



SML presents new stretch film line, PowerCast XL

With the new PowerCast XL presented at the K2019, SML launches a high-performance stretch film line, perfectly designed for customers requiring a high roll-width flexibility, a wide thickness range and high output volumes. Packed with several technical innovations, SML's new line outperforms similar systems in terms of efficiency, production stability and flexibility. The new PowerCast XL is the latest example of SML's innovative spirit and its technological leadership in the field of advanced stretch film lines.

PowerCast XL is a sophisticated further development of SML's well-proven PowerCast concept, especially suited for customers demanding extensive flexibility in production in combination with high output volumes.

4,500MM NET FILM WIDTH

The new PowerCast XL has a net film width of 4,500mm. Without increasing the trim ratio, the new line is able to produce 400, 450, 500 and 750mm wide rolls – a key advantage to serve individual requirements in the market. Other technical features of the new system are:

- ▶ 8 extruders, 13 layers
- ▶ a 5,435mm wide Cloeren Reflex™ die
- ▶ a 1,600mm diameter chill roll
- ▶ a double turret winder, W4000 4S 2T, with 4 shafts per turret

EASY PRODUCT CHANGES

SML's newly introduced "hands-free" operation of the extrusion die makes product changes on the new PowerCast XL line very fast and straightforward. Less manpower is



required, waste is reduced and overall line effectiveness is raised significantly. With the new Reflex™ die in combination with the in-house developed Booster regulation, the line operator does not need to manually interfere in cross-profile adjustment product changes any more. Using a conventional system, it takes sometimes 30 - 45 min until the required product quality is reached. The available "hands-free" and Booster regulation can do this in approx. 10 min completely automatically.

AUTOMATIC MAPPING OF DIE BOLTS

The automatic mapping of the die bolts is another innovation from SML to minimise both personnel costs and waste production. With conventional equipment, the operator needs to do a manual die mapping at every product change to ensure good regulation of the thickness gauge. With the new automatic version developed by SML, a special software constantly regulates the expanding and contracting of the die bolt at a defined

position to the film. The thickness measuring unit recognises the position of the bolt and automatically readjusts the mapping.

FILM TEMPERATURE MEASUREMENT

All of SML's stretch film lines can measure the real temperature of the extruded film directly on the chill roll. This is second to none and gives manufacturers the possibility to predict the quality of the film with regard to its elongation already inline during production! The operator then knows immediately if he needs to modify or readjust anything to achieve the right "Ultimate".

POST-CONSUMER LLDPE/LDPE RECYCLING

In the last six months, SML has developed an extrusion method to make high quality stretch film out of 80% post-consumer LLDPE/LDPE recycled materials – a milestone for the circular economy in the field of stretch film.

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Editorial

Karl Stöger
Managing Director



Dear Reader,

With the K-show around the corner, visitors are anxiously searching for new directions in which the plastic industry will be able to move forward in the years to come. It remains to be seen to what extent the exhibition will provide clear answers to their questions. One thing, however, is certain, "circular economy" will be an omnipresent topic. Exhibitors will showcase their latest innovations for the sustainable use of plastics. Personally, I am convinced that many of these developments can be effective answers to the problems we are currently facing. Above all, to the problems caused by plastic waste in the environment. If the best available solutions are adapted and put into practice, the transformation from a linear economy to a circular economy will undoubtedly succeed.

Most brand owners and retailers have recently published their new packaging guidelines. These can briefly be summarised as: reduce, reuse and recycle. Multi-material structures, which are difficult to separate, will be replaced by mono-material solutions that are easier to recycle. Opinions about which type of packaging material is more environmentally compatible, and therefore the first choice, seem to be inconsistent across the board. Certainly, it also depends on the application. Some suggest a move towards paper and cardboard, some propose to use more single material polyolefin and still some view polyester as more suitable overall. Correctly sorted, all these materials are easy to recycle and reuse. Then there are the plastic-like biodegradable materials. It is important to understand that bio-degradable materials are not made for recycling and therefore must not get into the recycling stream.

