

▶ **PET sheet**

Sheet Lines



Keeping you
in top form

If your needs include the highest levels of visual appearance, PET sheet lines by SML are the right answer every time. We keep a reasonable balance between well proven technologies and technical innovation.

We at SML are happy to advise our customers on how they can design their specific production setup even more efficiently. This applies regardless of whether the project involves trays, blister packaging, cups and lids for the food industry or whether the aim is to set new benchmarks in other sectors such as pharmaceuticals and medicine.

Whatever you require, SML's PET sheet lines mean moderate capital expenditure, along with a high output and ease of operation.

Experience first-class options

For SML, only supplying the line is not enough, we accompany our customers for as long as they need us. Our repertoire covers a huge array of customisable options with a maximum of flexibility – including three different extrusion concepts with thickness ranges from 150 µm to 1,800 µm and net widths up to 1,930 mm as field-tested standards. But SML is also well-known to put the limits further. All lines include highly advanced roll stack technologies, various winding systems as well as several options for co-extrusion and lamination.

In this context, we make sure that the best line concept for the raw material source is always the one used. This has proven to be an over-whelming success, with our customers enjoying decisive production advantages as a result. After all, SML is one of the leading suppliers of sheet extrusion lines for high-grade PET sheet.



Making the best use of material loops

Closing the material loop up to 100 % recycling will be increasingly important in the future. PET is particularly suitable to this task as one of the few raw materials that is available world-wide at a defined quality as recycled material.

Comfortable to control

SML offers winding concepts with different grades of automation in terms of roll and core handling. Together with the SMILE control system this enables customers to operate SML lines with a minimum of manpower. The analysing tool bitWise supports the constant optimisation of production processes.

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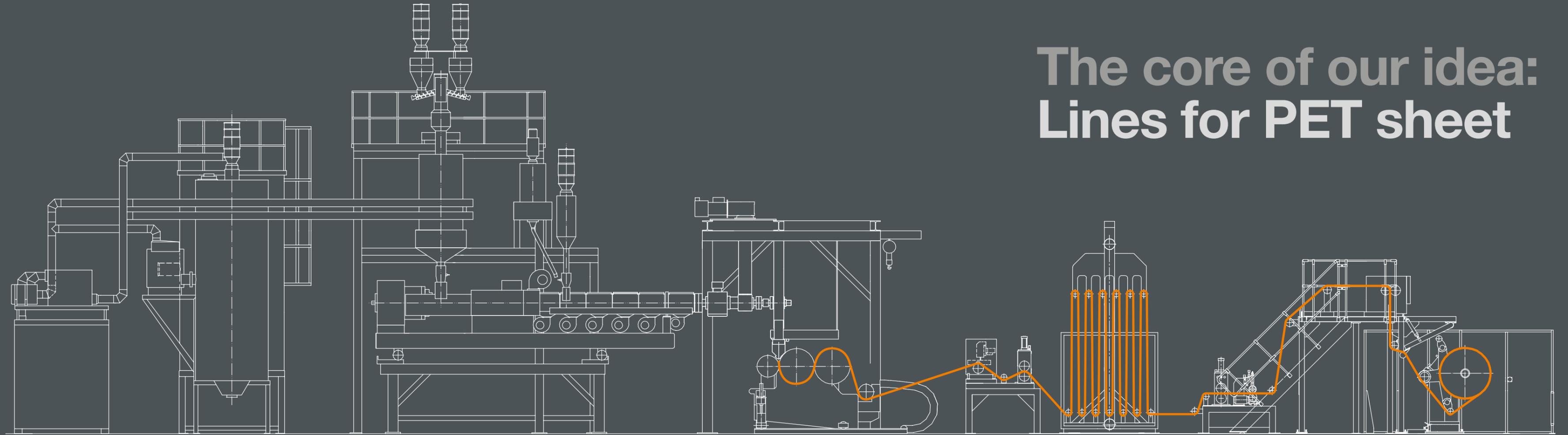
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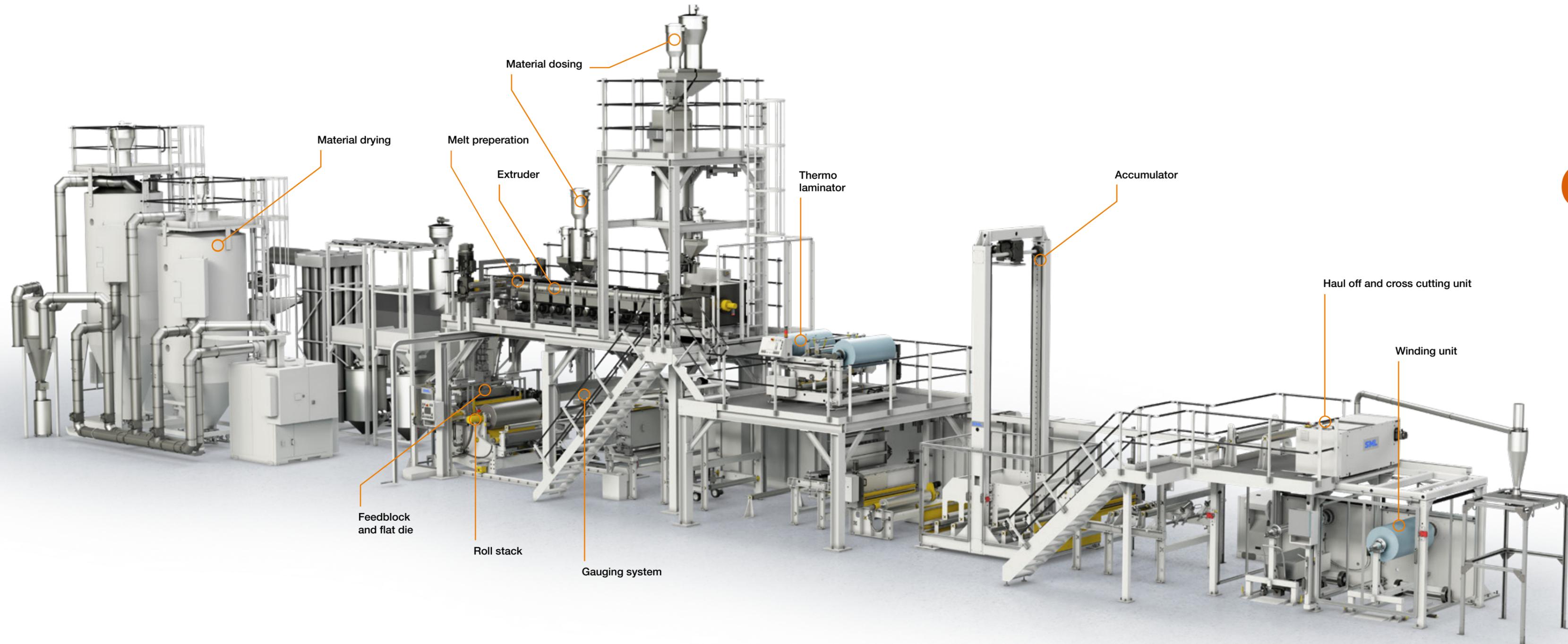
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PET sheet

The core of our idea: Lines for PET sheet





Overview

Plug and Play with a proven classic **ClassicPET – Sheet extrusion** with pre-drying and single screw extrusion

SML's ClassicPET is the perfect choice if you don't want to bother much with material mixtures and still produce top-quality sheet. This long-proven line configuration is robust and very comfortable to operate.

Discrete single-screw extruders combined with drying equipment, the ClassicPET represents a typical co-extrusion unit for the production of standard structures. It is especially suitable for high-quality sheet and can be upgraded in order to comply with the regulations of European (EFSA) and US authorities (FDA). An extraordinary advantage: **It is also suitable for the manufacturing of foamed sheet in various configurations.**

Drying systems

According to this single-screw extrusion concept, the raw materials are pre-dried through dry air drying systems (in combination with infrared (IR) dryers). In the dry air process, the individual components are dried separately, which provides a maximum of flexibility regarding mixture changes. When drying A-PET regrind, the amorphous flakes have to be pre-crystallised in the IR dryer or agglomerated in a separate unit. Conventional SML dry air drying systems can be suitable for processing PET-G as well.

