



100%  
eXtrusion  
SHEET LINES

PP / PS / BARRIER  
THERMOFORMING SHEET

## LINES FOR THERMOFORMABLE SHEET



SML is supplying advanced machinery for nearly all types of sheet used for thermoforming applications – like cups, lids, trays or blister packs.

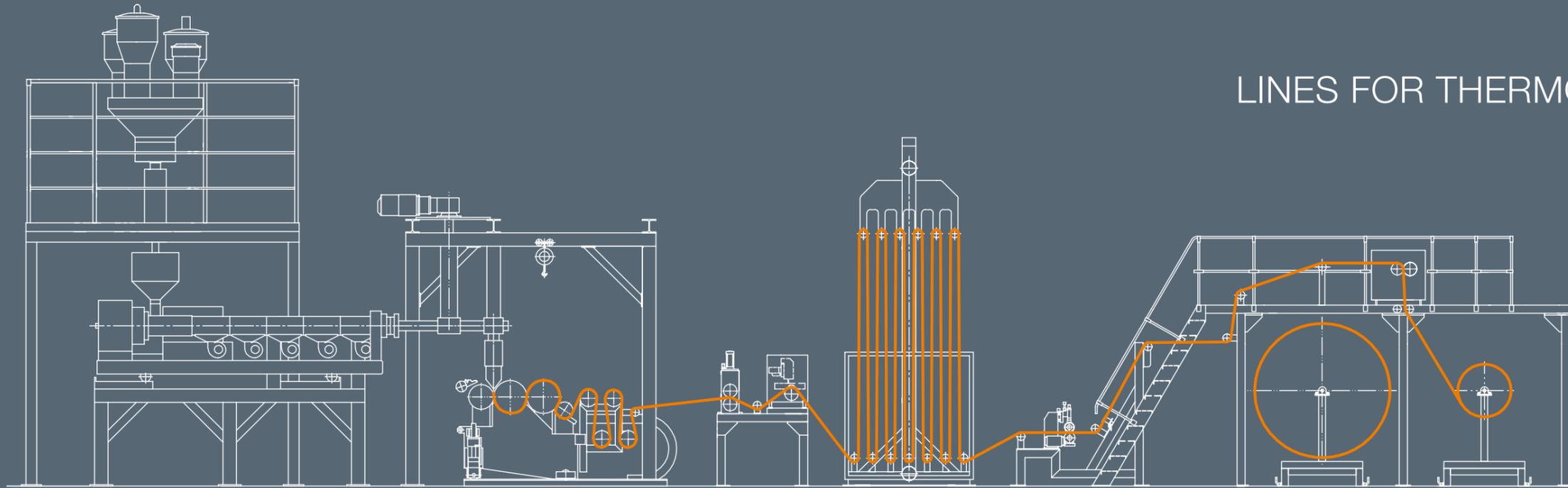
Based on its High Speed Extruders (HSE) and its HO-LT (High Output – Low Temperature) extrusion technology, SML provides high-performance sheet lines **focused on the cost-efficient large-scale production of sheet with superior qualities.**

The most recent example of SML's innovative strength in this field is its PP/EVOH barrier sheet line. This line manufactures sheet with outstanding barrier characteristics against oxygen, water vapour and odours – at output volumes as high as 3.2 tons per hour.

Apart from high-performance solutions, SML is providing its well-established Economic Class Sheet Lines for great flexibility at mid-range outputs, at an extremely reasonable price-performance ratio.

Another example of SML's leading role in this market segment is its well-proven inline sheet extrusion concept. It helps to minimise the energy costs of the overall production process of thermoforming applications of around 20 to 25 percent.

SML's thermoforming sheet lines are designed for 24/7 production reliability and a long service life. Beside outstanding extrusion solutions, it is above all **SML's advanced roll stack technology in combination with superior winding systems** and the operator-friendly machine control system SMILE, that gives SML's customers the competitive edge in this market segment.



# LINES FOR THERMOFORMABLE SHEET

CONTENTS

High-Performance Class Sheet Lines .....	6
Economy Class Sheet Lines .....	8
Barrier Sheet Lines .....	10
Inline Extrusion Lines .....	12
Line Description .....	14
Extrusion Unit .....	16
Downstream Equipment .....	20
Winding Systems .....	24





## High-Performance Class Sheet Lines

SML's High-Performance Class Sheet Lines provide extremely high output levels in combination with top product qualities, low energy consumption, minimal personnel costs and a very economical use of polymers.

All of this makes the large-scale production of sheet for thermoforming applications extraordinary cost-efficient and competitive.

### SUPERIOR EXTRUSION AND CALENDERING TECHNOLOGY

The central elements in SML's High-Performance Class Sheet Lines are High Speed Extruders (HSE) and well designed calendering roll stacks. These include a unique Smart Parallel Gap (SPG) calendering roll and an optimal number of post-cooling rolls, adapted to the respective sheet type.

### COMPACT LINE DESIGN

Another key characteristic of SML's High-Performance Class Sheet Lines is its very compact design, providing a maximum of productivity on a minimum of floor space. Based on SML's modular design concept, the layout of the line can be customised to very specific space requirements.

