extrusion.

"Therefore, we see a strong opportunity to incorporate PCR into hand film applications, offering both environmental and economic benefits," Thomas Rauscher concludes.

Expanding Business

UNIPACO – quality manufacturer of coated paper packaging

The dynamic growth of the Polish packaging manufacturer UNIPACO S.A. can be explained by the company`s early specialisation and its expertise in the production of coated paper for flexible packaging. Since 2016, UNIPACO has been using SML FlexPack coating and laminating lines to manufacture paper-based high-end packaging materials.

"UNIPACO, which has its headquarters in Poznań, Poland, and a production facility in Kostrzyn nad Odrą, is one of Europe's leading manufacturers of coated paper packaging, with a strong focus on the Central and Southern European markets. Since its foundation in the early 1990ies, Unipaco has developed paper coating to its optimum, and at the same time grown from a small-scale business to become one of the big players in the Polish packaging industry. Key products are papers with PE/PP coatings and paper/aluminium laminates.

GROWING MARKETS FOR SUSTAINABLE PACKAGING

In recent years, demand for sustainable and easy-to-recycle paper packaging in Europe has increased significantly. "Our vision is to expand our markets and provide the best possible quality in coated paper packaging for our clients. Regarding sustainable development, we are constantly striving to further extend the quality characteristics of our products, such as heat sealability and barrier properties, while simultaneously lowering the share of PE/PP. We are now able to coat paper with 4 gsm PE, which is an exceptionally low grammage. This enables the production of paper packaging with a share of plastics under 5%," Mateusz Cyman, the Export Manager of UNIPACO, states proudly.

EXPERIENCE AND PROCESS KNOWLEDGE

Unipaco believes experience, process knowledge and the right machinery are key factors when it comes to the production of high-end coated paper with an ultra-thin grammage. "4 gsm PE is extremely fragile, which can create a lot of obstacles, such as the possibility of pin holes or the delamination of PE. On such a thin coating, everything can influence the endproduct: from the air moisture and temperature to the surface of the paper," Mateusz Cyman explains.

EXAMPLE: CREATIVE SOLUTIONS FOR SALAD WRAPPING

An impressive example of UNIPACO's innovative potential is a project for a completely new, visually attractive type of recyclable salad wrapping in close cooperation with the packaging paper manufacturer UPM Speciality Papers. Using machinery from SML, UNIPACO coated the translucent paper UPM SolideTM Lucent and the one side coated UPM FlexPackTM packaging paper with 4 gsm of PE. "The paper and our coating helped to create a unique and beautiful product while maintaining humidity resistance for a short period of time, as well as heat sealability," Mateusz Cyman continues. The new packaging product contains less than 5% of plastic and can be considered recyclable. "The co-operation with UPM was a great success. It helped us to demonstrate one of the numerous opportunities offered by the utilisation of paper with 4 gsm PE coating. We can show that it's possible to lower PE grammage without losing valuable properties, while simultaneously gaining recyclability," Mateusz Cyman states.

THIRD SML FLEXPACK LINE SOON IN OPERATION

UNIPACO relies increasingly on coating machinery from SML. The co-operation between the two companies commenced ten years ago, when UNIPACO was looking for a new coating line. "We received SML's offer for the machine, and it turned out to be much better than those from other companies. We opted for the SML coating system, and we couldn't be more pleased with it. Not only the systems, but the customer service and customer relations are of a superior standard," Mateusz Cyman says.

UNIPACO's third FlexPack coating line from SML is going to be installed in the middle of 2025. "We are proud of our partnership with UNIPACO, a company with which SML has a lot in common. Like UNIPACO, at SML we favour long-term relations with our customers, we focus on ongoing technical innovation and high-quality standards and, last but not least, both companies have more than two decades of experience in the field of flexible paper packaging," Johannes Danter, Product Manager at SML concludes.

Comparing PS, PP, PET and "paper"

Which material is best for disposable coffee cups?

Any cup, any material: SML can handle all materials and production methods.

According to the consultants Research Nester, the market share for disposable cups will more than double from 13.45 billion USD in 2024 to 31.68 billion USD by 2037. Good thermal properties, health safety and easy recyclability are essential properties for disposable coffee cups.