In combination with IR-drying, the main components such as flakes and different types of regrind materials can be pre-mixed. After that, they are pre-dried in an IR-dryer before being further dehumidified in a conventional dry air dryer. Another advantage is gained from the ability of the IR-dryer to crystallise the regrind material in the same process. To add additives to the main material, small blenders are mounted just above the inlet of the extruder. The ClassicPET sheet line cannot be overfed and requires very little maintenance.

Your Advantages

- ▶ **Robust, technically mature and easy-to-operate**
- ▶ **Minimised reduction of intrinsic viscosity**
- ▶ **Maximum flexibility towards product changes**
- ▶ **EFSA, FDA approved**



Standard extruder

In general	ClassicPET 1	ClassicPET 2	ClassicPET 3	ClassicPET 4	ClassicPET 5	ClassicPET 6	ClassicPET 7	ClassicPET 8
Line width [mm]	1,050	1,050	1,200	1,400	1,650	1,800	2,000	2,200
Max. possible net width [mm]	800	800	950	1,150	1,380	1,530	1,730	1,930
150 µm/app. net output kg/h	590	590	700	850	1,000	1,190	1,270	1,420
500 µm/app. net output kg/h	670	840	860	1,300	1,310	1,550	1,490	1,500
1,000 µm/app. net output kg/h	670	840	860	1,130	1,310	1,550	1,440	1,460
1,200 µm/app. net output kg/h	670	800	860	1,040	1,310	1,460	1,410	1,230
1,800 µm/app. net output kg/h	650	650	680	830	1,130	1,100	1,130	1,050

Customised lines possible on request.

Keeping high quality at 1st sight...
and 2nd ... and 3rd ...

RecyPET – Recycling extrusion

(VACUREMA® System)

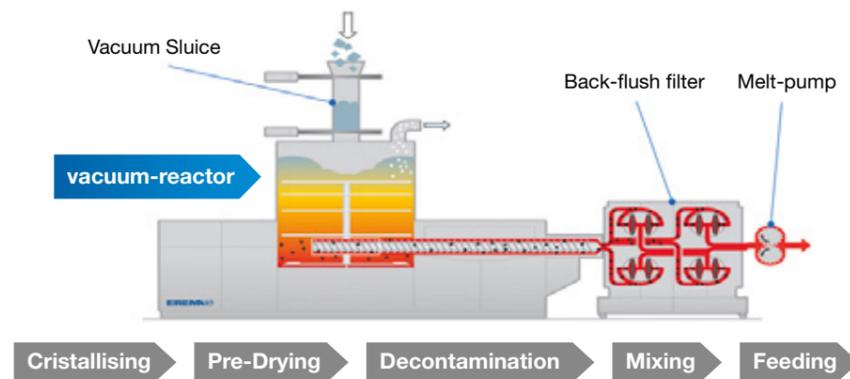
With RecyPET, a joint development of SML and EREMA, you benefit from two successful Austrian mechanical engineering concepts at the same time. This line configuration is ideal for large portions of recycled material.

The fact that recycled material can be processed into food-safe mono-packaging has to be one of the greatest developments of our times. SML's RecyPET does exactly that. In combination with the compact VACUREMA® system, it is ideal for processing PET bottle flakes and regrind. The advantages: **No conventional pre-drying of the input material and a low energy consumption.**

EFSA & FDA approval possible

The process complies with the regulations of European (EFSA) and US authorities (FDA). It is especially suitable for the decontamination of post-consumer bottle flakes and therefore appropriate for producing single (mono) layer PET sheet for direct food contact purposes in high output ranges.

Vacuum Reactor + Single-Screw Extruder - RecySHEET



VACUREMA Extruder

Patented pre-treatment in fine or medium vacuum

In its key components, the system consists of a vacuum reactor, which is linked directly to a single-screw extruder. The patented pre-treatment at an elevated temperature and in a medium vacuum before the extrusion process, removes moisture and migration materials from the feedstock very effectively. From the reactor, the hot material is fed under vacuum into the single-screw extruder which does not require a degassing port.

Discrete dosing unit for pre-mixing

For processing mixtures containing different materials, such as bottle flakes, regrind and virgin granules, the components are first premixed in a separate dosing unit and then fed into the reactor. Additives are injected directly into the extruder by a side feeder behind the material inlet zone.

Your Advantages

- ▶ EFSA/FDA approved process
- ▶ Patented vacuum reactor for pre-treatment
- ▶ Field-approved recycling technology

	In general	RecyPET 1	RecyPET 2	RecyPET 3	RecyPET 4	RecyPET 5	RecyPET 6	RecyPET 7	RecyPET 8
Line width [mm]		1,050	1,050	1,200	1,400	1,650	1,800	2,000	2,200
Max. possible net width [mm]		800	800	950	1,150	1,380	1,530	1,730	1,930
150 µm/app. net output kg/h		590	590	700	850	1,020	1,130	1,280	1,420
500 µm/app. net output kg/h		830	940	1,110	1,350	1,690	1,800	2,030	2,260
1,000 µm/app. net output kg/h		820	660	790	960	1,150	1,480	1,440	1,600
1,200 µm/app.net output kg/h		510	580	690	830	1,000	1,110	1,260	1,400

Customised lines possible on request.

Complexity & simplicity – not a contradiction

FlexiPET – Twin-screw extrusion

The name says it all. With FlexiPET, you can use a huge number of different polymers. The simple yet elegant complexity of this sheet line makes changeovers work quickly and easily.

Conical twin-screw extruders imply a highly advanced technology for a maximum of flexibility in the case of polymer changes. While you have longer changeover times with other systems, the FlexiPET manages switches very quickly. Furthermore, it is able to process a wide range of different polymers such as virgin and regrind PET granules, PP or PS.

PET production with or without pre-drying

Depending on the moisture level in the raw material and the required sheet quality, PET can be processed without pre-drying, which has a positive effect on total energy consumption. When material is additionally pre-dried before processing, the IV loss is lower and the values for AA-content and yellowing are exceptionally good, which results in a superior sheet quality from the same material.

100 % food grade sheet from bottle flakes

By combining the conventional pre-drying of washed bottle flakes with the medium vacuum on the conical twin screw extruder, this system complies with the regulations of European (EFSA) and US authorities (FDA). Thus, washed PCR bottle flakes can be directly converted into “excellent quality – 100 % food grade sheet”.

Optimised feeding through conical design

Owing to their ability to control the precise filling rate of the extruder, gravimetric loss-in-weight dosing units are generally employed with twin-screw extruders. The conically shaped twin-screw extruder is larger at the inlet than the screw diameter at the outlet, which provides advantages relating to the material's feeding ability. Hence the pressure build-up is significantly higher than that of a parallel twin-screw extruder. This effect opens the way to operations using a backflush filter without the need for an additional melt pump in front of it.

