

## Silage film for bale wrap:



# Is cast the new blown?

**Newly developed formulations from SML make it possible to manufacture high-quality silage film on its cast stretch film lines. Compared with the manufacturing of blown silage film, this new approach offers some key advantages: higher output capacities, significantly lower production costs and the possibility to optimise the relevant film properties.**

Silage films are primarily used in agriculture to preserve bales of silage, hay and maize. Wrapped around the bales, silage films prevent fermentation processes and maintain the nutritional value of the contents. To ensure easy bale wrapping and proper protection throughout the entire storage period, the quality requirements of these films are relatively high. So far, silage film was mainly made from blown film as the right dart impact, cling level and oxygen permeability could be more easily achieved than with cast film. This is now changing.

**LOW OXYGEN PERMEABILITY IS KEY**  
In cooperation with premium material suppliers, SML recently developed a silage cast film for bale wrapping that meets expectations in terms of its properties and even beats the blown product. "Our major concern was the higher oxygen permeability of our cast film," Thomas Rauscher, Product Manager at SML, remarks. The market-conform value for the oxygen permeability of silage film should not be higher than 9,000 cm<sup>3</sup>/m<sup>2</sup>\*24h. "In the past, a typical cast stretch film of 25 micron displayed a value above 10,000 cm<sup>3</sup>/m<sup>2</sup>\*24h, whereas due to the latest development we achieved values of around 8,500 cm<sup>3</sup>/m<sup>2</sup>\*24h," Thomas Rauscher explains.

**KEEPING "STICKINESS" HIGH**  
Typically, silage film made on SML's cast film line has at least 5 layers. The claim to fame of the silage film for bale wrap is that the cling layer has to be at the outside of the roll and the "stickiness" has to be very high, whereas a good cling level is between 5-10 N/m. "During the cast process, it is an easy task to put the cling material on the outer side of the roll. And we have several possibilities to guarantee a high stickiness," Rauscher says. The cast film line can either produce the film with PIB in liquid as well as in granule form, whereas the preferred process nowadays is without liquid. Additionally, the high cling level can also be reached without PIB. This solution reduces the handling cost, since silage film on a PIB base normally needs to "rest" at least 48 hours in a heated storage room. The cling value of the PIB-free cast silage film was tested at 8-9 N/m.

**"SLIP LAYER" WITH UV PROTECTION**  
The layer on the other side of the silage film has to have a high slip. The 'slip layer' helps to ensure that the wrapped bale does not get damaged during the stapling and storage process. As usual, the UV masterbatch is also added to this layer. The UV additive protects the goods against damage caused by sunlight.

**DART IMPACT AND STRETCHABILITY**  
The properties of the inner layers of the silage cast film guarantee the right dart impact and stretchability. "The dart impact of silage films should be at least over 10 g/μm, while the tested cast films reached values of more than 15 g/μm," Thomas Rauscher comments. Silage film usually requires a stretchability of between 50-100%. "For a cast film, this is not an issue and so all the tests produced results exceeding the required stretchability by far, based on 750mm wide rolls," Rauscher explains.

**HIGHER CAPACITIES, HIGHER PROFITABILITY**  
A roll width of 750mm is ideal for manufacturing silage cast film. For that reason, the SML brands MiniCast and SmartCast are the best choice. The MiniCast manufactures 2 x 750mm rolls and the SmartCast delivers twice the output with its 4 x 750mm rolls. From an output point of view, SML's SmartCast would be the clear winner, as it also has twice the output capacity of a state-of-the-art blown film line. The significantly higher production capability makes the manufacturing of silage film using the cast process much more cost-effective than on a line for blown film.

**RAISED UTILISATION LEVEL**  
Beside that, SML's cast film lines do not only produce silage film, which is a seasonal business: the same lines also manufacture conventional stretch wrap film. With the cast process, manufacturers are able to raise the utilisation rate of their extrusion lines further which also has a favourable impact on the profitability.

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## Editorial

**Karl Stöger**  
Managing Director



Dear Readers,

I trust and hope that you are all in good health and that your business is on track. The year 2020 was more turbulent than we could ever have imagined and the pandemic has certainly not made it easier to plan ahead.

As per my own observations, many of the industries we are working for are suffering and benefiting at the same time. Apart from the human tragedies at this difficult time, for enterprises like SML and for many of our customers, new opportunities are arising to offset the calamity of COVID-19. But, even though Corona may be providing a stimulus to the economy in a large sector of the "plastic community", we all wish to overcome this health crisis and to get back to normal as soon as humanly possible.