SML too, has invested considerable effort in the development of machinery and applications which are designed for the "greener" use of plastics. Inside this edition of TechReport, you will find articles focusing on them as well as many other interesting topics. Enjoy reading this edition!

Yours faithfully,

Karl Stöger

SML Technology Centre:

New demonstration and development line for thermoforming sheet

SML has started up a new demonstration and development line for R&D on thermoforming sheet. Located in SML's Technology Centre, the new line is a key element in a joint program between KIEFEL Packaging and SML, for the development of heat-resistant thermoformed end products from foamed PET and PP sheet. Apart from that, the new line stands open to all of SML's customers.

SML's new demonstration and development line for thermoforming sheet has a clear focus on processing PET, but can also be used for trials on PP and PS. With its considerable thickness range from 200µm to 2mm, the line offers a maximum of flexibility for all kinds of R&D projects related to thermoforming. Besides trials on standard products, the design of the line enables the production of specialities such as:

- ▶ rigid PET sheet up to thicknesses of 2mm, with excellent optical properties
- ▶ physically foamed sheet of PET, PP, PS
- ▶ laminates of PET/PE sheet

OPTIMISING PRODUCTION PROCESSES

SML already offers field-proved systems for the production of 3-layer PET sheet where the centre layer is physically foamed and the outside layers remain rigid. One of the aims of the new line is the further development of production methods for foamed sheets, especially of PET, but also of PP. Another target is



R&D result: heat-resistant, foamed PET cup

and KIEFEL Packaging. The aim of this joint programme is to develop thermoformed end products with special features from foamed sheet. Cups made of standard APET, suitable for hot-fill applications and boasting a heat resistance of up to 100 degrees Celsius, are one of the first developments to emerge from these joint R&D activities. The sheet for

to reduce the density of the foamed layer, so that the consumption of raw material is minimised. Beside that, SML's R&D activities are focused on methods utilising recycled materials for the production of thermoforming sheet. This can be post-consumer bottle flakes, but also regrind from foamed sheet or rigid sheet.

CO-OPERATION WITH KIEFEL

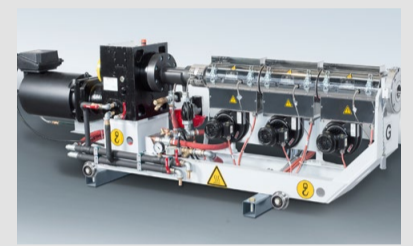
SML's new demonstration and development line for thermoforming sheet plays a key role in a co-operation between SML

such cups can have an overall density of about 0.65 kg/dm³, which saves material and increases the insulating properties, so that it is possible to hand-hold these cups filled with hot liquids. The next step in this co-operation is to distribute this development on the market.

Main technical data:

Two extruders for a 3-layer A/B/A structure	
Drying system:	IR-dryer / crystalliser and dry-air drying
Thickness range:	0.2 - 2mm
Max. output:	up to 1,300 kg/h
Max. sheet width:	up to 1,200mm
Max. winding diameter:	up to 1,200mm

HO-LT Extrusion – well-proved for technical thermo-plastics



SML's HO-LT (High Output – Low Temperature) extruders are perfectly designed for heat sensitive polymers, providing energy efficiency and the best melt quality. Launched in 2011 and constantly further-developed, they are now processing a vast variety of different raw materials, including highly transparent polymers such as PMMA and materials containing halogen.