Your Advantages

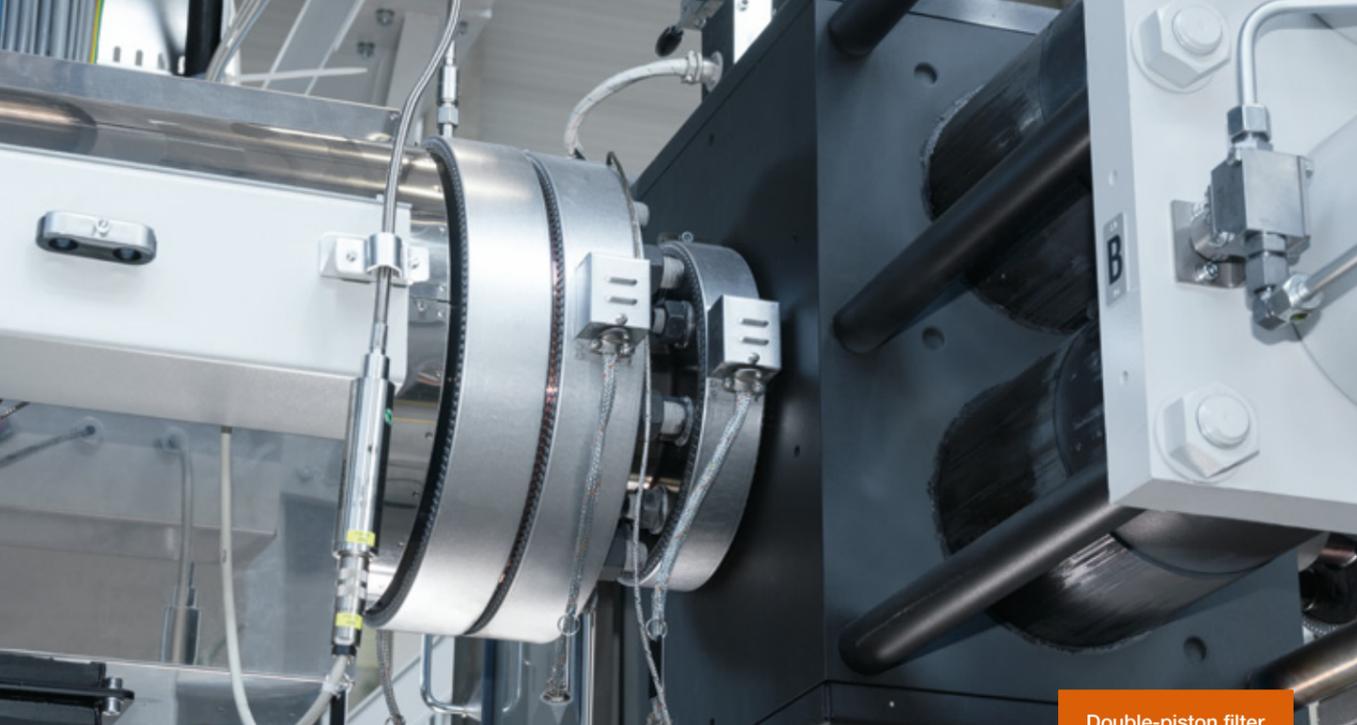
- ▶ Multifunctional extrusion system
- ▶ Optimised energy consumption
- ▶ EFSA/FDA approved process



Twin-screw extruder

In general	FlexiPET 1	FlexiPET 2	FlexiPET 3	FlexiPET 4	FlexiPET 5	FlexiPET 6	FlexiPET 7	FlexiPET 8
Line width [mm]	1,050	1,050	1,200	1,400	1,650	1,800	2,000	2,200
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150 µm/app. net output kg/h	590	590	700	850	1,020	1,130	1,280	1,420
500 µm/app. net output kg/h	590	930	940	1,350	1,390	1,410	1,420	1,430
1,000 µm/app. net output kg/h	570	910	930	1,130	1,400	1,410	1,420	1,430
1,200 µm/app. net output kg/h	590	800	860	1,040	1,380	1,390	1,410	1,430
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Customised lines possible on request.



Double-piston filter



Back flush filter

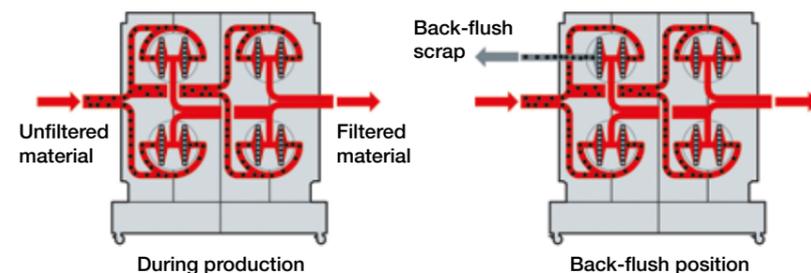
How we deal with impurities Filtration system

SML provides different types of filters, in-line with the specific extruder design and the level of impurities expected in the raw material.

- ▶ Single-piston, hydraulically actuated discontinuous filters
- ▶ Double-piston (2 or 4 cavities), hydraulically actuated continuous filters
- ▶ Backflush filters with up to 12 cavities
- ▶ Laser filters

In order to guarantee a stable pressure and a good melt homogenisation in front of the die, all of SML's PET sheet lines are equipped with melt pumps and static mixers.

Schematic drawing 8-cavities back-flush filter



Ready for special applications Feedblocks and flat dies

As a leading supplier of high-quality PET sheet lines, SML relies exclusively on renowned partners for its feedblocks and flat dies. All of our systems are basically configured for the production of a 3-layer A/B/A sheet structure with thin outside layers.

- ▶ Only virgin material is used to process the two outside layers, while recycled material is employed in the middle layer. This avoids contact between the packaged goods and the recycled material – complying with the food contact regulations of most countries.
- ▶ Application of anti-block additives only in the thin outside layers, helping to keep production costs low.
- ▶ Production possible with various additives like Masterbatch or foaming agent, just in the core layer.
- ▶ Manufacturing GAG sheet (PETG/APET/PETG).



Tool unit with a melt pump, static mixer, feedblock and flat die



Die splitting system

Details that matter

Feedblocks integrated in the PET sheet lines are available for processing up to nine layers as a standard. They are ready for special applications, i.e. for functional layers such as barrier and peel or seal layers.

SML provides manual and automatic flat dies with special features such as lip heaters or compound angles, for a minimum distance between the die and the roll stack. Dies are usually deckled with external or internal deckles or a combination of both. The SML die splitting system guarantees the quick and safe opening of the flat die for cleaning purposes.

Your Advantage

- ▶ Configurable for the manufacturing of various sheet structures
- ▶ Die splitting system for fast and easy cleaning
- ▶ Approved technologies from renowned partners

Outstanding technology for a clear edge

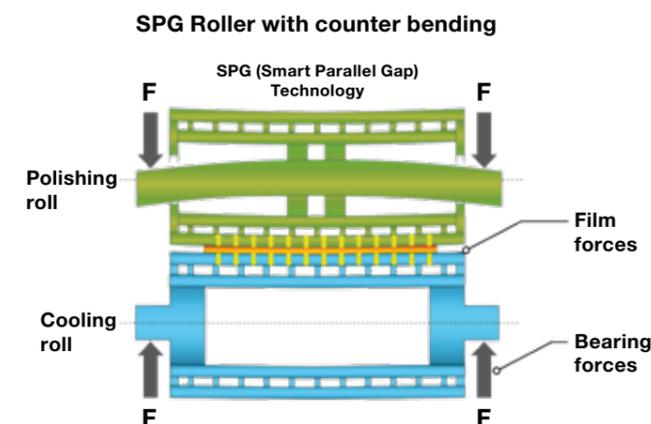
Roll stack

SML's roll stacks are operator-friendly and very easy to adjust and the process stability is reached swiftly. All of the roll stacks for PET sheet are equipped with the specially designed SPG (Smart-Parallel-Gap) C0 polishing roll for superior thickness tolerances.

Superior heat transfer

The main cooling roll and the secondary cooling roll have very thin outer shells. Due to an optimal heat transfer, they enable a highly specific output. All of the rolls at the roll stack are hardened, chromium plated and polished to a high-gloss mirror finish. Each roll is equipped with a separate water temperature control system and an individual, highly accurate drive system.

The maximum mechanical speed depends on the basic line configuration and factors such as the extrusion capacity, width and thickness range. SML sheet lines for PET are available for mechanical line speeds up to 100 m/min. Depending on the sheet thickness and output, additional post cooling rolls can be mounted on the roll stack for optimised outputs.