In this TechReport we have put together a range of interesting articles on new technologies and developments from SML. Spurred by the increasing demand for recyclable single material packaging structures, the demand for our Cast-MDO lines is booming, too. The newly launched dual-frame MDOs are an important building block enabling a wide range of applications for all kinds of mono-oriented films.

Apart from its music, mountains and machinery, Austria has, to a lesser extent, some fertile farmland. Last summer, Austrian farmers conducted extensive tests with silage wrapping film produced by the cast process on a SmartCast Infinity stretch film line, installed in our Technology Centre. The performance of this cast film not only surpassed all of the requirements of comparable blown films, but it also exceeded all of the expectations of the farmers trying out cast silage film for the first time.

Paper versus plastics in packaging is a much discussed topic. In a special article, we have tried to provide a neutral contribution to this debate.

I hope that you will find this or some other articles featured in this issue intriguing. Enjoy reading them!

Yours sincerely,

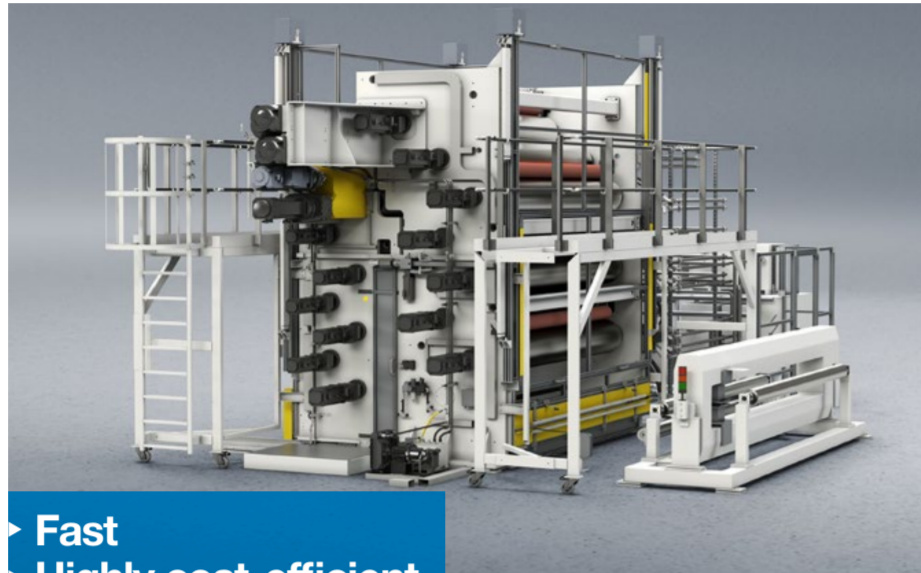
SML's latest generation of MDO

# Revolutionary dual-frame system with inline adjustable stretching gap

The most striking feature of SML's current generation of MDOs is the design consisting of two independent frames. While the line's overall setup guarantees high production speeds, the dual-frame system allows maximum service-friendliness.

The first frame with ascending rollers houses all the rollers of the preheating zone and the rollers of the stretching zone which run at low speed and operate the hold back function of the stretching process. The stretching rollers which operate the pulling function and go high speed, as well as all the other rollers of the stabilising and cooling zone, are located in the second descending frame.

The two frames are relocatable to each other. The variable distance between the two frames precisely defines the length of the stretching gap, which is adjustable during production. Thus the MDO process is adapted to the polymer and to the relevant production line speed. "Ultimately, all the essential mechanical properties of the film in the machine and cross direction are determined by the length of the stretching gap and the stretching speed. Our system guarantees both maximum control of the film properties and very high production speeds," Robert Preuner, Head of R&D at SML, explains.



**Fast  
Highly cost-efficient  
Service-friendly**

**VIBRATION RESISTANT DESIGN / HIGH PRODUCTION SPEEDS**

The frames are moved along strong linear guiding profiles, driven by robust jack screws, which strongly resist vibration. The positioning of the frames is done by highly precise servo positioning drives. The dual-frame layout is the ultimate space-saver. It

takes into account the increased number of rollers necessary for elevated line speeds. At the same time an excessive height of the stretching unit is avoided.

**VERSATILITY BOTH FOR POLYOLEFINS AND PET**

The SML "dual-frame design" offers stretching both according to the short gap and the long gap procedure. Thus SML's new MDO generation is not limited to process polyolefins but is also perfectly suited to PET applications like twist film for candy wrapping, adhesive tapes and shrink labels for bottles, which need to be stretched with a long stretching gap.

