



# TECHNOLOGY report

# SML

EXTRUSION LINES – ENGINEERED TO PERFORM ▶

LENZING | AUSTRIA edition no. 28 2/16



2 | A work in progress – the Austrofil FDY for PA6



3 | Innovative approaches to cast PP film production



4 | FlexiPET brings versatility to foamed PET

EDITORIAL



**Karl STÖGER**  
Managing Director

Dear Reader,

The upcoming “K” show will see the launch of yet another new SML stretch film line. Accordingly, some of you may well ask if the product life cycle of these lines is really so short? Well, the answer is no. In fact, SML is the only machine manufacturer in the world to offer and actually sell significant numbers of stretch film lines across the complete range of trimmed film widths between 1.5 and 6 meter.

Over the past few years we have renewed and rolled out models for 3-up, 6-up and 12-up production. The all-new PowerCast to be shown this year in Düsseldorf is an 8-up line that completes our product family, but does not replace other models. Nonetheless, the unique advantages of the new line concept, as described on the front page, may well impinge on the market share of some earlier lines, as to quote Voltaire: “Better is always the enemy of good.”\*

Foamed sheet was already a topic three years ago and in the meantime the technology has matured, and the trend has strengthened. Consequently, the new FlexiPET line, which is equipped with special melt treatment equipment, is a great success. Reducing density via gas injection is an intelligent means of saving costs and reducing environmental impact. Moreover, the trays and cups made from foamed PET sheet offer high stability and are nice-looking. Therefore, they are more than able of opening up new markets and applications for attractive and cost-effective packaging.

As usual, when a “K” show opens its doors, a wealth of innovations are on display and some of these are already described in this “Technology Report”. However, there are many more in store at SML. Therefore, please do not hesitate to contact us directly. I guarantee that we have plenty of additional new developments ready and waiting for you.

In this spirit, we look forward to hearing from you and I remain,

Yours sincerely,

\* “La Bégueule” (Contes, 1772)

## PowerCast completes SML’s stretch film line portfolio

**PowerCast** represents SML’s latest model for a 4m-wide (8-up) stretch film line. It offers high output and maximum flexibility for the production of 3-inch hand, machine and jumbo rolls on a top performance level. Furthermore, as is the case with all other SML cast stretch film concepts, it possesses a very compact design that cuts its footprint to a minimum and thus enables producers to optimise their production output per square metre.

The **PowerCast** 8-up rounds off SML’s broad range of stretch film lines comprising **MiniCast**® 3-up, **EcoCompact**® 4-up, **SmartCast**® 6-up and **MasterCast**® 12-up concepts. However, its use of a higher number of extruders is a major feature that sets it somewhat apart from the rest.

SML introduced the use of a higher number of extruder with its **SmartCast**® in 2013 and a **PowerCast** line incorporates no less than seven extruders, which facilitates the optimum adjustment of the raw material formulation to the required film properties through the minimised input of expensive, high-performance polymer material.



chill roll unit

In addition, in order to meet the market’s requirement for a “**simpler machine that is easy to operate and requires minimum maintenance**”, SML has come up with an innovative concept for film cooling. The new chill roll unit only has one main roller with a 1,600mm diameter. This dimension provides a cooling capacity, as well as an extended contact area, which are more than adequate for the maximum extruded output. Moreover, as no secondary chill roll is needed, a pump, nip roller and

guiding rollers have also been omitted, thus reducing both the cost of equipment and servicing.

Line power consumption has been significantly reduced by means of the employment of energy-efficient, high-speed and standard extruders in relatively small sizes in combination with heat-insulated adapters and edge trim recovery using a vertical scraptruder.

Last, but by no means least, flexibility with regard to film thickness, recipe changes and film width is clearly an absolute must for film manufacturers. Accordingly, the **PowerCast** winder W4000-4S meets this need in full and can easily handle 8 x 500mm, 9 x 450mm and 10 x 400mm films without additional trim waste.