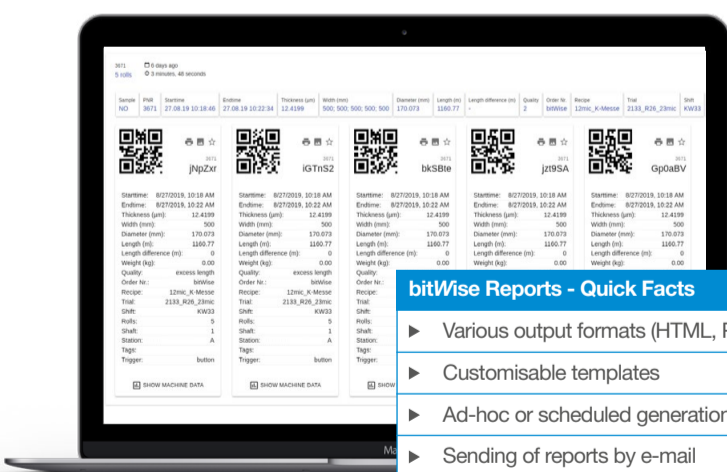
SML has adapted its HO-LT extruders to suit polymers like PVC, PVDC, PVDF, ETFE, FEP or ECTFE, apart from PP, PE, PA, EVOH and adhesive resins. For the smooth processing of these very different types of raw materials, the extruders had to be modified; especially with regard to the screw design, the torque value, the raw material processing temperatures as well as the material characteristics of the screws and the barrels. The very high melt quality generated by SML's HO-LT extruders is also the result of reduced material degradation. Less corrosive and less toxic degradation decrease ambient pollution and increase the longevity of these extruders.

Further technical advantages of SML's HO-LT extruders are the low energy input, the high throughput at a low melt temperature as well as their excellent pressure and production stability. Compared to conventional extrusion systems, HO-LT extruders save up to 25 % of the energy. Due to the short residence time in the extruder, the melting of the raw materials is extremely gentle. This simplifies the processing of sensitive raw materials.

SML's HO-LT extruders are available with screw diameters of 35, 45, and 55mm. Co-extrusion units for the production of barrier film, as part of larger extrusion system, are a very common area of application.

SML bit.Wise

Control through transparency



bitWise Roll Monitor

- #### bitWise Reports - Quick Facts
- ▶ Various output formats (HTML, PDF, XLS, CSV, etc.)
 - ▶ Customisable templates
 - ▶ Ad-hoc or scheduled generation
 - ▶ Sending of reports by e-mail
 - ▶ Based on live or historic data

bitWise is SML's in-house developed data logging and analysing tool with a clear focus on the optimisation of production processes and the final product. The bitWise modules, "Roll Monitor" and "Reports", exemplify how to gain control through transparency.

bitWise ROLL MONITOR FOR TRACKING AND TRACING

The tracking and tracing of all product related details is a legal auditing requirement in many industries. Using the production ID of a film roll or scanning its QR-code, the bitWise Roll Monitor is able

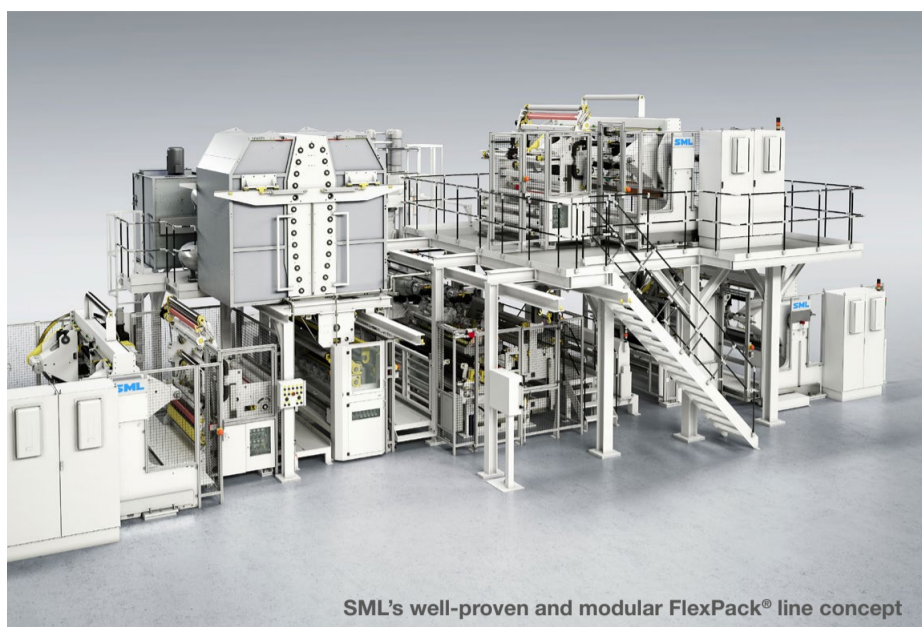
to generate the full production history of that roll within a second. It can also include data from interconnected third-party systems like MES (Manufacturing Execution Systems), ERP (Enterprise Resource Planning Systems) or QA (Quality Assurance). Besides fulfilling regulatory requirements, the Roll Monitor offers the opportunity for the in-depth optimisation of production processes end-to-end.

