

**A global story of success:
25 years Austrofil® HT spinning machines**

To date, 200 Austrofil® HT machines are worldwide in operation. Production stability at maximum speeds and excellent yarn qualities are the key features of SML's Austrofil® HT machines. But how did everything begin?

About 30 years ago, the rising demand for high-tenacity sewing yarns from the upcoming big bag industry stimulated creativeness among a small group of engineers at Starlinger & Co GmbH, until today the leading supplier of machinery for woven fabrics and sacks. The existing expertise in extrusion inspired the development of a multifilament spinning plant for PP yarn – Austrofil® was born. In the course of the foundation of SML in 1995, SML took over the Austrofil® spinning technology segment from Starlinger. From then on, it was SML that continued to develop it further and further. "Today, Austrofil® is more than a strong pillar in SML's product portfolio. Over the years it has become an internationally acknowledged brand that stands for quality, the highest yarn tenacities, yarn consistencies and flexibility,"

Julian Bammer, Product Manager of Austrofil® spinning at SML, comments.

HOT-AIR OVEN FOR PRODUCTION STABILITY

For the Austrofil® brand, the application of the unique hot-air oven technology plays a key role in its success. This is used to get the maximum tenacity out of the last stretching step. It enables an unbeatable HT production stability at the highest speeds, even when converging so close to the physical limits of the plastics. Achieving a maximum molecular orientation is simply the result.

WIDE RANGE OF APPLICATIONS FOR MULTIPLE MARKETS

Today, the applications of Austrofil® HT machines vary considerably. Aside from the original production of sewing yarns for big bags, the synthetic filaments find their utilisation in ropes, filters, belts, carpets, seals, bags, hygiene articles, nets, and many other textiles. It is among others, the huge titer range from 150 – 4000 den, that allows – in one shot – access to a variety of different markets.

STANDARDISED MACHINE CONCEPT

The production and further-development of Austrofil® HT spinning machinery is based on a highly standardised machine concept, intelligent in-house manufacturing, and the close relationship SML enjoys with its sub-suppliers. All of this ensures the shortest delivery times. As per forecast, 16 types of Austrofil® HT machines will be shipped to customers in 2021.

MAKING THE NEXT STEPS FORWARD

Constant technological innovation is a key characteristic of the Austrofil® brand. In the next months, SML will make inroads into new market segments with newly invented spinning machinery: An Austrofil® plant for the production of high tenacity PA6 yarns will be installed following close and long term trials with the customer. This year, two efficient production plants for polyester POY and MDY yarns will also start operation with a total capacity of almost 13 to/day, in response to the market need for ATY and DTY machinery to make quality yarn. To produce the well-known PP MDY yarns in the smaller denier ranges more economically, SML has developed a 24-end (3x8) production plant that will demonstrate its skills as of October 2021 at the customer's site.

► 02 Ultra-thin stretch film from PIR and PCR: Downgauging as a solution for a circular economy

► 03 SML's FlexPack® – Coating technology for extra-thin coating on paper

► 04 Electrical design & engineering: 100 % in-house

Editorial

Karl Stöger
Managing Director



Dear Reader!

Welcome back to another edition of our TechReport. As always, we are in good spirits and looking forward to interesting months ahead. The plastics industry is going strong despite having recently gone through an unprecedented period of turbulence. Demand has overtaken supply for a growing range of products. Raw materials are in short supply and (too) expensive. Capacity bottlenecks with regard to ocean freight are resulting in prolonged delivery times. We expect that the coronavirus pandemic, that has wreaked so much harm in the past 1 ½ years, has now reached its peak and shall continue to abate as enough vaccines become available.

On the global political scene, commitments have been renewed and ambitious targets have been set to cut carbon dioxide emissions by the end of the current decade. It is our firm conviction that "plastic solutions" can play a significant role in the reduction of CO₂ emissions to curb climate change. Some of the powerful arguments in favour of plastic are: lightweight components save energy, the excellent protection of goods provided by plastics helps to avoid wastage, the durability of the plastic material itself and the possibility to manufacture the resin from renewable resources. With the further development of a circular economy for plastic materials, we will be able to manage more material in a closed loop. SML is adapting all of its extrusion lines to process recycled materials and we will continue to develop technologies for the use of high percentages of post-consumer recovered plastics.

Inside this TechReport, we touch on various topics across our product range. Enjoy browsing through to find articles that trigger your interest.

Take care!



**Extrusion lines –
engineered to perform**

In conversation HIPAC-CEO Daniele Giorlando on stretch film production

The HIPAC Group is a European manufacturer of premium stretch film for industrial packaging. With its headquarters in Northern Italy and with further production sites in Spain and Romania, the HIPAC Group has a production capacity of around 140 k tons per year and an annual turnover of more than 130 mil. euros. As a long-term customer, HIPAC-CEO, Daniele Giorlando, granted SML this interview:

HIPAC offers a wide range of different types of stretch film for industrial packaging. Which key properties must stretch film have today to be successful in your markets?