### WINDER W4000-4S FEATURES

- For 3-inch hand, machine and jumbo rolls
- Thin core technology
- 4 shafts per turret; an index angle of 90°
- Secondary contact roll
- Cycle time of just 25 seconds
- Ultimate short tail -> zero waste roll
- Simultaneous automatic roll handling and core feeding

**Thomas RAUSCHER,**  
Product Manager Cast Film Extrusion



# The *FlexPack*<sup>®</sup> demonstration line more than meets expectations

SML listens to its customers and with them accepts the challenges involved in pushing technologies up to the next level. In this spirit, it has skilfully engineered the *FlexPack*<sup>®</sup> extrusion coating and laminating concept, which forms the basis for a new demonstration line that has been in operation at the company's premises in Lenzing since April 2016.

SML's expectations were high with regard to the new line, but even these were quickly surpassed. Customer interest has also been considerable, which has resulted in the line being in virtually constant use for trial runs and the joint development of new products. Moreover, the flexibility of the *FlexPack*<sup>®</sup> concept has been frequently confirmed by positive client feedback.

## AND WHAT ARE THE SECRETS OF FLEXPACK'S SUCCESS?

First and foremost, that it is based on decades of experience in the extrusion field, which in tandem with the extensive knowledge of the SML team provides a formula for exciting product developments and improvements.

This expertise is reflected by the demo line's ability to handle a wide range of raw

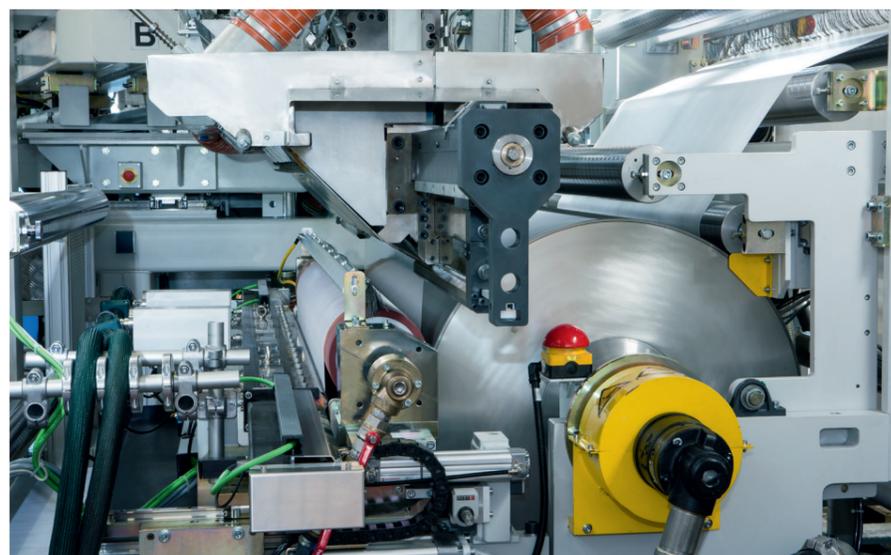
materials such as PP, LDPE, EVA, EAA, etc. In addition, a separate screw is available for TPUs that induces low shear. *FlexPack*<sup>®</sup> is also capable of operating with a diversity of coating processes. Extrusion coating and lamination in combination with a water-based primer as well as lamination with hotmelt are all possible, not to mention SML's new DoubleCoat process, which incorporates hotmelt and extrusion coating.

## DOUBLECOAT TECHNOLOGY IS A KEY FACTOR

DoubleCoat plays a significant role in the new *FlexPack*<sup>®</sup> line and extensive test runs have shown that previous restrictions with respect to layer thickness have been overcome. Above all, DoubleCoat technology offers major advantages with regard to monolithic, breathable coatings, furnishing excellent bondage between TPU/TPE and PP nonwovens and thus avoiding the need for expensive PET nonwovens. Membrane pinholes caused by the nonwovens are also prevented and this permits the downgauging of functional membranes to less than 7 g/m<sup>2</sup>.

## DOUBLECOAT + FLEXPACK = PRODUCT DIVERSITY

On the bottom line, these advances add up to a wealth of product possibilities that include flexible packaging based on pa-



*FlexPack*<sup>®</sup> DoubleCoat technology

per, film and aluminium foil substrates, as well as technical applications.

In addition, the DoubleCoat and *FlexPack*<sup>®</sup> combination is not only suited to the manufacture of soft touch hygiene products such as breathable film for femcare articles, but also hospital clothing with very high breathability and protection against bacteria and viruses. Furthermore, properties that include low weight, elasticity, water-tightness and breathability offer an opportunity to move outdoor textiles into a new dimension and create fresh applications. Therefore, should you have new

ideas or products to be tested on SML's *FlexPack*<sup>®</sup> demonstration line, feel free to get in touch. We promise to do everything possible to ensure that your expectations are also more than met.