## Your Advantages

- ✓ Maximum output and line speed
- ✓ Energy efficiency
- ✓ Polymer savings



HIGH PERFORMANCE LINE FOR PP/PS ▲

### PERFORMANCE LEVEL

Polymer	production performance (at 1m sheet width)
PS	up to 3,300 kg/h
PP	up to 3,000 kg/h
PET	up to 1,800 kg/h

### CONFIGURATION EXAMPLES

	TSL-1 Jumbo	TSL-2 Jumbo
Extruder	1x HSE75	3x HSE75
Plastification performance	PS: 1,500 kg/h PP: 1,350 kg/h	PS: 3,300 kg/h PP: 2,700 kg/h
Sheet thickness range	200 - 2,500µm (thin PP films may require an air knife)	
Number of layers	1	3
Sheet width	1,000mm	1,200mm
Line speed limit	70 m/min	
Webs	1	2
Winding diameter on 6-inch shafts	2,000mm	2,000mm

### SPECIFIC ATTRIBUTES

- Modular design
- High Speed Extruders (HSE)
- Easily handled feedblock technology
- Standard 1 – 3 layers
- Horizontal roll stack (with multiple nips)
- Optional air knife





## Economy Class Sheet Lines

SML's Economy Class Sheet Lines are an ideal solution for medium-sized production quantities.

With output volumes of up to 1,000 kg/h, this line concept stands for the highly efficient production of premium sheet at an extremely reasonable price-performance ratio.

### MACHINE SET-UP IDEAL FOR LOW BUILDINGS

One main characteristic of SML's Economy Class Sheet Line is its straightforward design. The HSE main extruder, the melt pump, the die, and the electrical cabinets are all mounted on the same frame. The usage of a vertical roll stack allows the extruders to be placed directly on the floor. The winding technology, including the accumulator, is designed to keep the height of the line as low as possible.

With this set-up, SML's Economy Class Sheet Lines are ideally suited to installation in buildings with minimal ceiling heights.

### Your Advantages

- ✓ Ideal line for the medium output range
- ✓ Energy and polymer savings
- ✓ Optimal price performance ratio



TSL-ECO JUMBO ▲

### CONFIGURATION EXAMPLES

	TSL-Eco Jumbo
Extruder	1x HSE75
Plastification performance	PS: 1,100 kg/h; PP: 1,000 kg/h
No. of layers	1
Sheet thickness range	200 - 2,500µm (thin PP films may require an air knife)
Net sheet width	1,000mm
Line speed limit	40 m/min
Webs	1
Winding diameter on 6-inch shafts	2,000mm
Options	Co-extruder and feedblock, air knife, gauge, cantilever winder



### SPECIFIC ATTRIBUTES:

- Modular design for 1 layer
- Main extruder, pump, die and electrical cabinets on one frame
- Vertical roll stack, 1,200mm roll width
- One control panel on the roll stack



## Barriere Sheet Lines

SML is offering customised Barrier Sheet Lines for PP and PS thermoforming products, that meet the highest standards for food applications.

SML's technology leadership in this field is above all based on its competencies in process engineering and comprehensive R&D. The latest innovations are High-Performance Barrier Sheet Lines with unparalleled, high output capacities.

### INTEGRATION OF HSE AND HO-LT TECHNOLOGY

With the launch of its high-performance PP/EVOH barrier sheet lines with a capacity of up to 3.2 tons per hour, SML has set a milestone – both in terms of output volumes and product properties. The line integrates two well-proven extrusion concepts: High Speed Extruders (HSE) are used for the outer and regrind layers of the film structure, while the barrier layer in the centre is produced by a High Output – Low Temperature (HO-LT) extruder.

### NEW OPPORTUNITIES FOR MANUFACTURERS

The fusion of HSE with barrier technology opens new opportunities for manufacturers, above all in cost-efficient high-volume production. Beside the output volume, it is the outstanding barrier characteristics, i.e. against oxygen, water vapour and odours, that make the difference.



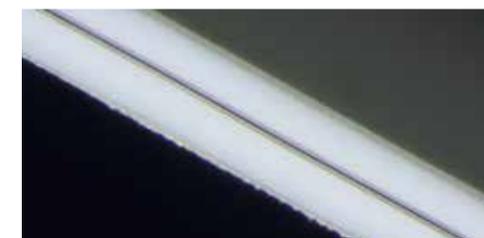
EXTRUDER ARRANGEMENT OF A BARRIER SHEET LINE ▲

### READY-TO-USE SOLUTIONS

Like all systems from SML, the High-Performance Barrier Sheet Lines are generally delivered as ready-to-use solutions. Due to the modular set-up, commissioning times are very short.

### SPECIFIC ATTRIBUTES:

- Customised design
- Layer security: individual extruders for each layer, gravimetric output control
- Flexible feedback technology with up to 9 layers or more, layer distribution manipulation
- HSE and HO-LT extruder technology
- High-performance horizontal roll stack (with multiple nips)



EVOH barrier sheet

## Your Advantages

- ✓ Superior sheet quality for thermoforming
- ✓ Energy and polymer savings
- ✓ Tight and stable layer distribution
- ✓ Skeleton recycling up to 70 %
- ✓ Outstanding polymer flow design to avoid polymer degradation effects





## Inline Extrusion Lines

Inline extrusion and thermoforming constitute the most efficient method of producing large quantities of cups and containers.

SML's inline extrusion sheet lines in combination with a thermoformer are designed to manufacture ready-to-use end products with outstanding quality properties.

### ADVANCED ROLL STACK TECHNOLOGY

SML has made no compromises with regard to the functional components and the extremely uniform sheet formats of these types of lines. Excellent product quality is guaranteed through comprehensive temperature control, Thin Shell Roll technology and a 5° inclined roll stack design.

### CLOSED LOOP MATERIAL FLOW

A closed material loop flow means, that there is usually no waste production. Only thermoformed containers leave the production line. There is no edge trim and, with direct skeletal refeed, neither storage silos for recycling, nor recycle reuse management is required.