Horizontal roll stack

Horizontal roll stacks for thermoformable PET

For the typical thermoformable PET sheet thickness range, we recommend a horizontal roll stack which offers significant advantages:

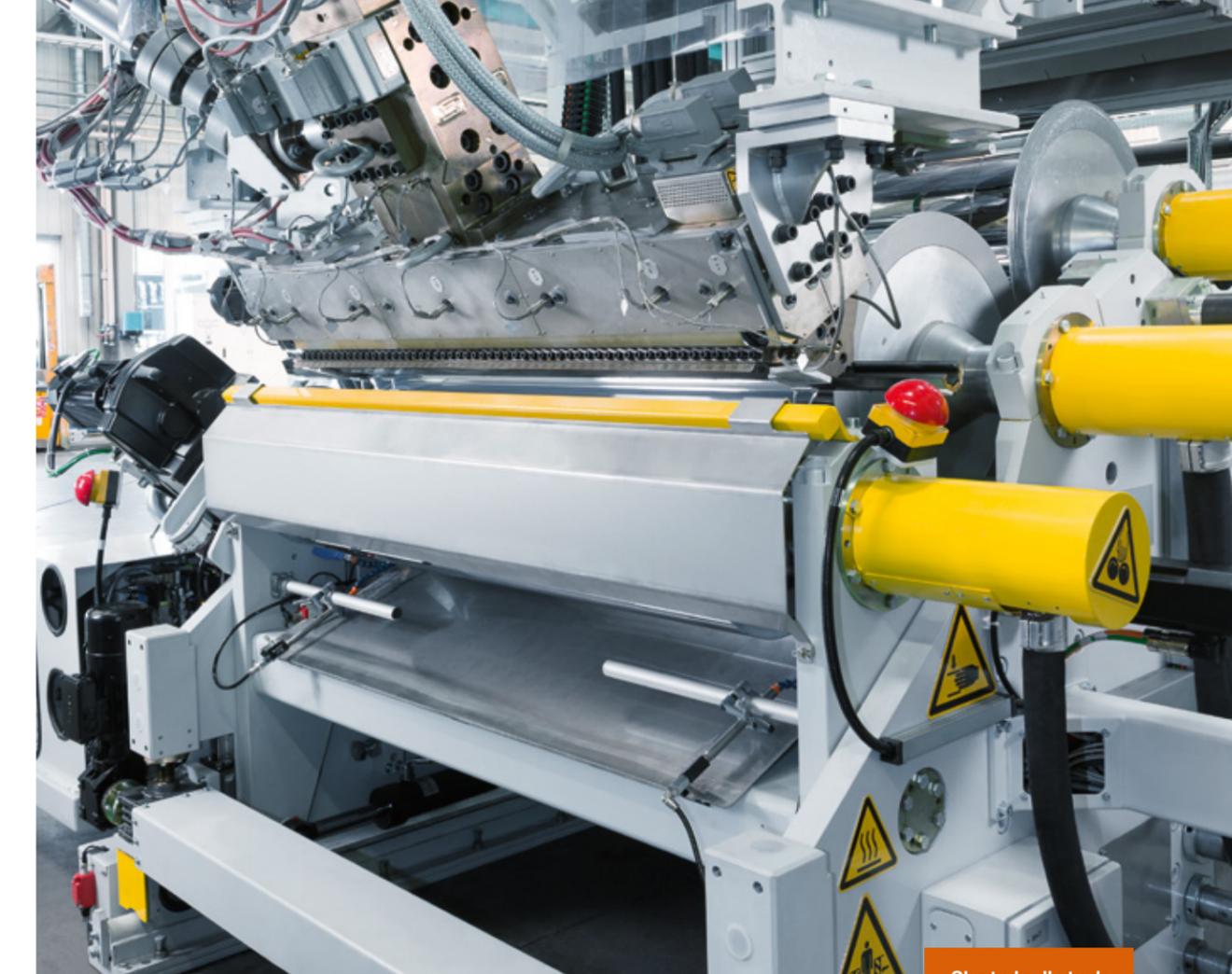
- ▶ Superior sheet surface quality thanks to the optimised positioning of the melt bank
- ▶ Vertical melt exit – the melt is not pulled over the edge of the die lip
- ▶ No sagging of the melt before roll contact, as can happen with vertical roll stacks
- ▶ Minimised internal stress in the sheet as the melt is not cooled by roll contact before it enters the gap

Slanted roll arrangement for thick sheet

For very thick sheet, SML supplies roll stacks with a slanted roll arrangement – which is the optimal design for these products. In combination with an elaborated temperature control, the slanted roll arrangement developed by SML guarantees the smooth production of PET sheet up to 1,800 µm.

Manual vs. motorised gap adjustment

In its standard designs, SML offers gap adjustment using manually adjustable spindles with scales and readings. As an option, motorised gap adjustment is available with AC servo motors driving the spindles. Adjustment parameters are displayed on a touch screen in the control panel on the roll stack and stored in the SMILE control system. A very useful optional feature is the nip load measurement system, which shows the actual pressure (N/cm²) in the polishing nip, online. The motorised gap adjustment system supports operating personnel in strictly following production specifications – making changes in production very fast and easy to implement at the operational level.



Slanted roll stack

Your Advantage

- ▶ Smart Parallel Gap – SPG polishing rolls
- ▶ Outstanding thickness profile
- ▶ Smooth processing of PET sheet up to 1,800 µm

Your choice of gauging

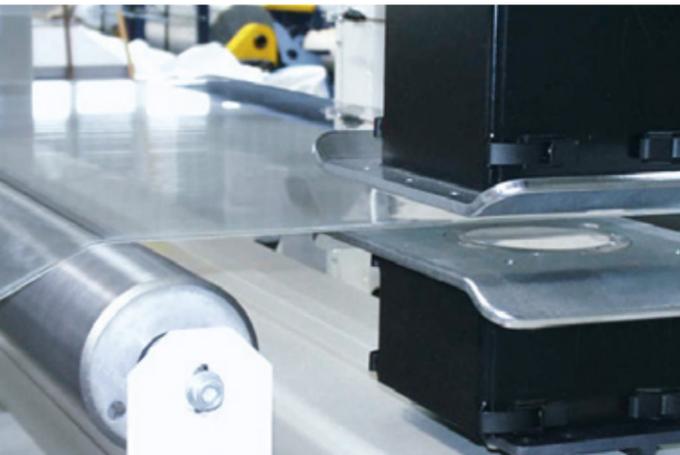
In response to the various local regulations and to specific requirements in production, SML supplies different automatic gauging systems.

- ▶ Inductive / capacitive sensors
- ▶ Air caliper systems
- ▶ Radioactive Beta-ray sensors (Kr 85 or Sr 90)
- ▶ X-ray sensors
- ▶ Laser shadow

All of these systems are available for dies with manual adjustment or automatic profile control. They are equipped with a control unit to regulate the speed of the main cooling roll C1 – in order to maintain the value of the thickness setting in the machine direction.



Inline thickness measuring unit with an inductive / capacitive sensor



Inline thickness measuring unit with a Beta-ray sensor



Edge trim cutting

Edge trim cutting

Edge trims are cut off using static blades or motor-driven circular knives. A precise cut is required for an excellent winding quality. The edge trim is usually pulled into an inline grinder. The regrind is then either filled into big bags for interim storage or refed directly to the main extruder via a conveying screw mounted above the extruder inlet opening.