### BASIC MACHINE DATA:

- 2 main unwinders with widths of 700 to 1,650mm
- Water-based primer station
- Ø 90/33D and Ø 60/33D extruders
- Die width of 850 to 1,850mm
- New DoubleCoat technology

**Mario HÖLLNSTEINER,**  
Product Manager Coating and Laminating

## A stretching unit for today and tomorrow

In order to meet both current and future market requirements, SML has developed a new mono-axial stretching unit for the production of breathable films. The unit is equipped with a film intake device for easy start-up, which is assisted further by a new A-shaped line layout that also simplifies servicing. The top mechanical speed at the outlet section is 500m/min and the rugged construction with enlarged roll diameters allows us to offer the line for a maximum primary film width of up to 4,200mm.

The gap between the two stretching rolls is infinitely adjustable via a motor. This feature allows the influencing of film properties and alterations to the stretching gap to meet individual product requirements. All the rolls in the stretching unit are driven and temperature-controlled individually in order to provide the maximum flexibility needed for ideal processing parameter settings.

The unit is equipped with its own control unit, which makes it suitable for both retrofitting into existing lines, or use as an offline stretching system. The next development step will involve the adaptation of the unit for the production of MOPP/MOPE/MOPET and oriented barrier films.

# A work in progress – the Austrofil FDY for PA6

SML is working on the adaptation of its best selling Austrofil HT 4x2E line series to the spinning of polyamide 6 into medium- and high-tenacity yarns. Initial trials have delivered highly promising results, which is most encouraging, as this development would open the door to additional production possibilities using the Austrofil HT line.

## WHAT FACTORS NEED TO BE CONSIDERED?

PA is hygroscopic and therefore for first phase trials, or the production of small lots, pre-dried PA6 is available from most resin suppliers in hermetically sealed aluminium bags. Otherwise the granules have to be pre-dried to less than 400ppm.

When PA6 is employed on standard PP lines extruder output for PA6 is limited to 90kg/h and the spinneret cross-section requires a different design to that used for PP. Special filters must be employed in the spinning packs to achieve an appropriate melt pressure and naturally enough, the choice of spinnings oil and

masterbatch must be appropriate for PA. SML has also selected new godets that are suitable for PA6 processing.

## INITIAL TEST RESULTS

On the basis of trials with 800 to 1,700 denier yarns with a dpf of approximately 5 to 8, tenacities of 7.5 up to 8.5 g/den have been achieved using PA6 materials from BASF. We have also

seen that especially during start-up, but also production, a certain amount of monomer fume is developed at the spinning beam. Therefore, it has proven advisable to install a monomer suction unit above the spinning section. SML is able to perform test runs for the evaluation of different granule types, masterbatches and spinnings, and thus recommend production parameters to its customers.



This enables entry into PA6 production in order to assess the situation with regard to the placing of an additional yarn product in the market.

For more details please contact  
our R&D department:  
**Christian MOSER; (moc@sml.at)**  
Product Manager,  
Multifilament Spinning

# Innovative approaches to cast PP film production

In view of its large volume and consistent growth rates, the worldwide market for laminated or metallised CPP film with printed BOPP and BOPET films is highly attractive. Therefore, technical development is progressing extremely rapidly, not only among machine suppliers, but also raw material and film manufacturers.

The increasing speeds of packaging equipment demand optimised CPP cast films with the improved sealing properties provided by surface layers containing special polymers. For example, an extra-thin sealing layer consisting of a PP-based elastomer is utilised, which provides a particularly low seal initiation temperature and a wide hot tack and sealing window.

Another requirement of the packaging industry is improved bonding of the film with aluminium during the vacuum metallisation process. This demand can be met through the extrusion of an especially thin adhesive layer of less than 1.5µm thickness with excellent chemical affinity to aluminium. Such a design improves the oxygen barrier and thus provides a decisive improvement in the shelf life of packaged foods.