### ENERGY EFFICIENT PROCESSES

Inline extrusion and thermoforming lines require less than 20 - 25 % of the energy compared with a conventional production process. During inline extrusion, the sheet is not cooled down more than necessary. The re-heating of the sheet to thermoforming temperature thus requires significantly less energy. The moderate cooling and re-heating process in the center of the sheet results in superior final product clarity and stiffness.



I-TF3 IN OPERATION WITH THERMOFORMER ▲

### LINE CONFIGURATION

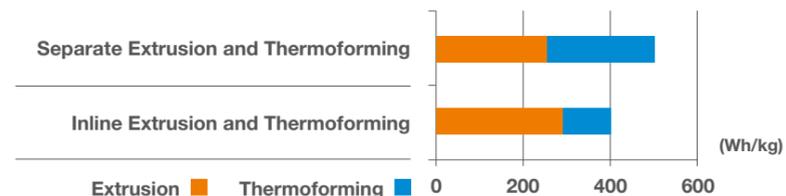
	I-TF2	I-TF3
Extruder	HSE75	HSE75 (*)
Plastification performance	PS: 700 kg/h PP: 600 kg/h	PS: 1,100 kg/h PP: 900 kg/h
Co-extruder option	ES35 or ES35 HO-LT	
Maximal sheet width	920mm	920mm
No. of layers	1	1
Roll stack	∅ SPG300/400/400mm	SPG300/490/490mm
Roll width	1,050mm	1,050mm
Post cooling rolls (optional)	3 x 250mm	

(\*) As and alternative, the HSE90 can be used for more polymer flexibility

### SPECIFIC ATTRIBUTES:

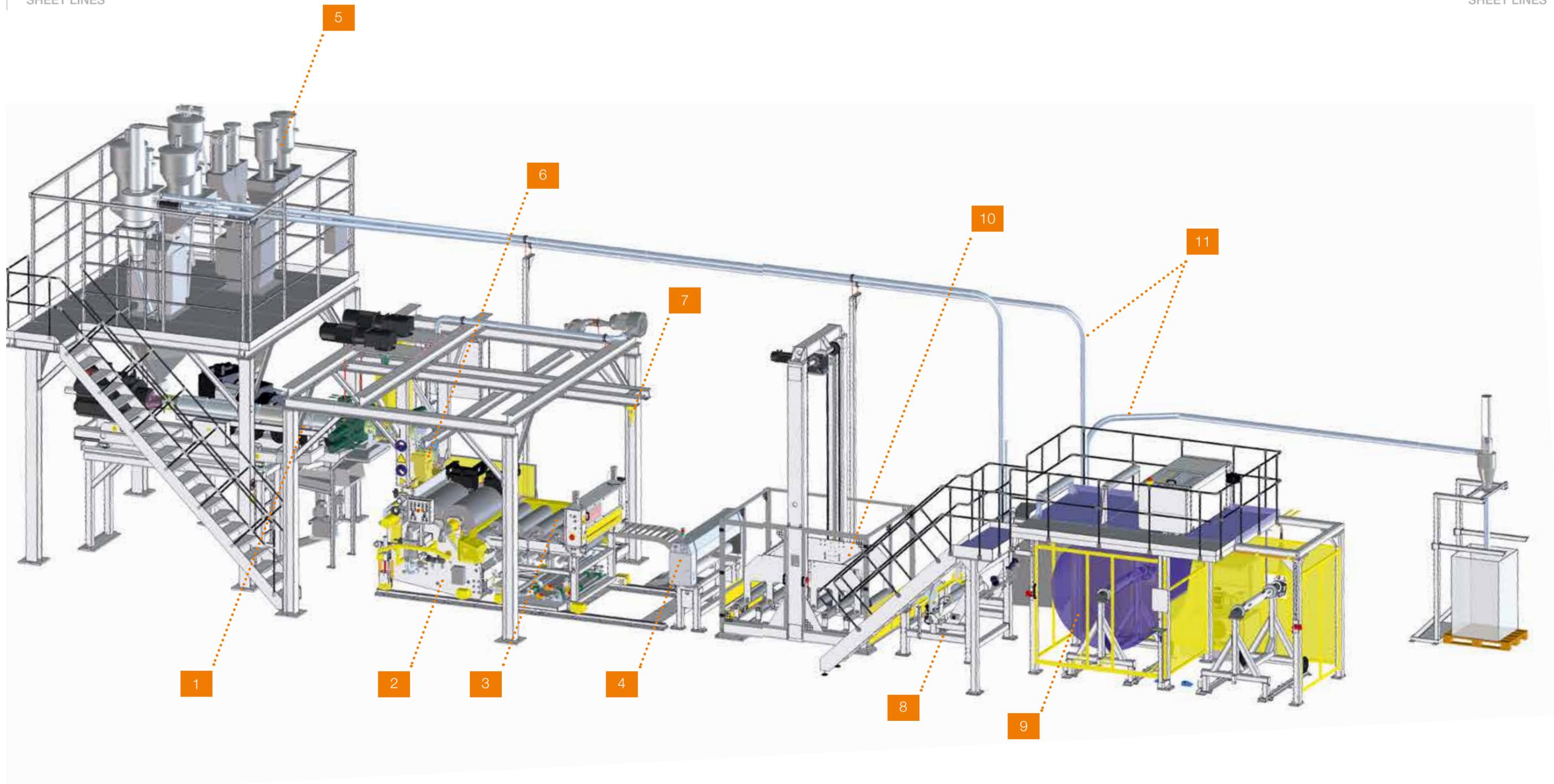
- SPG calendering roll for an outstanding thickness profile
- Thin Shell Roll technology for even cooling
- Electric cabinet mounted on the extruder frame