**POTENTIAL FOR NEW PRODUCTS**

Newly developed formulations provide tremendous potential for stand-up pouches (MOPE) and tear-open packages (MOPP). Established polyolefin applications using the short gap process are technical films for cable insulation, tear tapes and tape carrier handles. Hygiene breathable films for diapers and incontinence products are produced at an amazing production speed of 500 m/min.

optimum access to rollers, also on the inner side of the frames, for fast, comfortable and safe cleaning. Additionally, all of the rollers of the MDO, including the pressing rollers, have a quick-change mechanism. If necessary, the rollers can be changed fast and comfortably via integrated hoists.

**FAST CLEANING, SHORTER DOWNTIMES**

Significantly shorter cleaning and service times, and with it more cost-efficient operation, are further key advantages of SML's current generation of MDOs. In the service position, the two frames of the MDO can be moved apart as far as 0.8 meters. There is

## Paper and plastics – an eco-friendly symbiosis?

In the retailing of FMCG (fast moving consumer goods) there is a growing trend to replace plastic packaging with cardboard or paper. While mono-material packaging made from these materials has been established in the market for a long time for a number of applications, many newly developed packaging solutions from cardboard or paper are in fact composites or laminates – containing plastics which are subject to criticism.

"Regardless of whether packaging is made from metal, glass, paper or plastics: Each man-made material has an ecological footprint and it is impossible to generalise that one material is better than the other," Susanne Kohlberger, the Marketing Manager at SML, comments. The key question behind all of the current claims from retailing companies is: How environmentally safe are these new composite structures that are promoted as "paper" or "cardboard" packaging? As a matter of fact, cardboard and paper alone neither offer sufficient protection against moisture nor can they provide a barrier against oxygen. They rely on a symbiosis with plastic to attain these properties.

**RECYCLING AS A CHALLENGE**

According to legislation in many European countries, packaging from paper or cardboard can contain up to 15 % other materi-

als, above all plastics. In contrast to mono-material packaging from paper or cardboard, these composites or laminates are much more difficult to recycle. From a technical point of view it is possible to separate the major proportion of paper/cardboard from the rest of the structure in an energy consuming process. The pulp generated in such a recycling process is relatively short-fibred and can only be used to manufacture a limited number of rather simple products. The plastics extracted from the packaging materials labelled as "paper" or "cardboard" cannot be economically recycled and is either dumped or burned in incineration plants.

**COMPOSITE STRUCTURES CONTAINING BIODEGRADABLE PLASTICS**

Today the production of paper or cardboard coated with biodegradable plastics, like PLA, is state-of-the-art and there are several coating and lamination lines from SML on the market which process laminates with PLA in the same way as conventional polymers. Generally, biodegradable plastics, which are used in coatings or in composites for packaging, must have the same basic properties as conventional plastics. Yet bioplastics cause severe problems when they are mixed with conventional plastics in the recycling process. The key question now to be answered is, how eco-friendly can a circular economy be given that recycling is

**Each man-made material has an ecological footprint**

extraordinarily complex and energy consuming and that the starting material – cardboard or paper – is produced in a rather polluting process.

**MONO-MATERIAL AS AN ALTERNATIVE**

It should be considered that mono-material packaging might be the ecologically better solution for many packaging products since the recycling process is less complex and less energy consuming and an infrastructure of established facilities already exists. This applies both to paper, cardboard and plastics. When properties such as transparency, resistance against