## WHICH SOLUTIONS DOES SML OFFER?

SML's cast film lines fulfil these requirements through an increase in the number of layers to six, whereby a multi-manifold die in combination with feedblock technology is employed.

In addition, extruders are provided that have been optimised to match these special materials. The SML system offers multifarious setting possibilities, which enable the thickness of the functional layers to be reduced with resultant material and cost savings. In order to enhance film quality, SML systems are fitted with large area filters. This additional measure ensures that high-end, CPP films also meet the high quality standards required for exports to high-end markets.

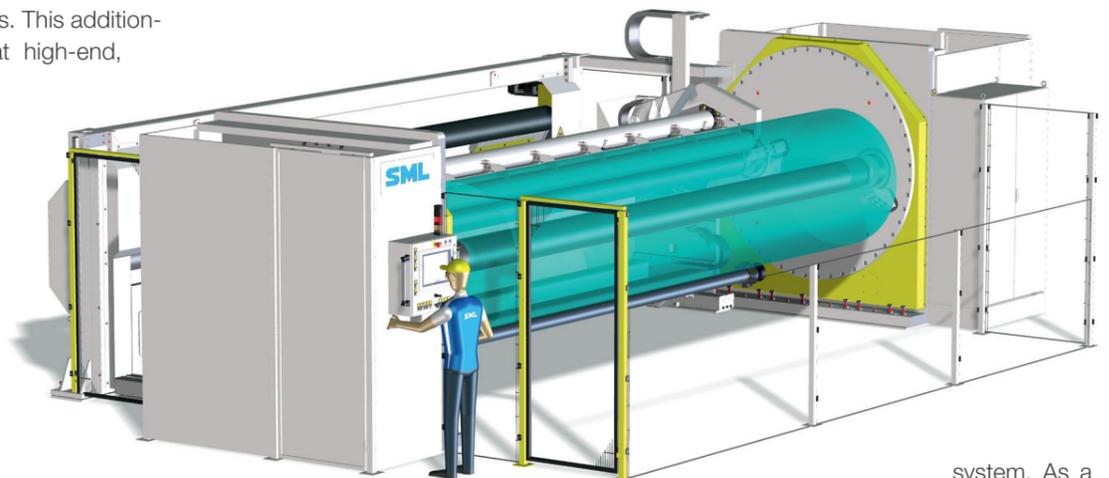
To cater for rising demand, the trend is towards wider and faster equipment. Therefore, SML CPP lines are manufactured with flat die widths of up to 7m and maximum net outputs of 2,000 kg/h. Such performance levels not only demand outstanding solutions in the extrusion area, but also with regard to winding technology.

## THE EFFICIENT WINDER GENERATION W6000

The new SML CPP winder W6000 is a turret winder that is built for a maximum contact roller width of 6.8m. The weight of the finished roll can be as high as 8,500kg, while the maximum roll diameter is 1,300mm. The winder W6000 is designed for mechanical speeds of 300 m/min

and is suitable for films in the 18 to 100µm thickness range.

Accurate film winding is of special importance owing to the aforementioned modifications to the structure of CPP films. Therefore, the design of this winder is fo-



winder W6000

cused on the winding of a first class, full-width mother roll on 12-inch steel cores. After storage for roughly fourteen hours for post-crystallisation purposes, this roll is further processed using downstream slitters and vacuum metallisation units.

The main aim of this design was the creation of an affordable solution that offers technical solidity and robustness. However, no compromises have been made with regard to winder components of decisive importance to quality.

The technical highlights of the winder W6000 include the sensitivity of the winding process, which is achieved by gearless, direct drives/torque motors in both winding stations and an ingenious tension regulation concept. In addition the winder is fitted throughout with low-friction, mass-minimised carbon fibre reinforced guide rollers. The contact roller is run in a slide system in line with the increasing diameter of the windings and a low-mass contact roll is employed with a special damper

system. As a result, lower contact pressures are also possible with higher line speeds. Furthermore, the feed angle of the film to the contact roller can be altered using a motor-adjusted satellite roller, which allows the hardness of the film roll to be effectively influenced.

With this new winder generation, SML recommends itself as a competent supplier of modern and competitive priced high-performance equipment for the production of innovative CPP films of export quality.