### ENERGY SAVING POTENTIAL OF INLINE EXTRUSION AND THERMOFORMING:

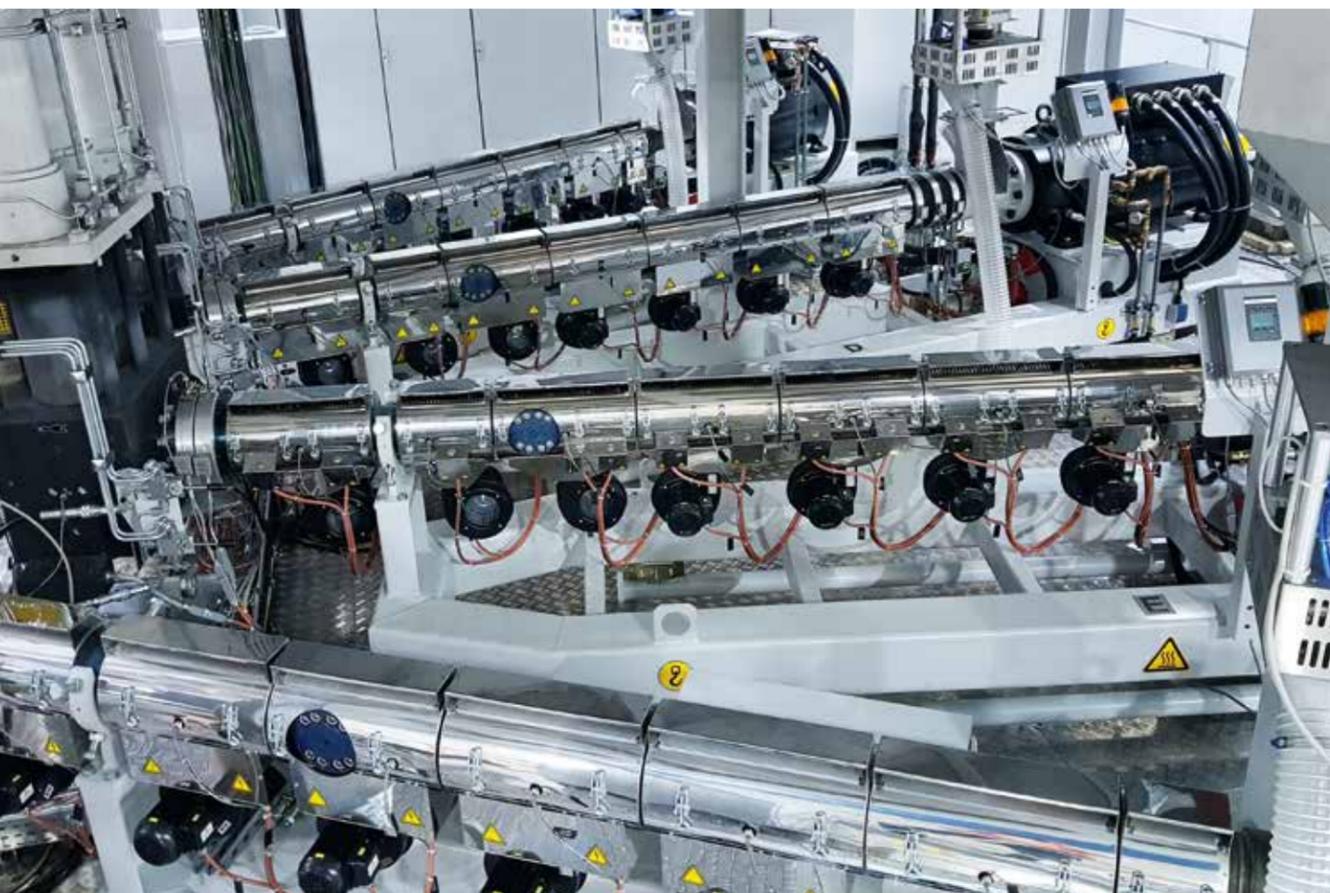


## Your Advantages

- ✓ 20 - 25 % less energy consumption
- ✓ Optimal utilisation of the remaining heat in the sheet
- ✓ Superior final product clarity and stiffness
- ✓ Inline recycling of skeleton up to 60%



- |                                    |  |                                    |
|------------------------------------|--|------------------------------------|
| <b>1</b> HIGH SPEED EXTRUDER (HSE) | <b>5</b> GRAVIMETRIC BATCH FEEDING AND DOSING SYSTEM | <b>9</b> A-FRAME WINDER            |
| <b>2</b> TRIPLE GAP ROLL STACK     | <b>6</b> TOOL UNIT                                   | <b>10</b> ACCUMULATOR              |
| <b>3</b> POST COOLING ROLLS        | <b>7</b> TOOL UNIT WITH CHAIN HOIST                  | <b>11</b> REGRIND CONVEYING SYSTEM |
| <b>4</b> GAUGING SYSTEM            | <b>8</b> EDGE TRIMMING                               |                                    |



## Extruders

Extrusion solutions highly customised to the respective production requirements

SML offers extrusion solutions highly customised to the respective production requirements. In addition to the High Speed Extruders (HSE) and the HO-LT (high output – low temperature) extruders, SML provides various standard systems, driven by a direct motor-gearbox combination. All SML extruders for thermoforming sheet lines are fitted with closed barrels and vented variations for a maximum of energy efficiency.