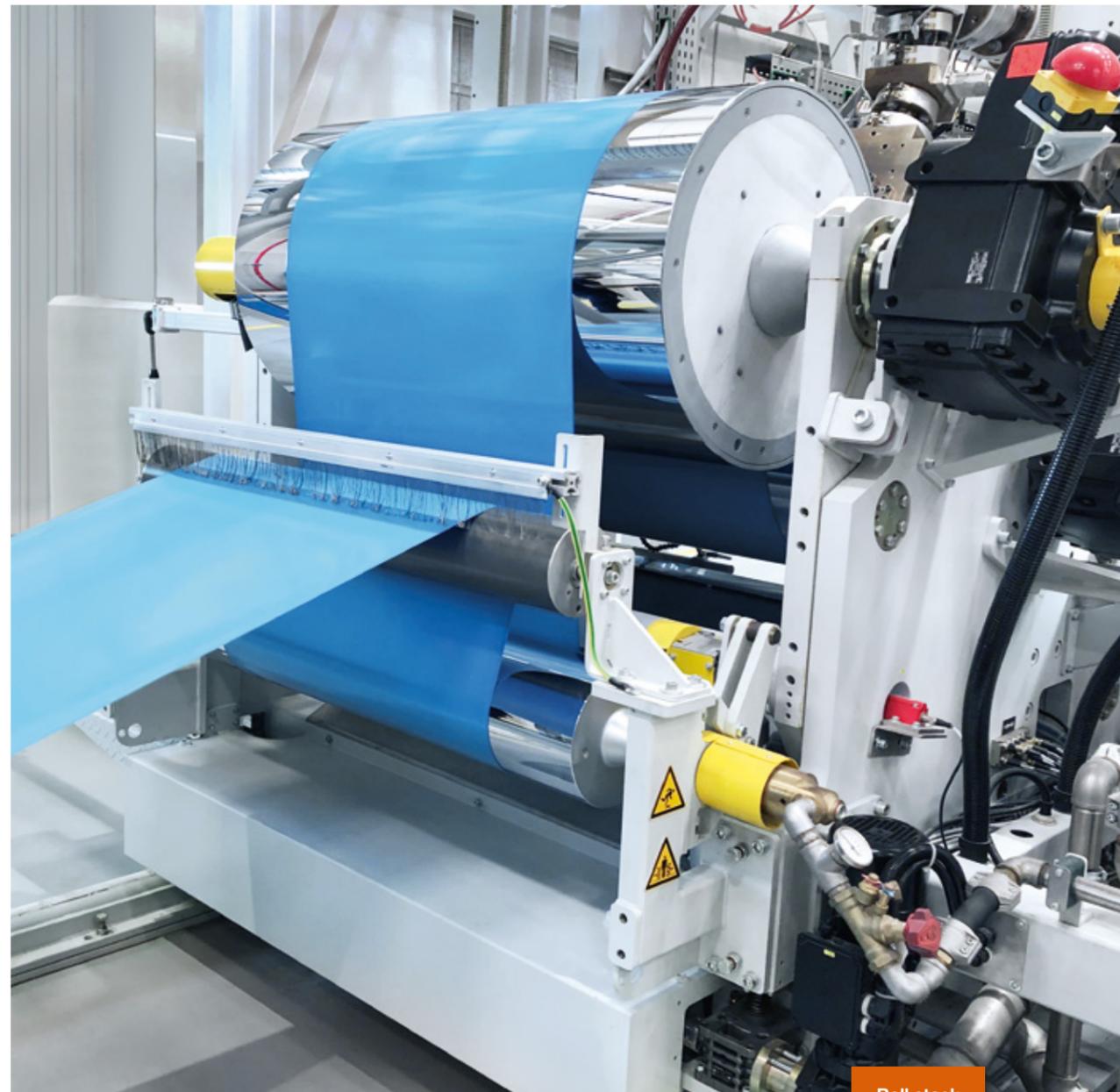


PET sheet products



An evolution for the market Production of foamed PET Sheet

Until now, PET was not considered suitable for cups and mugs filled with hot food and drinks, as it deforms and becomes unstable at high heat. Now things have changed. At SML, we are constantly pushing the limits of what is feasible. And we can prove it with our PET sheet extrusion lines for the production of foamed A-PET sheet.



Roll stack

The result is a new and innovative production method for PET sheet undergoing a thermoforming process to create trays and cups for high-temperature applications in a material-saving and cost-effective way. Just what this price-sensitive market needs.

Material savings

Foamed PET sheet produced with machinery from SML saves on raw materials by up to 40 % due to its lighter weight than usual PET sheet. This is a key property for the economic production of low-weight cups with excellent insulation properties.

Unparalleled results in hot-fill applications

The production of the 3-layer A/B/A sheet, where the middle layer is foamed is done physically with the injection of nitrogen or carbon dioxide. The foamed PET sheet can be used especially for hot-fill applications such as cups and trays and scores with excellent dimensional stability and heat insulation.

Operator-friendly technology

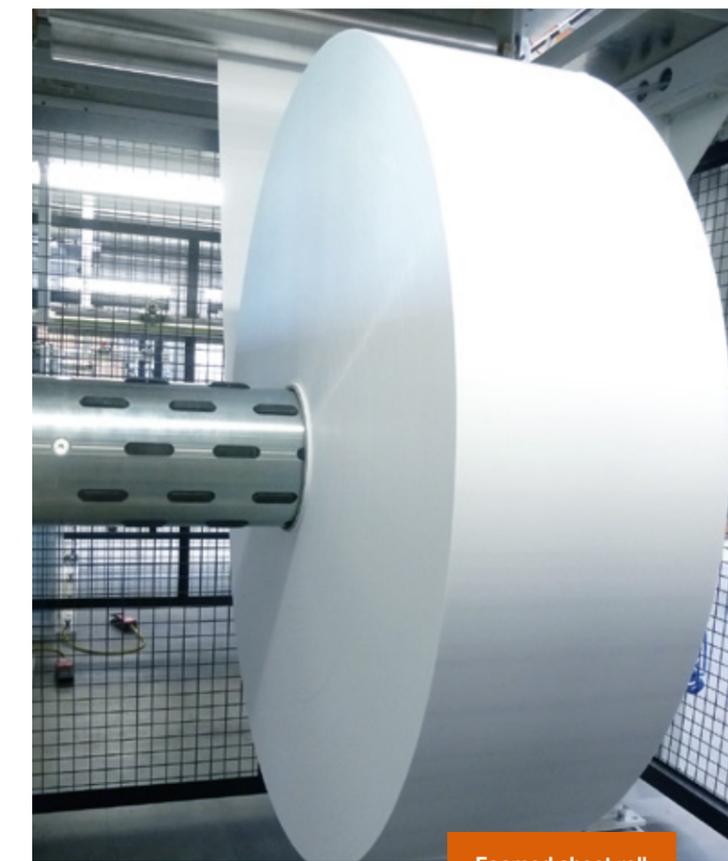
SML applies different foaming methods, depending on the type of extruder. Post-consumer PET bottle flakes can be used as a raw material for the foamed core layer together with virgin and regrind PET. Regardless of the foaming method applied – SML only delivers comprehensive, field-tested and operator-friendly foaming solutions with unparalleled sheet qualities.

Your Advantage

- ▶ 40 – 60 % less weight than conventional PET sheet
- ▶ Perfectly useable for hot-fill applications up to 140°C
- ▶ Exceptional heat-insulation, rigidity and surface feel



Cross section 3-layer sheet with a foamed middle layer



Foamed sheet roll



Foamed PET sheet products



Get the best out of your production

Winding systems

SML's customers can select from a wide range of different semi- and fully-automatic sheet winding systems for PET.

All winders for PET sheet are designed and manufactured in-house by SML. They have a proven track-record for longevity and outstanding properties in terms of technical precision, reliability and operability.

Semi-automatic sheet winders

Semi-automatic sheet winders are known for their excellent production reliability at an attractive price. They are used in combination with an accumulator, which works from a bottom to top position, while a torque-driven servo motor generates storage movement and precise web tension. The accumulator picks up the sheet during the manual change of the roll in the winder, making roll changes by the operators very easy and safe.

Your Advantages

- ▶ Film capacity: standard 38 m and 50 m
- ▶ Access doors on operation side for easy sheet feeding into the accumulator in the bottom position
- ▶ Compact solutions for a limited floor space

Find the right winder for your application

Winder type	W500	W600	W550	W900	W1200	W2000 XL
Line width	1,050 – 2,200 mm	1,050 – 1,800 mm	1,050 – 1,800 (2,200) mm	1,050 – 2,200 mm	1,650 – 2,200 mm	1,650 – 2,200 mm
Number of webs	up to 4	up to 4	up to 4	up to 4	up to 4	up to 4
Core ID (inch)	3, 6, 8	3, 6, 8	3, 6, 8	3, 6, 8	6, 8	3, 6
Thickness range	150 – 1,800 µm	150 – 1,800 µm	150 – 1,800 µm	150 – 1,200 µm	150 – 1,800 µm	150 – 1,800 µm
Max. mech. speed	70 m/min	70 m/min	70 m/min	70 m/min	100 m/min	100 m/min
Accumulator	yes	yes	yes	yes	no / yes	no / yes
Max. roll diameter up to*	1,200 mm	1,200 mm	1,200 mm	1,200 mm	1,200 mm	1,200 mm
	2,000 mm	1,400 mm				

* Depending on the shaft diameter, roll width and number of webs



Winder W500 A-frame

The winder W500 A-frame is a **comfortable** and **cost-saving** solution **for large roll diameters**.

This single or multi-web winder is equipped with an electric drive and with two A-frame winding trolleys for each web.