HIPAC Group's strategy, and the key to its success, has always been the development of a portfolio of premium stretch films with ultra-low thicknesses. This reduces the consumption of film by 50 % per unit of wrapped package, while maintaining the same performances as standard films. For our users, this means a cost reduction of 30 %.

How important are flexibility and / or high production volumes for you?

Again and again, the stretch film market demands for increasingly customised products. This has led to the need for

more versatile products which can also enable a fast service. Over and above all of that, it should not be forgotten that the HIPAC Group operates in a "commodity" market where, in order to be competitive, it is critical to have efficient plants ensuring high productivity levels.

As a manufacturer located in Europe, how important are cost-efficient production processes at HIPAC, especially with regard to raw material consumption, energy consumption or personnel costs?

Compared to such emerging countries as those of the Middle East and Asia, Europe is absolutely not competitive in terms of manufacturing costs, especially in terms of energy and labour costs.

The HIPAC Group's strength to face such a scenario is its capacity to make products with a very high value-added, while using the best technology available in the market. This also helps us to reduce the costs.

Which role do post-industrial and post-consumer recycling play at your sites?

The use in our productions of recovered raw material, such as PCR and PIR, has been rapidly increasing. There are, however, still numerous issues to settle at



Daniele Giorlando, CEO
HIPAC Group

producer offering very advanced technology with whom we could establish a long business relationship; a producer who could satisfy our needs and turn them into a customised and very advanced technology.

How many stretch film lines from SML are in operation at your sites today, and where do you see the strengths of the systems made by SML?

Together the HIPAC Group and SML have carried out eight projects so far, including plants currently running and new, planned investments. Without any doubt, the strength of SML is the reliability and high quality of its lines without neglecting energy efficiency.

Five years from now which attributes will a stretch film line have to have to satisfy the demands of your markets?

Answering this question is not an easy job because the market changes very quickly. Without any doubt, matters such as the circular economy, the sustainability of products and the use of no virgin material will increasingly drive the choice of our customers. Therefore, technologies should develop accordingly.

each level of the supply chain, from the poor availability of resources, to the quality of the latter and, let's not forget, the uncertainty of current regulations on this matter.

When did you buy the first stretch film line from SML and what were your motivations?

The HIPAC Group bought its first SML line almost ten years ago after carefully selecting between different manufacturers at world level. We were looking for a

Ultra-thin stretch film from PIR and PCR: Downgauging as a solution for a circular economy

Downgauging and recycling play a key role when it comes to making stretch wrap film environmentally friendly. SML's SmartCast Infinity line is now ready for ultra-thin stretch film of only 10µm with up to 80 % post-industrial recyclate (PIR). For manufacturing pre-stretch film with a thickness of 8µm, SML has developed a specific recipe for post-consumer recyclate (PCR).

The new formulations for the manufacturing of ultra-thin stretch wrap films from PIR and PCR are the fruit of intensive R&D work: in 2020, SML succeeded in producing film with an ultimate elongation value of 400 % by using up to 80 % PIR. "We started our trials with a film thickness of 23µm. Following the first positive analyses, we began to reduce the thickness step by step," Thomas Rauscher, Product Manager for Cast Stretch Film, explains. Finally, 10µm film with a high content of PIR could also be realised and qualified. "Looking at these results, downgauging with PIR is also a solution. The film's quality is totally in line with market requirements and the

optical properties are excellent," Thomas Rauscher adds.

FIELD TESTED: STRETCH FILM FROM PCR

The use of post-consumer recyclate is technically more challenging than the manufacturing of ultra-thin stretch film from PIR. With high-quality PCR, SML reaches re-feeding rates of up to 60 % on its SmartCast Infinity lines. However, in a sustainable circular economy, where cast stretch films are frequently recycled, a general recommendation is a ratio of 30 % PCR in combination with 70 % virgin material. Beside the use of post-consumer recyclate, it is downgauging which really further increases the environmental compatibility of stretch wrap film with PCR. "In our trials on our SmartCast Infinity line, we used PCR to manufacture different stretch wrap films from 23µm down to 12µm for jumbo, machine and hand rolls. Subsequently, these products were then tested and utilised by end-users – with very positive feedback," Thomas Rauscher comments.