### HIGH SPEED EXTRUDERS

For thermoforming sheet applications, SML provides HSE solutions with 75mm and 90mm screw diameters. Both sizes cover the same output range: the 75mm diameter extruder runs at a higher screw speed and with superior energy efficiency, while the 90mm diameter extruder is selected when a wider range of different polymers are processed. With the 75mm diameter extruder a L/D ratio of 37 and 42 is standard. This allows the processing of up to 70 % recycled materials in SML's thermoforming sheet lines. In general, all SML's HSE extruders cover a wide output range with only two screw diameters by using differing extruder configurations.

### ENERGY-EFFICIENT DRIVE TECHNOLOGY

Naturally, all of SML's HSE extruders are able to handle extended cycle rates and are equipped with vented screws and barrels. They are driven by energy-efficient, special AC or torque motors with a direct connection between the motor and the screw.



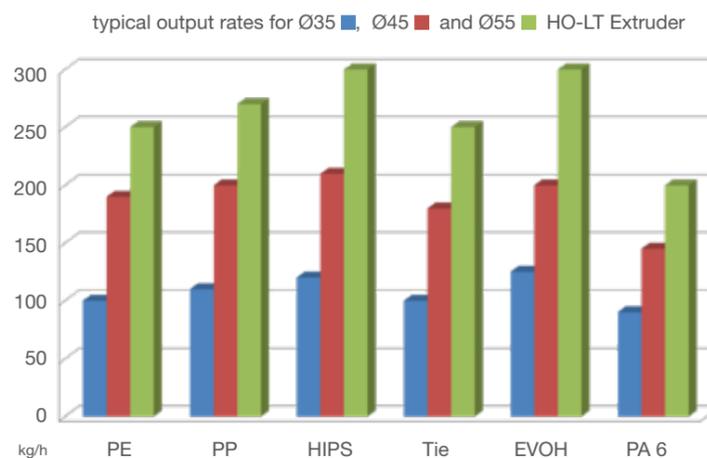
HO-LT EXTRUDER ▲

### HO-LT EXTRUDER

HO-LT stands for "High Output - Low Temperature". The special screw and barrel configuration enables these extruders to plasticise a huge amount of polymer at relatively low screw speeds. This leads to a low melt temperature, an extremely stable output and high pressure generation with very fast material changeover times. Due to these features, HO-LT extruders do not require a melt pump. They are ideal for heat-sensitive polymers such as EVOH and adhesives. SML's HO-LT extruders are available with screw diameters of 35, 45, 55 and 75mm as a standard.

## Your Advantages

- ✓ Perfect for heat-sensitive polymers
- ✓ Outstanding output volume at low melt temperatures
- ✓ High pressure generation for a maximum of production stability





MELT FILTRATION ▲

## Use of regrind material

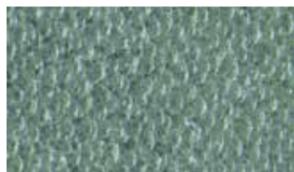
SML's sheet extruders are designed to re-process very high volumes of regrind material. For some applications, a 100 % of the regrind can be recycled. This is possible due to the advanced screw geometrics in SML's extruders, which are very forgiving with regard to changes in regrind density. The refeed of scrap can be done directly from buffer storage, or by using standard dosing equipment.



Regrind material

## Foam

Polymer foam can be produced using additives (chemical), direct gas injection (physical), or with a combination of both. SML's thermoforming sheet lines can be fitted with a special screw and a gas dosing pump for the physical foaming process. The gas injection process is less expensive than the use of additives. In addition, the direct gas injection allows the quick adjustment to the required density in less than five minutes.