The operation of the winder is simple and straightforward – after the roll change procedure, an operator removes the A-frame trolley with the finished roll from the winder. The roll itself must be lifted from the trolley by means of a crane or a forklift.

Your Advantages

- ▶ Suitable for large roll diameters
- ▶ Single or multi-web winder
- ▶ Electrical movement of winding trolley, optional



Winder W600 cantilever

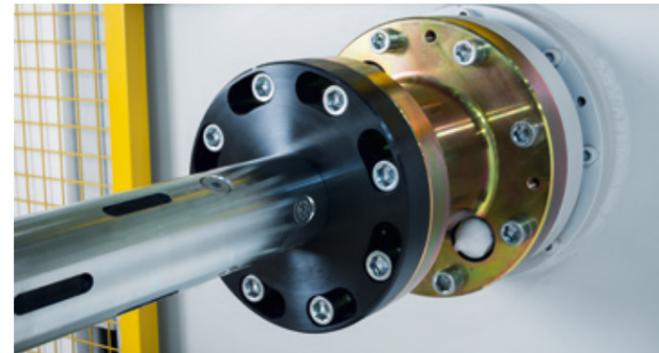
The winder W600 cantilever ensures a **maximum of operator convenience**, especially in the case of **small diameter rolls** and **frequent roll changes**.

This model is a single or multi-web winder which has two winding stations with winding shafts for each web, supported on just one side.

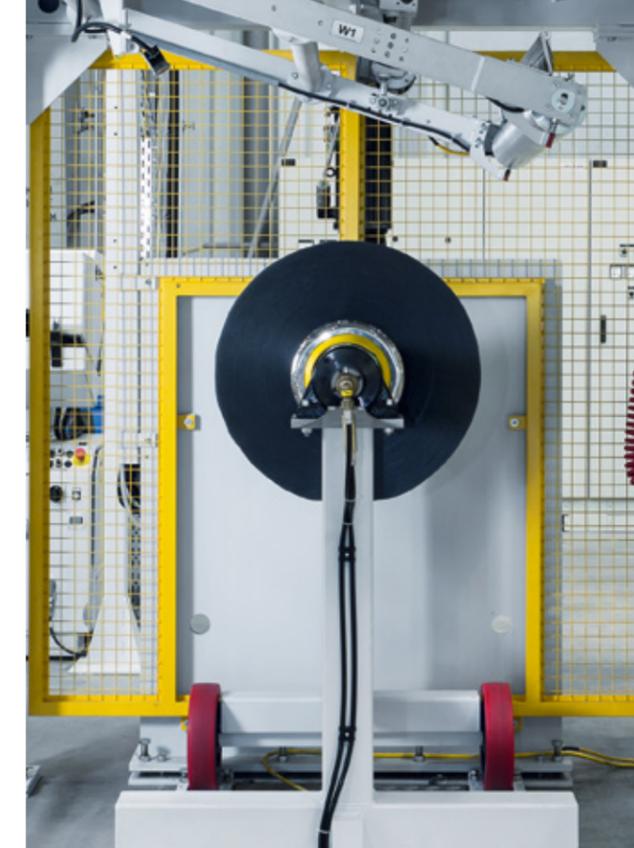
After the roll change procedure, a lifting trolley is used to remove the finished roll from the cantilever shaft which remains in the winder.

Your Advantages

- ▶ Suitable for smaller roll diameters and frequent roll changes
- ▶ Single or multi-web winder
- ▶ Winding shafts for each web, supported on just one side



Winder W550 combined A-frame / cantilever



The winder **W550** combines the advantages of the A-frame winder W500 and the cantilever winder W600. It **can be easily modified**.

The W550 stands for greater flexibility and production reliability in changing roll diameters from small to big. The A-frame winding trolley is typically used for production processes requiring jumbo rolls, while the cantilever winding shaft is best suited to making frequent roll changes when producing small rolls.

The winder W550 can be easily converted from an A-frame winder into a cantilever winder. The A-frame trolley only has to be moved out and the cantilever shaft is quickly fixed to the drive disk.

Your Advantages

- ▶ Highly flexible system – efficiently useable for all roll diameters
- ▶ Operator-friendly modification from A-frame to cantilever winder

Winder W900 turret

The semi-automatic turret winder W900 is easy to operate and requires **less floor and handling space**. It is available with friction winding.

Because of its short, internal film guideways, the turret winder is particularly well suited to medium roll diameters and the production of thin sheet.

As an option, the winder W900 turret is available with friction winding shafts, which makes it possible to wind two or more webs on one shaft.

Your Advantages

- ▶ Especially suited to medium roll diameters and the production of thin sheet
- ▶ Space saving
- ▶ Available with friction winding shafts as an option



Winder W1200 fully automatic turret

SML's winder W1200 – the heavy one – is a **fully automatic center driven turret winder**, especially designed for operation in sheet lines with **large film widths and throughputs**.

This model operates in precisely controlled gap winding mode. Two different cutting systems are available - the flying knife or chopping knife - which allow cross-cutting in wide thickness ranges. This winder is also equipped with friction shafts for winding part bobbins. An automatic shaft and reel handling system ensures the easy handling of the finished rolls.

Your Advantages

- ▶ Designed for operation in sheet lines with large film widths
- ▶ Cross-cutting system with flying or chopping knives
- ▶ Automatic shaft and reel handling
- ▶ Friction shafts for winding part bobbins





Winder W2000 XL fully automatic

SML's fully automatic sheet winder W2000 XL enables **roll changes at full line speed** eliminating the need for an accumulator.

The short web path in the winder and the automatic attachment of the film to the new winding core represent advantageous features of the W2000 XL. This applies especially to thin films. Generally, this winder is designed for winding PET sheet in a wide thickness range.

Horizontal shaft movement

The winder has a web tension measuring roll in the winder entrance, which separates the winding tension from the upstream web. Owing to the horizontal shaft movement principle, the roll remains in an optimum winding position until the very last moment before cross-cutting, thus guaranteeing a perfect winding quality up to the last layer on the roll.

Powerful guillotine cutting unit

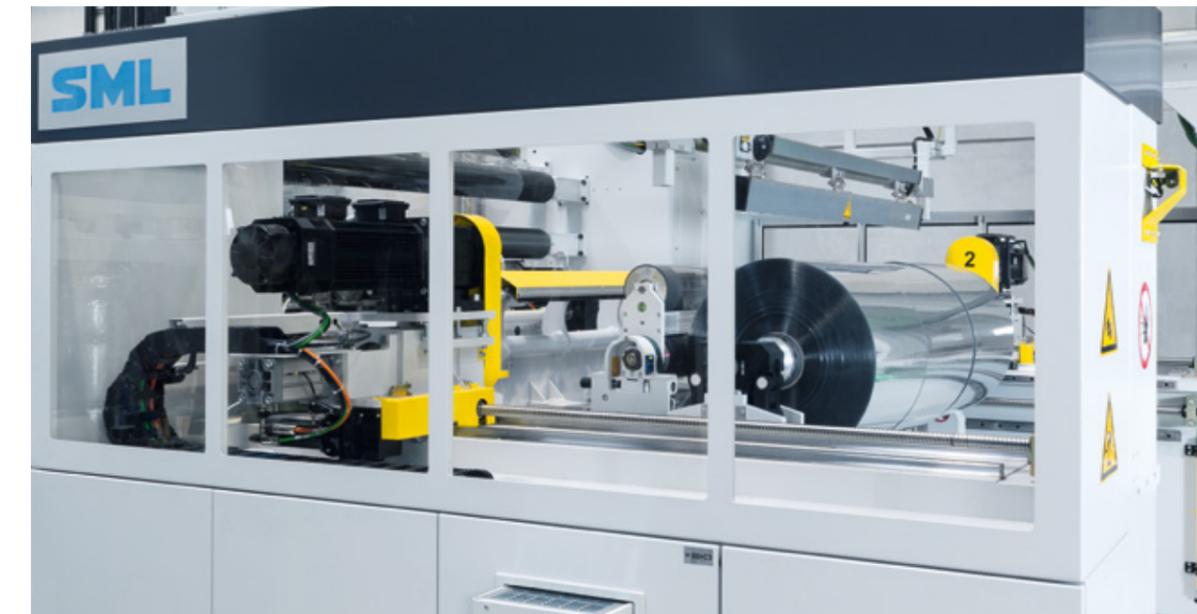
The W2000 XL is equipped with a powerful guillotine cutting unit. After cutting, the leading edge of the film enters a guide system and is pressed onto the newly prepared winding core. The winder is also designed for precise gap winding. The upper side of the sheet is wound on the inside.