"For several years now SML has been developing processes to manufacture heat-resistant materials for applications such as coffee cups on its own sheet lines. Meanwhile, thermoforming companies are eliminating several different materials for manufacturing cups in line with changes in market demands and in compliance with increasingly stringent environmental regulations," Rupert Becker, the Product Manager for sheet lines at SML, explains. But what might be the optimum material for the coffee cups of tomorrow?

CUPS FROM RIGID PS

Conventionally, disposable coffee cups were mainly made of polystyrene (PS), which is relatively easy to thermoform. Polystyrene has, however, fallen from favour among several FMCG (Fast-Moving Consumer Goods) manufacturers due to potential health hazards. Coffee cups made of polystyrene can release odours and may affect the taste. The material can be recycled, but post recycling applications are limited.

PP-FOAM CUPS

To create a future-oriented and environmentally acceptable alternative to rigid PS products, SML has developed a new method to manufacture PP foamed materials. PP-foam coffee cups are made from 3-layer PP sheets. The central layer is physically foamed while the outer layers are rigid. The sheet is extruded using flat die coextrusion technology in combination with a gas injection unit. To create the specific cell structure of the foamed inner layer, a gas such as nitrogen is used. Coffee cups from foamed PP have excellent insulation properties and are heat-resistant up to 100 °C. Compared with cups from 100% rigid PP, PP-foam cups have a significantly lower density and lower weight. This means that less material is required to produce these. In addition, PP-foam sheet is very easy to thermoform. When it comes to recycling, a major advantage of PP-foam materials in comparison to other foamed plastics is that they can be sorted by the regular process in waste sorting plants.

PET-FOAM CUPS

The same thing that worked with PP also works with PET. As a next step, SML developed cups of mono-material PET-foam sheet. PET-foam sheet is not transparent, manufacturing processes and material properties are very similar to those of PP-foam sheet. PET foamed sheet can consist of up to 60% recycled PET, while still being in compliance with food safety standards. It cannot be sorted by gravity waste sorting plants due to its lighter weight compared to rigid PET.

C-PET LIGHT CUPS

C-PET light sheet is characterised by its suitability for transparent applications, high stiffness and efficient production with a high output. The material is an economic and easy-to-recycle alternative to rigid PS and PP in thermoformed hot fill applications – such as coffee cups. C-PET light withstands temperatures of up to 100 °C. In thermoforming, shorter cycle times represent an economic advantage compared with conventional C-PET. Due to the similar density of virgin PET and its transparency, coffee cups from rigid C-PET light can be easily sorted and recycled in existing facilities.

AND WHAT ABOUT "PAPER" CUPS?

Practically, all of the coffee cups made from "paper" are of paper coated with polymers, either PE or bio-based PLA. The function of the polymer coating is mainly to provide moisture resistance. So far, coffee cups from paper coated with plastics have become well established in the market. Their biggest disadvantage is the higher CO_2 footprint of paper production and their limited recyclability since the polymer and the paper components of the cups have to be separated in a relatively complex process before recycling. Today, polymer-coated "paper" coffee cups are generally categorised as single use plastics in accordance with EU directive 2019/904 regardless of whether the coating is made of PE or bio-based PLA.

So, what is the best material for disposable coffee cups?

	Heat resistance	Thermal insulation	Thermoforming	Recyclability
PS rigid	Up to 90 °C	insufficient	good	insufficient
PP foam	Up to 100 °C	excellent	excellent	excellent
PET foam	Up to 120 °C	excellent	special tools required	acceptable
C-PET light	Up to 100 °C	insufficient	excellent	excellent
PE-coated paper	Over 100 °C	acceptable	No thermoforming	insufficient

"Our different extrusion lines are able to produce practically any material for coffee cups – from rigid and foamed monomaterials to polymer-coated paper. The question of 'Which material is best' naturally depends to a large extent on the specific requirements of the material manufacturers, the thermoforming companies and the end-customers. However, if we try to weigh up the advantages and disadvantages of the individual materials, easy-to-recycle mono-material PP-foam has a lot in its favour," Rupert Becker, the Product Manager at SML, confirms.

Extrusion lines – engineered to perform

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