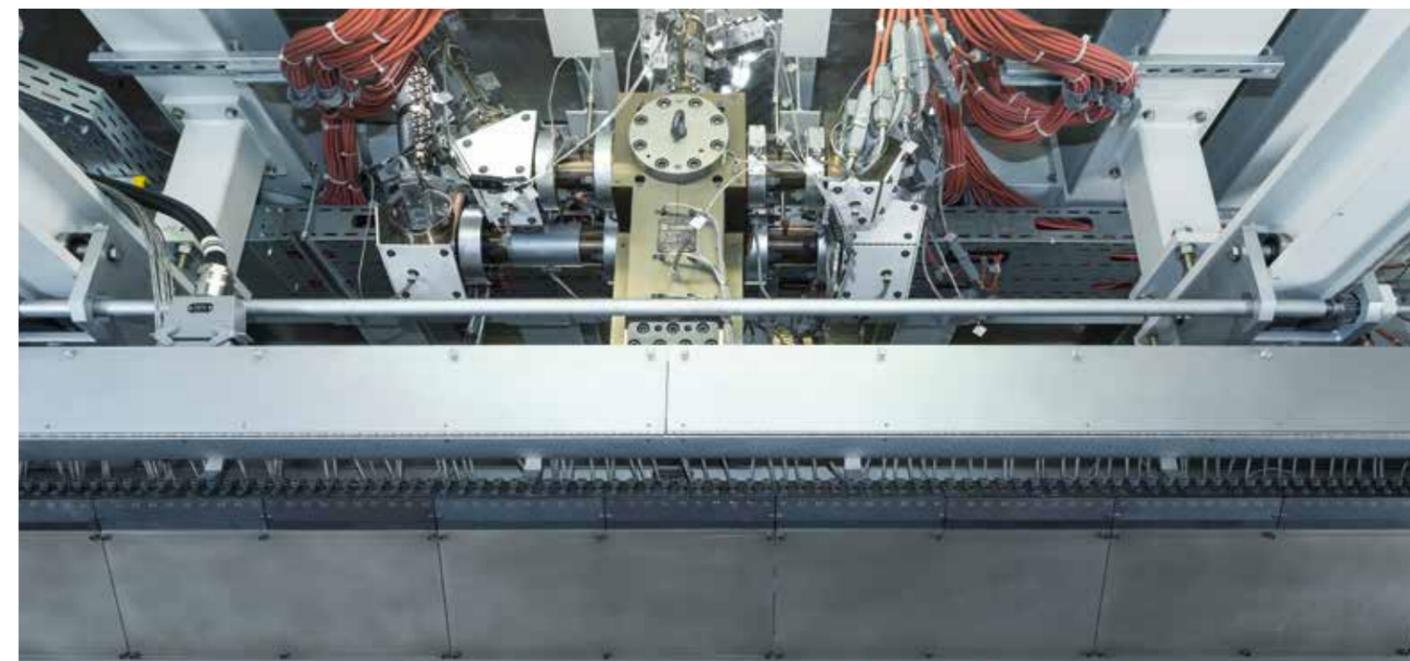
Foam structure in the microscope

## Venting

The use of vented extruders is very popular for sheet extrusion, and quite often it is sufficient to vent atmospherically. In addition, a wide choice of active vacuum systems is available. All vented barrels, employed in thermoforming extrusion, can be plugged.

## Melt filtration

The size and type of a melt filtration system depend on the output volume, the type of polymer, the required filter mesh and the anticipated amount of contamination. SML provides single and double piston concepts for the production of thermoforming sheet. These are manually actuated for small units, and otherwise hydraulically actuated. Double-piston systems allow screen changing while the machine continues to run.



FLAT DIE ▲

## Melt pumps

The melt pumps in SML's thermoforming sheet lines operate as volumetric dosing systems for the melt, while building up pressure efficiently. The constant volumetric flow ensures the perfect length tolerance of the sheet. It naturally contributes to the stability of the sensitive melt bank between the calendaring rolls. The excellent pressure build-up capacity in SML's lines relieves the screw of this task, which makes it easier to operate vented extruders economically. In addition, the melt pump can compensate a certain degree of extruder instability, originating from a very high level of low-density regrind.



## Feedblocks and flat dies

SML provides various solutions for feedblocks for its thermoforming sheet lines. These range from simple fixed geometry inserts, to flexible solutions for layer configuration, adaptable flow geometry, and elements for the fine tuning of the traverse layer distribution. The latter are frequently used for barrier sheet lines.

### FLAT DIES WITH IDEAL FLOW GEOMETRY

SML provides manual and automatic flat dies from renowned partners. They can be characterised by their simplicity, by their robustness and by the ideal design of the flow geometry. This allows the operation with only one flexible lip, a restrictor bar is not necessary. Dies are

usually deckled with external or internal deckles or a combination of both.

## Your Advantages

- ✓ Various solutions for feedblocks, simple and technically advanced
- ✓ Flexible layer configuration
- ✓ Die splitting system for fast and easy cleaning



HORIZONTAL ROLL STACK ▲

## Roll Stacks

Precise temperature control for effective sheet cooling and best operability

The roll stack technology in SML's thermoforming sheet lines is characterised by precise temperature control for effective sheet cooling and the best operability. These are the key factors for outstanding product properties. The typical roll dimensions in SML's roll stacks are diameters between 400 – 715mm and widths from 900 – 1,800mm, while other dimensions are available on request.

### HORIZONTAL ROLL ARRANGEMENT

SML generally employs roll stacks with a horizontal roll arrangement in its high-performance sheet lines. At horizontal roll stacks, the melt flow from the die to the rolls follows gravity, avoiding undesirable effects such as the melt touching one of the rolls prematurely. The melt bank can be positioned on either roll, which allows maximum flexibility for the optimisation of product quality. Free access to the bolts of the hanging die provides maximum comfort and allows the easy integration of a die splitting device.

### VERTICAL ROLL ARRANGEMENT

Vertical roll stacks are frequently used by SML in its medium-performance sheet line range. The extruders can operate at a lower height, which allows favourably priced solutions. SML inline extrusion systems use a vertical roll stack with an integrated pull roll.

### ADDITIONAL COOLING ROLLS

Additional cooling rolls can be installed without compromising the process or the handling of the machine. The design of the additional cooling rolls and the relevant process settings define properties such as the surface, transparency and flatness; and frequently the mechanical properties of the sheet as well.

### SPG POLISHING FOR PERFECT SHEET THICKNESS PROFILES

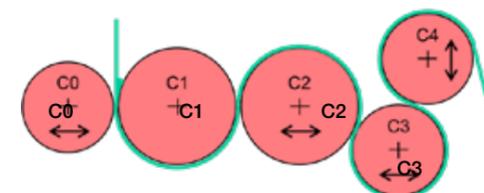
The specially designed SPG (Smart-Parallel-Gap) C0 polishing roll ensures a parallel gap between the rolls C0 and C1, since it deflects exactly, inverse to the C1 cooling roll. The parallel gap provides a perfect sheet profile with minimal operator intervention. This principle works for a wide range of sheet widths and nip pressures, allowing comfortable and quick changes of sheet thicknesses with minimal die adjustment.