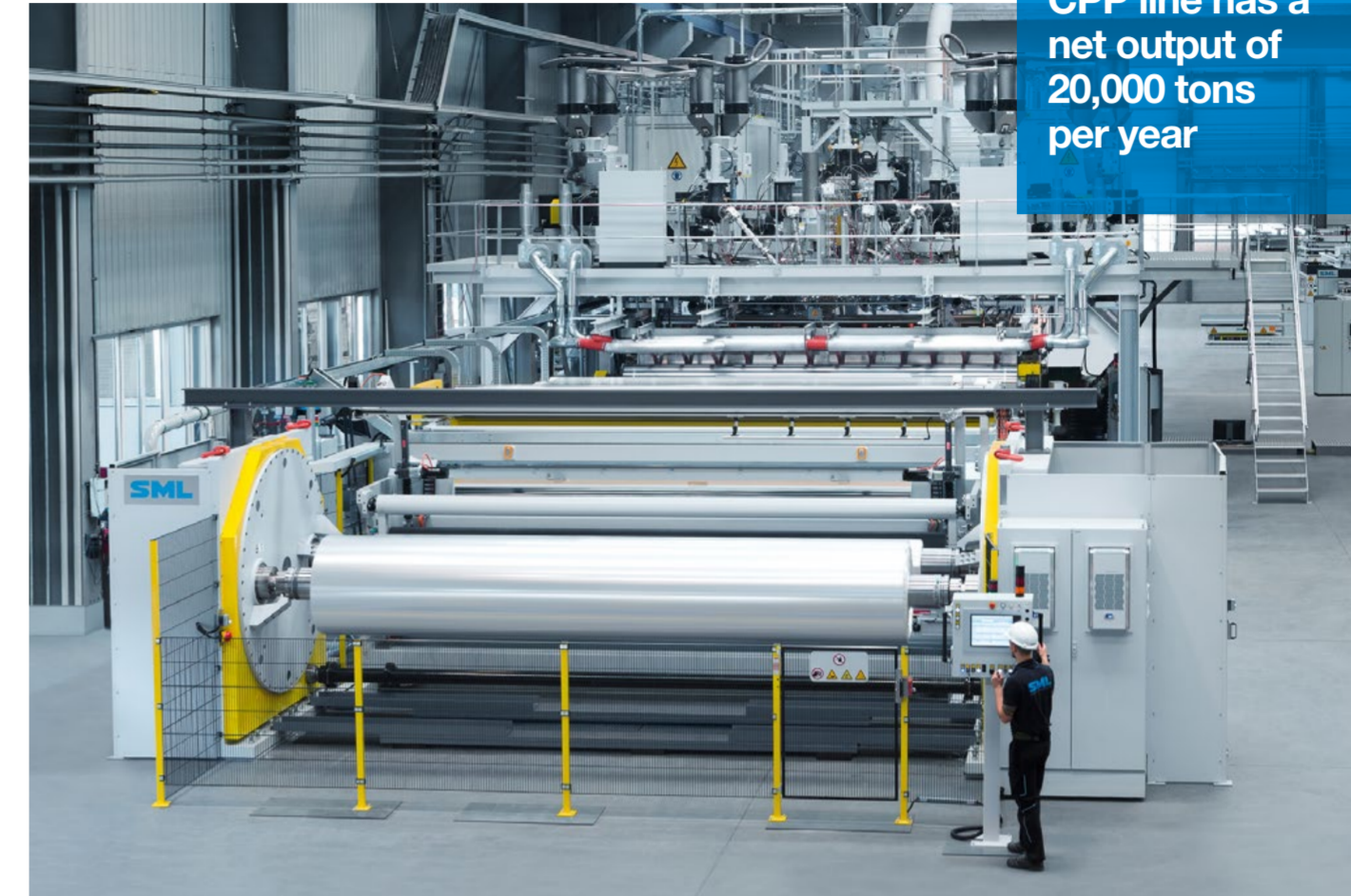
moisture or barriers against oxygen are required, the application of plastics in packaging is unavoidable: either in composites or coatings or as a mono-material. Despite all the claims to the contrary, there is considerable evidence that new mono-material solutions in packaging are at least as eco-friendly as obscure composite products that are labelled "paper" or "cardboard".



CPP film for metallisation

# Extra-wide lines for maximum cost-efficiency

**SML's largest CPP line has a net output of 20,000 tons per year**



Extra-wide CPP film lines are a cost-efficient solution when it comes to the high-volume production of CPP film for metallisation. SML offers extra-wide cast film lines for the production of CPP film for the packaging of food and textiles, especially for metallised CPP lamination films, which are highly popular in Asia. These CPP lines are typically 5-layer lines with film widths ranging up to 6.5m.

**DESIGNED FOR SUBSEQUENT METALLISATION**

A frequent extruder combination is Ø 180/90/90/90/90mm. SML's largest CPP line has a net output of 20,000 tons per year.

Extruders from SML which produce CPP films for metallisation are additionally equipped with disc or candle filters. These large area filters are capable of eliminating even small gel particles at a differential

pressure of less than 30 bar. This avoids defects in the film after the subsequent metallising process.

**COST SAVINGS – FEWER SPECIALITY POLYMERS, FEWER ADDITIVES IN CERTAIN LAYERS**

SML uses 5-layer feedblocks, possibly in combination with a 3-layer multi-manifold die. This facilitates savings due to the optimum distribution of the layers and a de-

crease in layer thicknesses in the outer layers of the film. On the sealing side, special high-end metallocene sealing polymers are processed which provide a low seal initiation temperature and a good tack strength in the film. On the metallising side of the film, high performance but expensive PP ter-polymers are used, which ensure a good adhesion to the vaporised aluminium. A further cost advantage is derived from the reduced number of anti-block additives in the thinner outer layers.