PCR FOR PRE-STRETCHED FILM

"Pre-stretch film" is becoming increasingly important with regard to safe film usage. The usual thickness of the final product ranges from 6 - 9µm. This makes pre-stretch film an ideal solution, e.g. for logistics and warehouses, where it can help to make processes more eco-friendly by drastically reducing film usage. Based on the model employed to manufacture "conventional" pre-stretch film, SML has developed a specific PCR-recipe for film that can be pre-stretched offline in a secondary process. The film developed by SML has 16µm and was pre-stretched down to a final 8µm. Tested at different customer sites, the film met all of the quality and usability criteria. "Generally, the processing of PIR and PCR produced very good results, both in in-house tests and also with regard to



The film's quality is totally in line with market requirements

direct feedback received from consumers. This gives sound cause for optimism, that a working circular economy can be achieved in this segment in the foreseeable future", Rauscher concludes.

Extrusion lines –
engineered to perform

Case study on PET foamed products Saving production costs by 20 %

Common case studies from SML and the thermoforming specialists Kiefel B.V. on the manufacturing process of PET foamed products confirm 20 % lower production costs, compared with articles from conventional thermoforming sheet. And raw material consumption is even reduced by more than 30 %.

"The use of foamed sheet in the thermoforming process for applications like hot-fill cups or MAP trays does not only help to cut overall production costs. In the light of the ongoing discussions about consumers' plastic footprint, easy-to-recycle foamed PET sheet can be a sustainable alternative to conventional thermoforming sheet", Max Phillip Lutz, Product Manager Sheet Extrusion at SML, says. APET foamed regrind from skeleton and edge trims can also be used up to 100 %. To prove these statements, SML and its co-operation partner has conducted the following case studies on APET foam cups and foamed MAP trays.

VERIFIED TESTS ON SML'S MULTI-PURPOSE SHEET LINE
The foamed sheets in the case studies

were produced on the state of the art multi-purpose sheet line with output capacities of up to 800 kg/h foamed sheet, installed at SML's Technology Centre. Calculations of the manufacturing costs for the sheet production were based on raw materials (mixture), additives, energy consumption and manpower. The thermoforming was done on advanced thermoforming machinery (KTR 5.2 Speed, KMD 78.2 Speed and KMD 85 Speed) with common thermoforming tools. For the thermoforming process, the calculations were based on tool investment, energy consumption and manpower.

FAST CHANGEOVER FROM FOAMED TO RIGID SHEET

SML's PET sheet lines for foamed APET sheet are also capable of producing conventional APET sheet for thermoforming applications. The changeover time between rigid and foamed is less than 20 min.

PET foamed products are part of a new generation of plastics products which are ready to demonstrate their benefits in two major fields: in raw material consumption and recyclability.



MAP trays

Description: MAP (modified atmosphere packaging)
LxWxH: 190x145x50 mm
Application: Food Packaging, e.g. meat, cold cuts etc.

	Tray rigid	Tray foamed
Weight of product	18,8g	12,5g
Material consumption	100 %	66 %
Production cost	100 %	77 %

Samples available on request

This significant decrease in the costs of the production of MAP trays is mostly related to two main factors:

1. Saving raw material
2. Reduction in the heating power required for thermoforming

APET foam cups

Description: Hot fill cup (up to 100 °C)
Ø x H: 82 mm x 81 mm
Application: Hot food packaging

	CPET cup	APET foam cup
Weight of product	6,6g	4,9g
Material consumption	100 %	74 %
Production cost	100 %	89 %

Samples available on request

With APET foam cups, the decrease in costs is mostly related to two main factors:

1. Saving raw material
2. High thermoforming performance



SML's FlexPack® Coating technology for extra-thin coated paper

Although easy-to-recycle mono-material packaging from plastics may be more eco-friendly than paper or cardboard laminated with plastics, there is a clear market trend towards paper-based structures. The ability to coat ultra-thin polymer layers is crucial for the manufacturing of eco-friendly composites for packaging. Not least because of its extraordinary melt quality, extrusion coating lines from SML are already well-established in the market for thin coatings.

To further develop material properties according to meet the requirements of a highly dynamic packaging market, suppliers of raw materials and packaging producers have joined forces with SML. "We are experiencing a strong demand for functional paper and cardboard coatings," Martin Kaltenecker, Head of Sales at SML, explains. These composites, developed on machinery from SML, contain a minimum of polymers, based on one polymer family, for example polyolefins, green PE, or PLA. In this way complex structures with additional materials, such as aluminium foil, can be avoided.

HOMOGENOUS MELT QUALITY AS A BASIS

In general, the extrusion coating process is an ideal way to apply polymers to papers with the highest possible efficiency in an environmentally friendly process. This happens without solvents and with-

out the need to invest a lot of energy in the drying of water-based glues. "Ever since our extrusion coating systems have provided a very homogeneous melt quality for thin layer coatings at defined processing temperatures," Johannes Danter, Product Manager Extrusion Coating and Laminating, comments. Depending on the substrate, coating layers can be as thin as 5µm. Different film functionalities are reached in one step with the correct choice of materials in the co-extrusion process.