**Robert PREUNER, R&D Manager**

# The first US-compatible stretch film line is up and running in record time

In September, Sigma Plastics went into production with the first SML cast stretch film line for the US market. The 9-up line with a width of 180" (4.5m) was built to UL specifications and following modifications to meet state code

requirements was installed by SML at Sigma's Riverside facility in California.

Adjusting the line design to meet Californian demands was a straightforward process owing to the fact that SML sup-

plies machinery to countries worldwide, including the USA, and employs many standard components that are already UL-approved. More difficult and key to the award of the order was the gaining of Sigma's confidence that SML, a new supplier for the group, could complete the project on schedule and provide seamless training and support in the post-commissioning period.

Accordingly, in order to simplify planning for Sigma and provide SML with greater control over the schedule, the film line was offered with a turnkey package that included delivery, installation and putting into operation. In combination with SML's all-inclusive approach to line supply, which involves the shipping of all inter-connecting components such as pipe-work and cables along with the line, this resulted in both a minimal workload for Sigma's personnel and rapid assembly and start-up. In fact, less than twelve

weeks elapsed between the arrival of the shipping containers on site and the commencement of production.

With the line now in full operation, an SML field engineer based in Los Angeles, which is within an hour's drive of the Riverside plant, is available for ongoing support. As well as offering technical and operational back-up, he is also assisting Sigma's maintenance personnel as part of SML's commitment to help customers minimise operating costs.

SML extrusion lines are a familiar sight at production plants around the globe and with its first cast stretch line now in operation in the USA, the company is looking to further expand its business in North America with the same combination of winning features.

**Mark JONES, Business Development and Customer Support North America**



# FlexiPET brings versatility to foamed PET

Earlier this year SML introduced a new and highly successful process for the production of foamed PET sheet using a conical, twin-screw extruder and a CO<sub>2</sub> gas injection system.



The manufacture of physically foamed PET requires that special attention is paid to melt treatment. Accordingly, this was an absolute priority during the design of the melt preparation equipment.

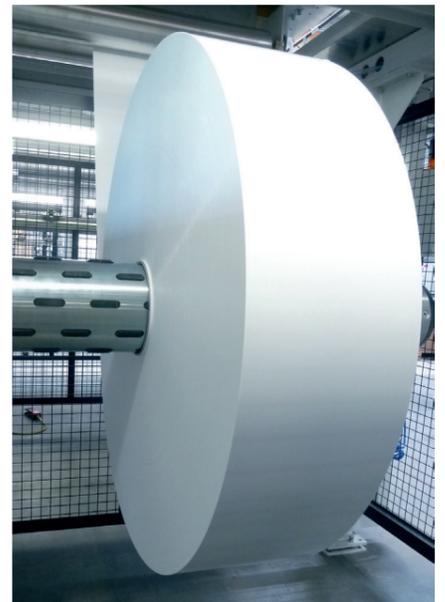
The main 90mm conical, twin-screw extruder has a maximum output with PET of 1.4 t/h and can process everything from 100% virgin granules to 100% regrind or bottle flakes. One critical advantage of the conical, twin-screw extruder is its very large inlet opening. This makes it ideal for the processing of a high percentage of regrind, even with low bulk density.

The 75mm single-screw co-extruder has a maximum output of 300 kg/h. The roll stack and further downstream equipment

have a roll width of 1.4m, which provides a net, edge-trimmed width of 1.1 to 1.2m. The line itself is highly versatile and can handle production switches between foamed sheet, solid sheet, cast film or laminated PET/PE with minimum change-over times. Foamed PET sheet (3-layer) with a total density of 0.7 to 0.9 kg/dm<sup>3</sup> makes an ideal and cost-effective product for the thermoforming of lightweight cups and trays.

Following successful in-house testing at SML and a factory acceptance test together with the client, the first FlexiPET line was shipped out and installed at the customer's plant, where it has been in full operation since the beginning of August.

**Roland HÖRLESBERGER,**  
Product Manager Sheet Extrusion



physically foamed PET sheet

## COMING SOON! A line for thick PET sheet production!

PET has the highest growth rate of any material in the thermoforming business area and most of the PET sheet produced has a typical thickness of approximately 200 to 800 microns. Occasionally, this range stretches to 1.2mm, but very rarely to thicknesses of 1.6 or 2mm.