REAL-TIME DATA TRANSPARENCY

"The bitWise Roll Monitor makes processes one hundred percent transparent and visible," Dietmar Baur, Head of the Digital Business Unit, comments. Adding pictures, documents or other auxiliary information to the rolls complements the process information that the bitWise Roll Monitor manages. Handwritten notes are no longer necessary and incomplete data or orphaned rolls are no longer a problem.

bitWise REPORTS

bitWise Reports is a versatile reporting engine which is flexible enough to quickly create customised reports. It not only allows for the ad-hoc or scheduled generation of in-detail reports, it also creates them for the past – with access to all the recorded data, in full detail. With bitWise Reports, incomplete or missing reports are no longer a challenge.



SML's well-proven and modular FlexPack® line concept

SML's extrusion coating and lamination solutions are characterised by their reliability, constant in-detail innovation and the regular launch of new systems. The well-proven and modular FlexPack® line concept has already become a benchmark in the flexible packaging market. From simple PE-coating onto paper to complex structures for snack food pouches or coffee packaging, this line can fulfil even more requirements in customised configurations.

NEW TRIPLEX EXTRUSION SYSTEM FOR ASEPTIC PACKAGING

The Triplex line is designed to produce various types of board/aluminium/polymer laminates in one simple and cost-effective production step. Unlike nearly all of the

other systems on the market, SML's Triplex line processes thin paper and rigid paperboard at an equally high quality.

CUTTING-EDGE DOUBLECOAT METHOD FOR OUTSTANDING MATERIAL FEATURES

DoubleCoat is SML's patented sequential coating process for the production of extremely thin, breathable products. DoubleCoat combines extrusion coating with hot melt lamination, allowing the joining of materials which were considered incompatible so far. Apart from sanitary articles and functional clothing, roofing film in the construction industry is a huge field of application. SML's diffusion open products, based on nonwovens and reinforcement grids with thermoplastic bonding materials such as TPU or TPE, are already widely spread in this market.

Extrusion coating and laminating: applications beyond flexible packaging

WINDING TECHNOLOGY FOR LARGE ROLL DIAMETERS

For SML's high-output coating and laminating lines, the contact winder W1800 has been created for large roll diameters up to 1,800mm. Together with new heavy cardboard unwinders for diameters up to 1,600mm, SML has extended the capabilities of these core components to new limits.

- ▶ Single/Tandem/Triplex line configurations
- ▶ Combined lines integrated into cast film production or calendaring processes
- ▶ Full selection of usefull auxiliaries
- ▶ Comprehensive data management using SML's data analysing tool, bitWise

R&D EFFORTS TOWARDS ECO-FRIENDLY APPLICATIONS

In general, the extrusion coating process is one of the most economic methods to produce complex structures made of different materials. In the light of the ongoing discussion about plastic waste and the demand from brand owners for recyclable or biodegradable products, SML invests considerable R&D efforts into the development of environmentally compatible solutions. Machinery for PLA coated paper is just one example. Single source structures like "polyolefin only", which can be fed back into a recycling process is another example.

Key components produced in-house

- ▶ Complete range of unwinders and winders
- ▶ Extruders for all of the relevant polymers
- ▶ Primer station for the improvement of adhesion
- ▶ Laminator and DoubleCoat technology
- ▶ The SMILE machine control system

CUSTOMISED TURNKEY SOLUTIONS

Thanks to its strong engineering capacity, SML is able to deliver customised turnkey solutions with a wide range of optional features:

MDO films – enhanced properties for multiple applications

Embracing end-products which are so different, like stand-up pouches, labelling film and hygiene products, the application range for MDO films is truly tremendous. Customised MDO units from SML are installed all over the world, producing nearly every type of mono-oriented film with outstanding properties.