**LESS EDGE TRIM**

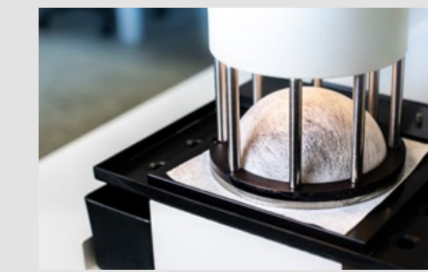
The production of extra-wide CPP films further minimises the portion of edge trim relative to the net film width which is produced. The inline feedback of the edge trim scrap by a scraptruder essentially contributes to the commercial success of the SML CPP film line.

**WINDING TECHNOLOGY BOOSTS EFFICIENCY**

For extra-wide CPP cast film lines, SML recommends its turret winder W6000 with a maximum outer roll diameter of 1,300mm.

The turret winder W6000 enables a roll length of 50,000 meters – 50km! – of 25µm film. Compared to the previous standard roll diameter of 1,000mm, the roll length is 75 % longer. A maximum roll diameter of 1,300mm is perfect for the subsequent metallisation in a state-of-the-art vacuum metalliser. "Bigger roll diameters are a major boost in production efficiency for the manufacturing of metallising CPP films. Due to longer running times at the metalliser, there are less roll changes with less film waste, when the metalliser is started or stopped and the vacuum is released or generated," Alexander Bruckmüller, Product Manager Cast Film Extrusion at SML, reports.

## DoubleCoat Process Avoiding pinholes in ultra-thin coatings



SML has found a way to prevent pinholes during the production of ultra-thin coatings. The enhanced DoubleCoat process allows the manufacturing of breathable functional film with exceptional properties on SML's FlexPack® lines. This opens the way for a range of new products, especially for the construction industry.

During R&D work to further optimise the adhesion between different layers utilising its patented DoubleCoat process, SML discovered a way to effectively avoid the emergence of pinholes. "Pinholes can occur in certain coating processes and they can be a problem especially in ultra-thin coatings. They occur when fibre ends from the cloth create micro holes in the coating layer," Mario Höllnsteiner, Product Manager for coating and lamination at SML, explains.

**HIGHER WATER COLUMN, LESSER WEIGHT**

The absence of pinholes especially gives lightweight composite structures extraordinary properties. "This allows, for example, the production of 40 gsm TPU coating layers with an unreachd high water column of more than 8 meters", Mario Höllnsteiner, continues. "Coating layers with such a water column usually have twice the thickness. Not least because of their better water vapour transmission rate, ultra-thin coating layers offer significant benefits," Höllnsteiner is convinced.

**LESS RAW MATERIALS, LESS COSTS**

Lower production costs due to a reduced raw material consumption represent a major economic benefit when it comes to lightweight composite structures. Also for that reason, ultra-thin layers are in great demand in the construction industry, i.e. for advanced types of roofing membranes. Apart from that, the DoubleCoat process is perfectly suited to applications like single-use protective clothing, where both water vapour permeability and the lightweight structure of the materials are a key issue.

**DOUBLECOAT – A FULLY DEVELOPED TECHNOLOGY**

With the "Pinhole-Challenge" solved, the way stands wide open for a further range of new applications and products, some of which still have to be discovered. Meanwhile, SML's patented DoubleCoat process is already established in the market: There are several FlexPack® lines equipped with the DoubleCoat process in operation at customer sites, another one about to be completed and one pilot line in SML's Technology Centre.

# Play-it-safe

100 % pre-tested before delivery



A central reason for our risk-conscious customers to go for an SML line is the fact that we are able to pre-test complete extrusion lines before delivery at SML's headquarters.

As Martin Kaltenecker, the Head of Sales at SML, says: "We live up to our slogan '100 % pre-tested' by making full assembly and function-testing before the delivery of all of our complex components,

such as winders or extruders for special polymers," says Martin Kaltenecker. Before leaving the production hall at SML's headquarters in Redlham, Upper Austria, all the important machine parts run on a test bench.