Friction winding for inline split rolls

The winder W2000 XL can be fitted with optional friction winding shafts for the production of inline slit rolls. In this case, two adjustable banana rolls are positioned behind the slitting unit in order to separate the webs with a small clearance between them. In the friction-winding mode, the pneumatic pressure in the winding shaft controls the winding tension in line with the start tension and the selected taper curve.

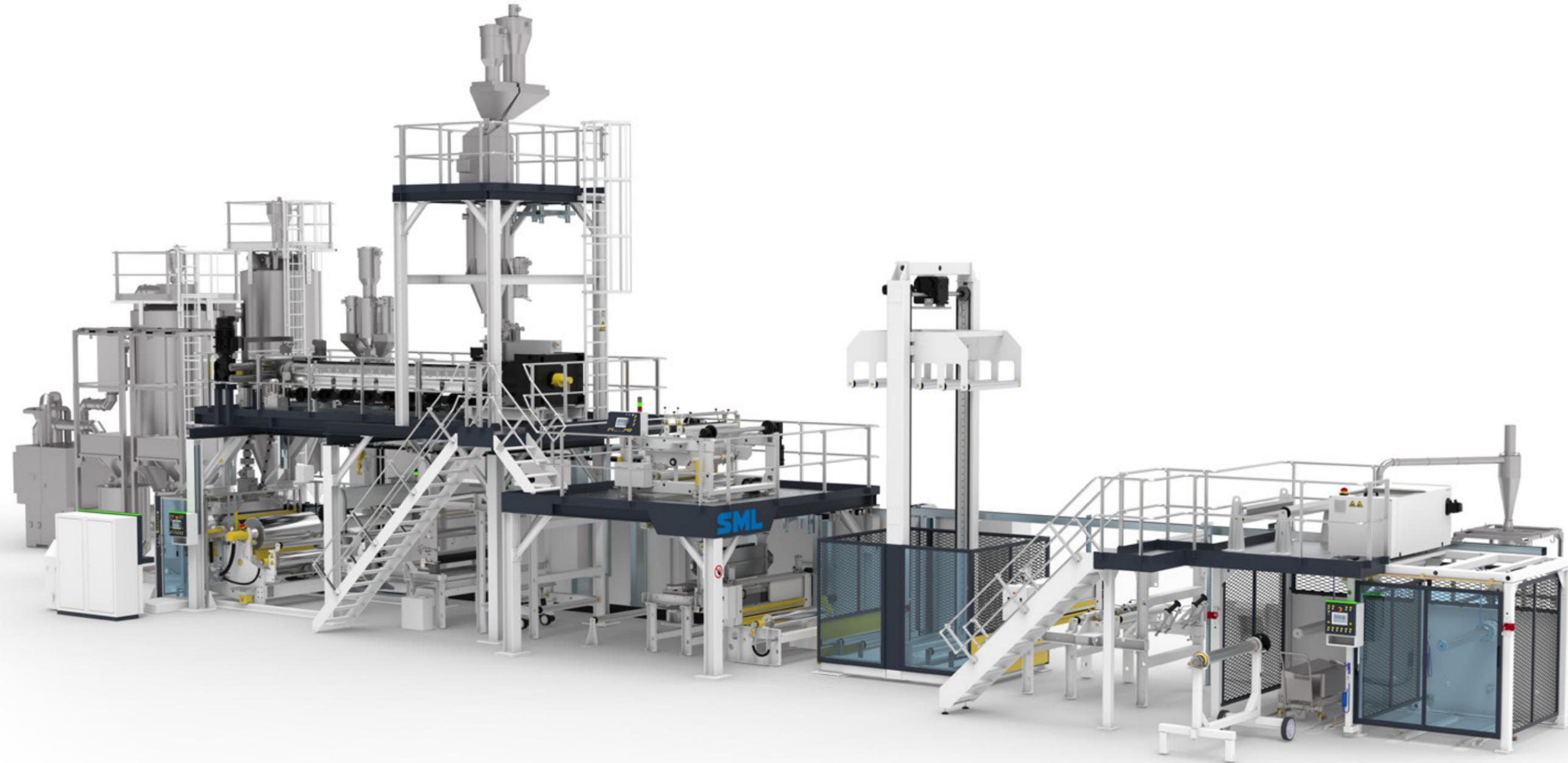
Fully integrated roll and shaft handling

At the end of the winding process, the finished roll and the winding shaft are transported onto a moveable lifting table by an overhead robot, which then pulls the rolls off the clamped shaft. The complete roll and shaft handling process is fully integrated in the winder's automatic mode.



Your Advantages

- ▶ Automatic roll changes at full speed
- ▶ Horizontal shaft movement for an equally high product quality up to the last layer on the roll
- ▶ Powerful guillotine cutting unit
- ▶ Fully automatic control of winding quality



Proven technology – **new design**

When it comes to line performance, high quality and precise interaction of the internal components are particularly important. But who says **extrusion lines** shouldn't **look great too**?

Technology that makes you smile

SMILE control system

Not sure if a technology can really make you smile? Now, let the facts about **our ingenious machine** control systems **convince you**.

SMILE is SML's machine control and operation concept. It allows **highly precise synchronisation** of all components in an SML extrusion system. If an extrusion system is the powerful body, then SMILE is the **driving soul that brings that body to life**.

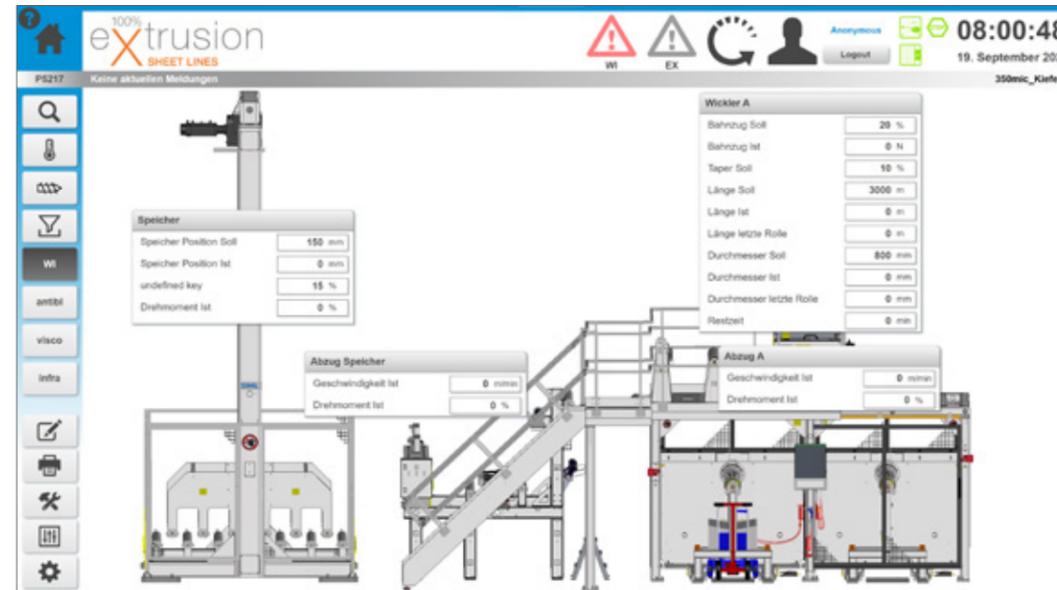
100 % developed in-house

The dynamic controller system is entirely developed in-house and has undergone significant further development in recent years. SML's long-standing competence in the field of automation and machine control provides loads of innovative and exceptional features.

Centralised all-in-one concept

SMILE's central control station system allows the management of each production process with a wide touch screen attached to the sheet line. More than 1000 signals come together here, collected by many sensors, transducers and motors and transported via modern Ethernet bus systems.