A substantial amount of MDO films manufactured on systems from SML is still used for packaging. With new types of mono-axially stretched films, the packaging weight can be reduced to a minimum, while single-material packaging paves the way to new forms of recycling. On lines from SML, the main thickness range of mono-oriented films starts at 12µm, for example for MO-PET, and goes up to 150µm for foamed-MOPP-films. SML delivers customised MDO units for all of the following products:

Films for stand-up pouches have a thickness range from 25 - 60µm and are made of polyolefins. Thinner films are used to replace BOPET film on the outside of the pouches, so these receive a single material structure. Thicker films are used for the sealing layer, providing straight tear properties when the pouches are opened.

PET films for twist film or lamination film. In these films, the thickness range starts at approx. 12µm and goes up to 40µm. The

central characteristics of these types of mono-oriented PET film are their good twistability, high gloss, as well as good printability and transparency.

MDO films for shrink-sleeves are mainly made of PET-G. The key advantage of MD-shrink-sleeve-film is its high labeling speed.

Label films are made of polyolefins. The final products are transparent or pigmented self-adhesive labels, i.e. for beverages bottles, sanitary product bottles, food product containers or for cleaning agent bottles. Mono-axial stiffness makes it easy to dispense of the labels, as they are stiff in one direction to enable the smooth peeling of the protective backing. At the same time, these MDO labels are soft in the transverse direction, so they conform well to rounded shapes like that of bottles.

Films for carrier handles, i.e. water bottle six-packs, are mainly made of MOPP-film with a thickness of approx. 50µm.

Foamed MOPP films are mainly used for labels, cable insulation and decoration tapes. They have a thickness range of 80 -150µm.

Breathable films are made of PE or PP with calcium carbonate in a range of 45 - 55 %. The main applications are back-

sheet-films for hygiene products and house wrapping films. The degree of breathability can be adjusted with the amount of calcium carbonate in the film and the stretching ratio on the MDO unit.

OPTIMISED FILM FUNCTIONALITIES

MDO films manufactured on lines from SML are enhanced products with multiple benefits at a significantly reduced cost. Down-gauging film requires fewer source materials, less packaging and lower transportation costs, thus reducing the carbon footprint, while retaining and improving the film properties:

Superior mechanical properties, such as tensile strength, puncture resistance, stiffness, dead fold, easy one-directional tearing, machine direction stretch control and a high shrinkage in the machine direction.

Specific optical properties, customised to various requirements such as a high transparency and gloss, a low or high haze and light polarisation.

Outstanding barrier properties. The enhanced technology developed by SML allows the production of films with a minimal thickness and with the same oxygen and water barrier properties as thicker films.

▶ outstanding film functionalities



Mono-oriented films manufactured on SML's MDO units can be made from a wide range of raw materials, such as:

- ▶ polypropylene (PP)
- ▶ polyethylene (HDPE / LDPE / LLDPE)
- ▶ polyamide (PA)
- ▶ ethyl vinyl alcohol (EVOH)
- ▶ polyethylene terephthalate (PET)
- ▶ polystyrene (PS) and many others

New high performance sheet line for FFS packaging



Output capacity up to 1,500 kg/h

- ▶ 3 vented extruders for the main structure plus one small extruder for the glossy outer layer
- ▶ A fully gravimetric dosing system with registration of the material consumption and recipe control
- ▶ A processing unit for the foaming of sheet
- ▶ A horizontal 3-roll calendaring rollstack with additional post-cooling rolls
- ▶ A length slitting unit for 4 webs including a removal system for cutting dust
- ▶ A thickness gauging and web inspection system
- ▶ A 4 web cantilever winder with 8 winding stations for up to 1,400mm winding diameter

controlled in functional groups. This guarantees a defined cooling process of the sheet prior to cutting and winding.

In order to save expensive raw materials, SML's sheet lines for FFS packaging can be equipped for chemical and/or physical foaming and for the processing of master-batches with fillers.