### THIN SHELL ROLL TECHNOLOGIES FOR HIGHER PRODUCTION PERFORMANCE

Modern and reliable Thin Shell Roll technologies allow higher cooling rates and better heat uniformity at the sheet edges. This results in a better production performance, less edge trim and a better winding quality. In comparison to conventional rolls, Thin Shell Rolls do not require chilled water of a very low temperature level.

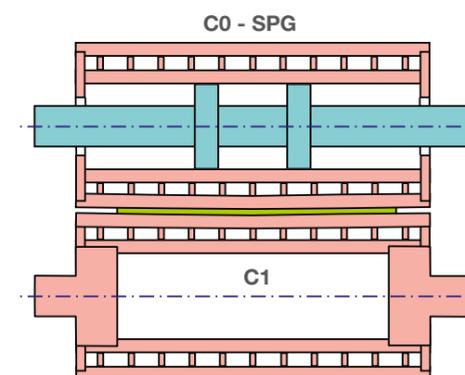
### SPECIFIC ATTRIBUTES:

- Thin Shell Rolls
- SPG roll
- Four roll gaps
- Additional cooling rolls
- Air knife
- Temperature control unit (TCU), either open or closed loop



## Your Advantages

- ✓ Superior product properties
- ✓ Maximum flexibility
- ✓ Quick change of sheet thickness with minimal die adjustment
- ✓ Less edge trim, better winding quality





MULTIPLE WEB WINDING ▲

## Gauging system

In answer to the various regulations in customer countries and to specific product needs, SML supplies different gauging systems:

- Inductive / capacitive sensors
- Radioactive Beta-ray sensors (Krypton 85 or Sr 90)
- X-ray sensors
- Laser shadow sensors

All these systems are available for dies with manual adjustment or automatic profile control. In order to maintain the average value of the thickness setting, they are equipped with a control for the speed of the main cooling roll C1.



Inline thickness measuring unit with inductive/capative sensor

## Edge trim cutting/removal

Edge trims are cut off by using static blades or motor-driven circular knives. A precise cut is required for excellent winding quality. The edge trim is usually pulled into an inline grinder and the regrind is then either filled into big-bags for interim storage or re-fed directly to the main extruder.





## Winding Systems

SML offers a wide range of different semi-automatic sheet winding systems, depending on customer requirements and the available floor space.

All winders for thermoforming sheet are designed and built 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 are known for an excellent production stability at an attractive cost level.

### ACCUMULATORS FOR CONTINUOUS OPERATION

Accumulators integrated in SML's semi-automatic winding systems work either from top to bottom with gravity, or from the bottom to top position. In that case, a torque-driven servomotor 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 both very easy and safe.

### Your Advantages

- ✓ Film capacity: 38m or 50m
- ✓ Access doors at operation side for easy sheet feeding into the accumulator
- ✓ Compact solutions for limited floor space



## Winder W500 A-frame

comfortable and economic

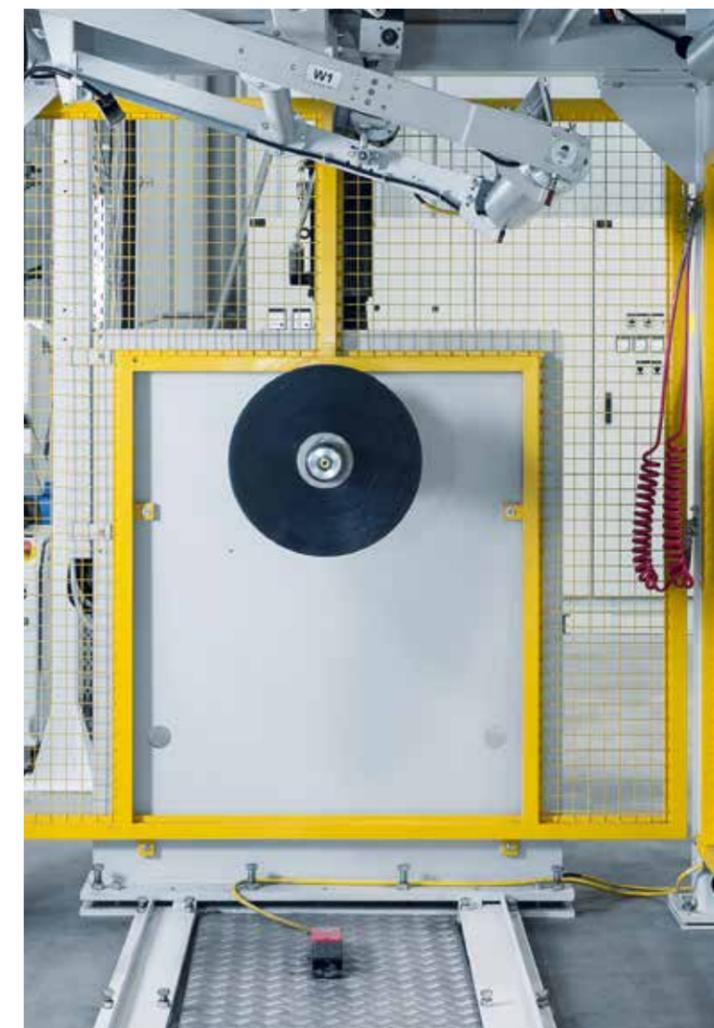
The winder W500 A-frame is a comfortable and economic solution for large roll diameters.

It is a single or multi web winder equipped with 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 has to 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
- ✓ Electrically-driven 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.

It 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 manually operated 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

maximum operator convenience

## Winder W550 combined A-frame / cantilever

Combining the advantages of the A-frame winder W500 and the cantilever winder W600.