This data includes sensory measurements like temperatures, speeds and pressures as well as actuator readings from valves, hydraulics, drives and positions. Thanks to SMILE, all of these components are interconnected and can be perfectly synchronised with each other. This fine-tuning allows customers to run their sheet lines at the very best performance level.



Intuitive machine control

At SML, we believe machine control and operation should be highly intuitive and self-explanatory. SMILE is therefore an integral part of our coherent and user-friendly overall line concept.

- ▶ A central control station system for the highest operating comfort and the visualisation of all processes
- ▶ Reduced training efforts and error rates at operator level
- ▶ Remote control, remote update and remote service (from a PC or even a smartphone)
- ▶ The system is fully multi-client and multi-user capable, different types of users can log-in simultaneously

Optimised production efficiency

One key purpose of SMILE is the increase in the Overall Equipment Effectiveness (OEE) through optimised production processes.

- ▶ Optimised use of raw materials, preventing waste
- ▶ Faster start-up of production
- ▶ Minimised times for product change-overs, customisable assistant for product changes

Systematic quality control

In close interaction with SML's data collection and analysis system bitWise, SMILE is an efficient tool to keep output quality stable and to optimise output properties.

- ▶ Formula recipe system to store production parameters
- ▶ Documentation and detailed reporting of production processes
- ▶ Automatic alarm functions via e-mail or text message for quick debugging

Interconnectivity and third-party integration

SMILE has many open interfaces that allow the web-based data exchange with third-party machines and systems.

- ▶ Open to interconnecting with systems like Enterprise Resource Planning (ERP), Quality Assurance (QA) or SML's data analysis tool bitWise
- ▶ Based on open standards like HTML5 and OPC-UA, complete end-to-end process control beyond SML extrusion lines

Tailored to specific requirements

SMILE can be tailor-made to client's specific requirements. This is blazing the trail to new manufacturing concepts as well as delivering product properties.



Stop guessing, start knowing with bitWise data analytics

With bitWise, SML's customers can **analyse the entire process history** of a sheet line with a **single click**, rather than relying on **current snapshots**.

bitWise incorporates decades of experience in automation with the **latest technologies in data analytics** and provides for a wide range of **completely new opportunities** for data-driven decisions.

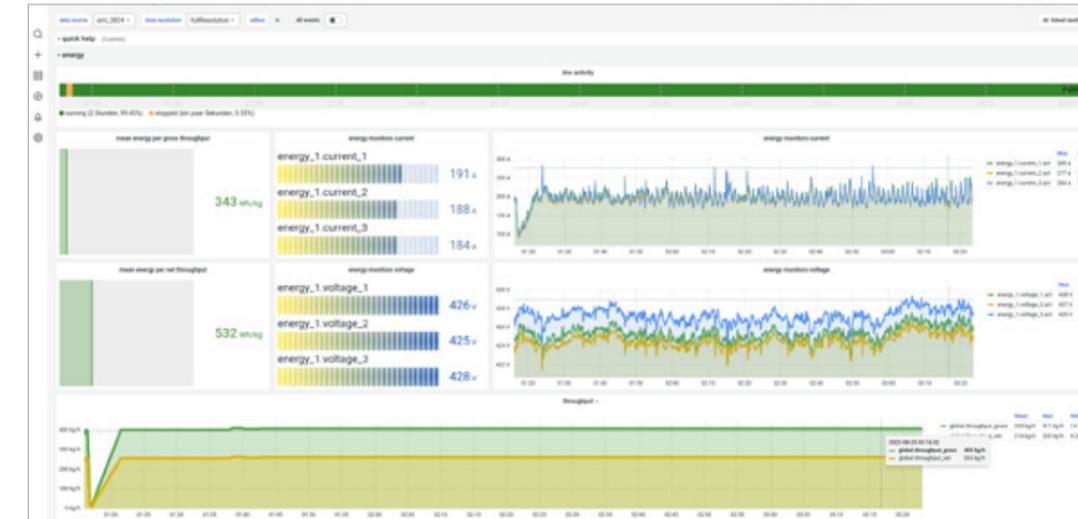
In-depth view of all details

SML's sheet lines are equipped with hundreds of data-generating sensors. BitWise records and visualises this data up to 10 times per second. In addition, each manufactured roll is provided with a QR code that can be identified again. Putting everything together, manufacturers get an in-depth view of all the details involved in a production process – both in the present and in the past.

With bitWise, customers can look back at pressures within the system components and check whether there is a correlation with other measured values such as temperature or with the laboratory results of a finished product roll.

Always connected, even on the go

BitWise is an 100 % on-premises solution. This means that the data remains in-house on dedicated hardware, no cloud services are required. Nevertheless, customers can access bitWise in their company network via their VPN or a remote desktop solution.



Optimising quality

BitWise is a powerful tool to precisely optimise any aspect of the production process with a direct effect on product quality.

- ▶ Monitoring of all quality-related process parameters, allowing quick corrective action
- ▶ Comprehensive tracking and documenting of product quality
- ▶ Making quality reproducible

Maximising output

Recorded, aggregated and visualised data by bitWise helps to raise overall line utilisation and delivers a faster return on investment (ROI).

- ▶ Discovering hidden or unused output capacities
- ▶ Preventing downtimes by detecting potential problems at an early stage
- ▶ Minimising maintenance times through optimised scheduling and structured access to documentation and service support

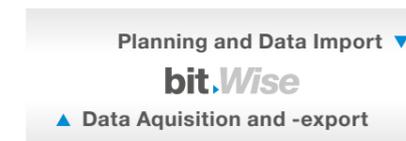
Minimising production costs

BitWise is the central tool to measure and visualise all production related costs. It forms a strong and reliable basis for the continuous cost-optimisation.

- ▶ Detailed monitoring and reporting of energy and raw material consumption
- ▶ In-depth optimising, tracking and reporting of Overall Equipment Effectiveness (OEE)
- ▶ Full end-to-end cost transparency through third-party integration

Open for vertical integration

At SML we understand that sheet lines represent a key part in a wider production chain. For end-to-end optimisation, bitWise therefore supports data exchange and vertical integration with third-party systems such as Manufacturing Execution Systems (MES), Enterprise Resource Planning (ERP) or Quality Assurance (QA). Customers can simply retrieve the data from the system.



Choose your perfect interface

As with most technologies developed by SML, bitWise is highly customisable. The remote system can be retrofitted to all existing SML sheet lines.

Outstanding end-to-end service support. Reliable assistance - around the globe, at all times.

Always at your disposal.

Our dedicated customer service team offers reliable assistance to ensure the continuous operation of any SML extrusion line at all times. Regardless of how long a system has been in operation, we offer service to every customer.

- ▶ Long term experienced SML service technicians
- ▶ Support in all ways – via telephone, video call, chat, email and in person
- ▶ On-call service from 7 am to 10 pm CET
- ▶ Remote maintenance system
- ▶ Visual assistance via smart glasses as an option
- ▶ SML service technicians on call worldwide
- ▶ Quick on-site service

Immediate assistance.

The remote maintenance system, which is available for every SML extrusion line, makes it easier to identify potential problems and provide a quick diagnosis. In order to find solutions, our service team works closely together with other departments at SML. This way, 85 – 90 % of all malfunctions can be solved remotely.



Our highly-skilled technicians are at your service within 24 hours throughout Europe and within 48 hours in the rest of the world.

Up-to-date knowledge and experience.

Our service team consists of technicians who know SML's extrusion lines inside out, having installed them themselves for many years. In order to keep their know-how up to date, all service employees continue to work regularly in everyday production. Their competence is reflected in the short reaction times to our customers' enquiries.

Visual assistance in real time.

Through the use of smart glasses, our service team can provide real-time assistance worldwide. Whether our customers have technical problems, need help with product changes or maintenance work - they are guided step by step. This service is available for every extrusion line from SML.

Analyses
Development
Pre-tested Performance
Delivery on Time
Service Support
Customer Satisfaction

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The image shows a large, modern industrial building with a white facade. The SML logo is prominently displayed on the upper part of the building, rendered in a light blue, three-dimensional font. The building has large glass windows and a dark lower section. The sky is a clear, light blue.

► **SML - Head Office**

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**Follow Your Instinct –
choose SML!**