CONSTANTLY HIGH SHEET QUALITY

The clean room environments at the filling companies require zero-defect container forming in order to avoid contamination and to avoid the frequent, intensive cleaning of the inline filling machines. Therefore, SML's new high-performance line delivers polystyrene sheet with properties fully optimised for FFS packaging:

- ▶ A low and constant shrinkage of the sheet in the machine and in the cross direction
- ▶ Narrow thickness tolerances over the sheet width
- ▶ Narrow coex-layer thickness tolerances
- ▶ Perfect sheet flatness
- ▶ Narrow tolerances for undulation on the edges or the bow effects of the sheet

It goes without saying that FFS lines from SML are equally suitable for processing PP should this material be demanded in your market.

SML is presenting a new high-performance extrusion line for top quality polystyrene sheet, delivering material for subsequent FFS processing. With an output capacity of up to 1,500 kg/h, the new line is especially designed for brand-name companies in the food industry, which produce packed products in high volumes, i.e. dairies or the manufacturers of confectionary and chocolate.

Using Form, Fill and Seal (FFS) sheet is an extremely cost-effective method of thermoforming cups or trays – filling and sealing them in one production step. “We have developed our new polystyrene sheet line to give a clear answer to the market's need for high capacities and outstanding quality levels, above all with regard to food safety in the FFS process,” Martin Kaltenecker, Head of Sales at SML, explains. The new line has an output capacity of up to 1,500 kg/h at a thickness of up to 800µm and a net width on the winder of up to 1,600mm. It is equipped with:

IDEAL THICKNESS TOLERANCES MEETING FFS CRITERIA

SML's new high-performance sheet line for FFS is equipped with a horizontal calendaring system, including a Smart Parallel Gap (SPG) roll for ideal thickness tolerances. It was especially designed to meet all the relevant quality criteria for FFS sheet in continuous production. Both gaps of this calendar are motorised adjustable and the gap force is measured. The subsequent production section includes in total seven post-cooling rolls which are driven and temperature-

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R&D on biodegradable paper/PLA composites

Resource-efficiency has always been a key characteristic of extrusion technology from SML. Today, SML is using its brand-new FlexPack demonstration line in its Technology Centre to develop eco-friendly paper/PLA composites and easy-to-recycle laminates.

“During the last decades, plastic laminates with multilayer structures have been developed to optimise the shelf life of packed products. These materials have outstanding mechanical and optical properties, but their recyclability is limited,” Mario Höllnsteiner, SML Product Manager for Coating and Laminating, states. Meanwhile, the requirements of the market have shifted. “At the end, it should be possible to efficiently recycle or compost single-use packaging materials. Therefore,

SML is testing and developing composites with completely new structures, in close cooperation with customers and partners“, Höllnsteiner adds. A key role in the creation of new packaging solutions is played by SML's fully equipped FlexPack extrusion coating line in the brand-new SML Technology Centre.

PLA INSTEAD OF PET AND LDPE

Typical single-use laminates from paper / board and plastic, which are commonly used for drinking cups, disposable plates or burger wraps, can be substituted by products which are extrusion coated with biodegradable PLA – instead of LDPE or PET. PLA is already processed in extrusion coating lines and used for commercial applications. In comparison to standard coating lines, systems suitable for processing PLA require additional equipment. Above all, special dryers for the

granules, a material specific screw design and extruder drives with a higher engine power to provide sufficient torque.

DEVELOPING SINGLE MATERIAL LAMINATES

Another approach taken by SML is to go for single material laminates to make recycling easier. In that case, extrusion coating has significant benefits in comparison to the conventional glue lamination process. Whereas conventional lamination lines contaminate the structure with glue, extrusion lamination, in combination with primer coating, uses the same polymer for bonding.

To conduct trials on SML's FlexPack line, please contact Mr. Mario Höllnsteiner (hom@sml.at) to reserve your time slot.

Events 2019/2020

Event	Location	Date
Stretch & Shrink Film US Conference	New Orleans, USA	Dec, 03 - 04, 2019
Saudi PPP	Riyadh, Saudi Arabia	Jan, 13 - 16, 2020
Interplastica	Moscow, Russia	Jan, 28 - 31, 2020