## IN-HOUSE-ACCEPTANCE BEFORE DELIVERY

Customers of complex, non-standardised machines in particular are increasingly making use of the opportunity to pre-test complete lines with their specific raw materials before delivery. This gives both parties a perspective for the quick commissioning of the line after it was finally set up at the customer's location. When pre-testing at SML, the customers have the opportunity to familiarise their staff with the new machine ahead of delivery. Samples can be produced before the start of production.

However, it is not always necessary to set up a complete line for pre-testing: "production-related tests on the demonstration lines in our Technology Centre are another option, enjoying increasing popularity among our customers". This means, that the time-consuming and costly complete set ups of customer systems at our site are no longer necessary for every project," Martin Kaltenecker explains.

## PRE-TESTS FOR PROJECTS AHEAD

In the next 12 months, several customers are pre-testing ordered lines before delivery at SML's headquarters. "At the moment, we are setting up a dedicated cast film line for the production of material for the medical sector. A 5.5m wide high-performance line for thin CPP films will follow in the 2nd quarter of 2021", Kaltenecker says. SML is currently developing a new Austrofil spinning line for the production of POY yarns from polyester for a customer. The complete line will also be tested in production conditions in the 2nd quarter of 2021. And in the second half of 2021, two extrusion coating lines for the lamination of nonwovens with thermoplastic elastomers and with polyolefins will be fully commissioned at SML's site. One of these systems is equipped with the DoubleCoat module developed and patented by SML.

## DEMONSTRATION LINES OPEN FOR INSPECTION

Apart from ordered machines which are set up for pre-testing, SML is running a number of production scale pilot lines for R&D and demonstration purposes in the Technology Centre of its headquarters. All of these machines are available for inspection and tests after consultation with the responsible sales and product managers.

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## Hot fill applications

# Foamed A-PET cups now heat-resistant up to 140 °C

SML is able to manufacture foamed A-PET sheet with a heat resistance of up to 140 degrees Celsius on its pilot line in the Technology Centre in Redlham. Beside its excellent thermal and mechanical properties, the material is 100 % recyclable.

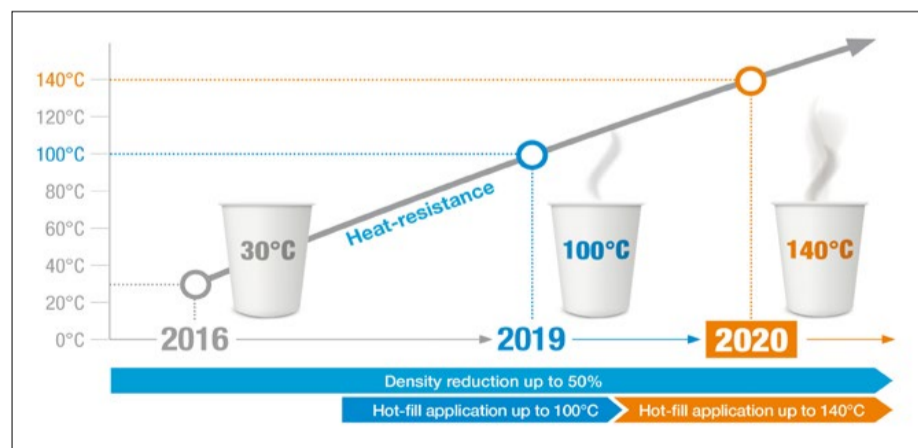
"Our innovation paves the way to new types of hot fill products, not least in areas where the heating-up of rather oleaginous foodstuff at extraordinarily high temperatures is required," Max-Phillip Lutz, Product Manager at SML, explains. Another promising application area is the sterilisation of cups for dairy products with hot steam immediately before the hot-filling process.

The R&D activities leading to the augmented heat-resistance of A-PET-Sheet were mainly inspired by customer demand. The Dutch thermoforming and mould machinery specialist, Kiefel Packaging B.V, is our partner for the development. Thermoforming trial series took place at their plant.

Apart from a heat resistance of up to 140 °C, products made from the thermoforming sheet manufactured on SML's pilot line display excellent properties in terms of

dimensional stability and heat insulation. "Hot fill applications thermoformed from this sheet can be used for heating in microwave ovens as well as for baking in conventional ovens. Holding a fully filled cup with hot oil of 140 °C in bare hands for a couple of minutes is no problem", says Max-Phillip Lutz.

Following the successful test series of heat resistant foamed A-PET sheet, SML is now undertaking promising trials in its Technology Centre to be able to manufacture a new type of foamed PP sheet.



## Events 2021

Due to the current situation we keep you up to date at [www.sml.at](http://www.sml.at)