ULTRA-THIN 3-LAYER STRUCTURES
Extrusion coating lines from SML are able to process special polymers, which

offer strong adhesion properties to substrates like paper, and which form an effective barrier layer. On the other hand a good sealability and "hot-tack" need to be achieved. As a result, well known coating structures can be simplified to ultra-thin 3-layer structures. Their special features are substantially important to allow a waste recycling stream back to paper and to fulfill the latest packaging regulations. By adding sophisticated thin films, such as SiOx, AlOx coated or metallised films from a secondary unwinding station, paper-based packaging materials with an increased barrier functionality can be produced in one production step on SML's lines.



Paper-based packaging cannot do without coating

ESTABLISHED TECHNOLOGIES FOR NEW TYPES OF PRODUCTS

Packaging products made from laminated paper or cardboard, like stand-up pouches for noodles, meat packaging trays, drinking and yoghurt cups, as well as packaging for chocolate or even quick-frozen vegetables are becoming more and more popular in the supermarkets. Extrusion coating technology, as provided by SML, is the basis for these types of products.

Electrical design & engineering:

100 % in-house

From the first steps in planning to the commissioning of the line on the factory floor

SML has emphasised its high engineering competence ever since. The design and construction of the electrical equipment in SML's extrusion lines, from circuit diagrams to control cabinets, exclusively take place at the company's headquarters. SML's in-house electrical design department guarantees maximum flexibility to accommodate customer requirements through short decision paths, in-detail documentation during the whole lifespan of a line, and the reliability of perfectly coordinated systems.

"There is no advanced machinery without appropriate cabling. For that reason, electrical design plays a central role in the construction of our extrusion lines", Dieter Pachinger, Team Leader of Electrical Design at SML, emphasises. Beside its key role, the overall and detailed planning of all electrical installations, SML's electrical design department acts as an interface between several company sections such

as R&D, the mechanical design department and the automation department. Although all these divisions are located next door to each other at SML's HQ, communication is highly standardised, digitalised and automated.

FAST REACTIONS ON CHANGING DEMANDS

The automated processes and the undisturbed flow of information favour fast decision-making during all production stages: From the first steps in planning to the commissioning of the line on the factory floor. SML's electrical design department uses EPLAN P8 software to create assembly diagrams, circuit diagrams, terminal connection tables as well as wire lists and parts lists.

Field engineers at the customer's site steadily communicate with the electrical design department at SML's HQ via the EPLAN attached and the cloud-based software eVIEW. Among other things, this allows in many cases flexible adaptations on the factory floor virtually at the very last minute.

SAFETY FIRST

Machinery from SML always is 100 % compliant with the national safety regula-

tions of the respective country. The technical basis for that is SML's freely programmable safety control in conjunction with modular safety installations. The increased complexity of country-dependent regulations for personnel and machine safety has a significant impact on electrical components and the circuit diagrams. Meanwhile, most of SML's machinery is equipped with a safety-PLC.

FULL LIFE-TIME DOCUMENTATION

SML sets a clear focus on long-term relationships with its customers: All the relevant electrical data of an extrusion line manufactured by SML is archived during the whole lifespan of the system, which is designed to be in operation for more than 25 years. Customers benefit from the continuously updated electrical documenta-

tion, especially when it comes to the extension or the retrofitting of extrusion lines in operation.

DATA-BASED AUTOMATISATION AT SML

At the construction of extrusion lines, data collected and prepared in SML's electrical design department plays an increasingly significant role. Above all, for the automation of specific production steps. For example: the mounting panels of SML's control cabinets are now designed in 3D with the software ProPanel, which generates CNC files and transfers them directly to a Perforex machine. This machine drills and mills the openings of the mounting panels in an automated manner. Compared with the manual processing of the panels, the savings of working hours is more than 50 %.



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SML's onsite-assignments hit record high

Despite travel restrictions due to the pandemic, a record-number of field engineers are working at sites abroad.

"Regardless of the increased bureaucracy involved for both our customers and for us, we are proud to report that we are able to send our staff to nearly every country worldwide without significant limitations", says Wolfgang

Kirchgatterer, Head of the Customer Service Center. Apart from many European countries, staff members from SML are currently working in states like Brazil, the United States, Russia, Saudi-Arabia, India, China, Malaysia, and Indonesia, to name but a few. On the one hand, SML's customers expect the field engineers to arrive on time at their location in order to start and carry out the installation of recently delivered extru-

sion lines. Another group of customers requests urgent on-site service visits, when remote assistance would not provide sufficient support. Regardless of the pandemic, all of the customers of SML can count on the excellent on-site assistance which they have come to expect. With this in mind, SML wants to thank all of its field engineers for their willingness to travel despite restrictions and quarantine regulations.

Events 2021

Due to the current situation we keep you up to date at www.sml.at