This situation is due primarily to the fact that as compared to PP or PS, the production of thick PET sheet with good optical properties is very de-

manding upon both sheet line design and process parameters. In order to produce excellent, thick PET sheets it is vital that the raw material be suitable with regard to IV and crystallising speed. In addition, the PET must be dried perfectly prior to melting and the viscosity of the melt has to be kept as high as possible during the entire extrusion process. The melt must also be handled carefully on its path from the extruder to nip of the roll stack, which

has to be suitably designed for thick PET sheets.

SML's new line for thick PET will have a main 135mm single-screw extruder with a maximum output using PET of 1.0 t/h. As an option this extruder can also be fitted with an integrated vacuum system. The 75mm single-screw co-extruder offers an output with PET of max. 300 kg/h. The roll stack consists of SML's newly designed,

slanted, upstack unit, which has 1.4m wide rolls that provide a net, edge-trimmed sheet width of 1.1 to 1.2m.

The PET sheet thickness range extends from 200 to 2,000 microns and the line is also designed for the production of physically foamed PET sheet. Furthermore, it is equipped with a new IR lamination system for the production of PET/PE laminates.

**A demonstration line with this configuration will be available for trials in the second quarter 2017.**

ADDRESSES

**SML - Head Office**  
Bundesstrasse 1a  
A-4860 Lenzing, Austria  
Phone: +43-7672-912-0  
Fax: +43-7672-912-9  
E-mail: sml@sml.at  
www.sml.at

**SML - Machinery Far East Sdn Bhd**  
(1029958-P)  
1201 Block B, Menara Amcorp  
No.18 Jalan Persiaran Barat  
46050 Petaling Jaya  
Selangor, Malaysia  
Phone: +60-3-7955-9098  
Fax: +60-3-7955-9981  
E-mail: yen@sml.at

**SML - Moscow Office**  
Ogorodny proezd, 5  
Building 6, office 504  
127254 Moscow, Russia  
Phone: +7-495-618-8007  
Fax: +7-495-619-5961  
E-mail: kna@sml.at

**SML - Beijing Office**  
Unit 1410, Landmark Tower  
No. 8 North Dongsanhuan Road  
Chaoyang District  
100004 Beijing, P.R. of China  
Phone: +86-10-6590-0946  
Fax: +86-10-6590-0949  
E-mail: sml@sml.bj.cn



## Dirk Beckendorff is the new Area Sales Manager for Germany

We are pleased to announce that Dirk Beckendorff has joined SML as the Area Sales Manager for the German market.

In view of his twenty years of experience already gathered while working for SML in the company's former agency in Germany, Dirk Beckendorff is ideally suited to providing the continuity essential to serving what is an important SML market. For as

he himself observes: "In view of its highly specialised film industry companies, Germany represents a lead market for SML worldwide. Indeed, many important developments in the SML product range have emanated from the requirements of German manufacturers."

For SML, this new constellation means even more intensive support for its German customers. As apart from the specialists at SML headquarters in Lenzing/Austria, Dirk Beckendorff is now available

fulltime at the SML sales office in northern Germany near Osnabrück. Consequently, SML can respond with greater flexibility to requests for short-notice meetings in both the north and south of the country.

Indeed, as Head of Sales, Martin Kaltefleiter, notes: "The dynamic German market has always been one of SML's most important sales regions and with the full support of Dirk Beckendorff we are able to further extend our position in future."

EVENTS 2017	EVENT	LOCATION	BOOTH No.	DATE
	ARABPLAST	Dubai	6C120	January, 7 - 10
	INTERPLASTICA	Moscow	H8.1 A16	January, 24 - 27
	KOPLAS	Korea		March, 7 - 11
	ICE	Munich	Halle A6, Stand No. 554	March, 21 - 23
	INDEX	Geneve		April, 4 - 7
	CHINAPLAS	Guangzhou		May, 16 - 19

**IMPRINT**  
**Publisher: SML**  
 Bundesstrasse 1a, A-4860 Lenzing  
 AUSTRIA  
 Phone: +43 7672-912-0  
 Fax: +43 7672-912-9  
 E-mail: sml@sml.at, http://www.sml.at  
 © Date: 10. 10. 2016  
**Editor-in-chief: Bettina KREUZER**  
 Marketing Assistant, E-mail: krb@sml.at