The W550 stands for increased flexibility and production reliability when making 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 modified from an A-frame winder to a cantilever winder. The A-frame trolley only has to be moved out and the cantilever shaft is quickly fixed to the drive disc.



can be easily modified

### Your Advantages

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



Winding	W500	W600	W550
<b>Max. net film width</b>	950mm / 1,100mm	650mm / 950mm	950mm / 1,100mm
	1,300mm / 1,550mm	1,100mm / 1,300mm	1,300mm / 1,550mm
	1,700mm / 1,900mm	1,550mm	
<b>Number of webs</b>	up to 6	up to 3	up to 3
<b>Core ID (inch)</b>	3, 6, 8	3, 6, 8	3, 6, 8
<b>Thickness range</b>	250 - 2,500µm	250 - 2,500µm	250 - 2,500µm
<b>Max. mech. speed</b>	70 m/min	70 m/min	70 m/min
<b>Accumulator</b>	yes	yes	yes
<b>Max. roll diameter up to *</b>	1,200mm	1,000mm	1,200mm
	2,000mm		

(\* Depending on shaft diameter, roll width and number of webs)





E-CONTAINER ▲

## SMILE® control system

SMILE is SML's generic machine control and operation concept. It stands for all-encompassing automation, providing machine control systems with the highest usability in combination with outstanding capacities for profound process management and monitoring.

The end-to-end integration of third-party systems, overall line effectiveness, operator-friendliness as well as tailor-made and flexible software solutions are the key elements of SMILE.

SMILE is developed as a whole in-house and is integrated one hundred percent in SML's extrusion lines. It is the highly precise, centralised control and synchronisation of all components in an extrusion system, which is blazing the way to new manufacturing concepts as well as delivering product properties, line efficiency and output volumes.

### INTUITIVE MACHINE CONTROL CONCEPT

SMILE is an integral part of SML's coherent and user-friendly over-all line concept; machine control and operation is highly intuitive and self-explanatory:

- 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, less personnel required
- Remote control, remote update and remote service for minimised maintenance-costs, multi-client / multi-user capability

### 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



Control panel



### SYSTEMATISED 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 copy production parameters
- Documentation and detailed reporting of production processes
- Automatised alarm functions via e-mail or text message for quick debugging

### INTERCONNECTIVITY AND THIRD-PARTY INTEGRATION

SMILE has 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 UPC-UA
- Complete end-to-end process control beyond SML extrusion lines

### INTEGRATED ALL-IN-ONE CONCEPT

It is SMILE's all-in-one concept that helps to create completely new types of extrusion solutions, making one single operator-friendly step out of the most complex production processes. The control of temperatures, speeds and pressures on SML extrusion lines is highly centralised. All of the line modules and motors are perfectly interconnected and synchronised with each other.

### CENTRAL CONTROL STATION SYSTEM

SMILE's central control station system allows the management of all of the production processes from the wide touch screen attached to the line. As SMILE is web-based, all of the production and maintenance processes can be entirely remote controlled, i.e. 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.

### OPEN FOR CUSTOMISATION

Developed in close consistency with the hardware components of SML's extrusion lines, SMILE is highly customisable. It is SML's flexibility that offers a wide range of opportunities if customer-specific solutions are required.

### SOFTWARE 100 % DEVELOPED IN-HOUSE

Above all, it is SML's long-standing in-house competence in the field of automation and machine control that provides loads of innovative functions tailored to specific customer requirements. In-house developed, state-of-the-art and dynamic controller systems always allow running the machines at their very best performance-level – considering both economic and environmental aspects. All of SMILE's software solutions are developed by SML technicians. Last but not least, it is SML's concentrated know-how in any aspect of automation, that helps to create the extrusion solutions of tomorrow.

### SMILE SOFTWARE FEATURES

- ▶ Central control station system for all production processes
- ▶ Full interconnectivity – global UPC-UA, programmed on HTML5, open interface to other machines and systems
- ▶ Remote access for operators and service teams – worldwide via the internet, from any PC, laptop or most smartphones
- ▶ Multi-client / multi user capability – simultaneous access for different type of users, simple assignment of permissions
- ▶ Highest comfortability – visualisation of all production processes on a wide screen
- ▶ Worldwide possibility of remote update for customisation and technical support

### SMILE HARDWARE FEATURES

- ▶ The hardware components of SMILE are supplied by B&R Industrial Automation GmbH, a member of the ABB group, a global leader in automation.



## bitWise data analytics

bitWise is SML's digital transformation solution for extrusion lines. It breathes life into the buzzword **"Industry 4.0"**. bitWise provides for a wide range of entirely new opportunities for data driven decisions with a clear focus on the optimisation of production processes and the final product. Completely developed in-house, it incorporates SML's decades of experience in automation with the latest technologies in data analytics and visualisation.

### IN-DEPTH PROCESS INSIGHTS

SML extrusion lines are equipped with hundreds of data-generating sensors. Following the principle of **"stop guessing – start knowing"**, bitWise collects, records and visualises this data up to 10 times per second. This gives manufacturers a 360 degree in-depth view of all of the details involved in a production process, both in the present and in the past.

### OPTIMISING QUALITY

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

- In-depth monitoring of all quality-related process parameters, allowing quick corrective action
- Comprehensive tracking and documenting of product quality
- Making quality reproducible

3871  
qhObwH

Position:	B4_1
Width:	500
Weight:	17.6
Diameter:	234
Endtime:	10.9.2019, 15:55
Length:	2665
Length difference:	0
Rolls:	4
Order Nr.:	bitWise
Quality:	excess length
Recipe:	12mic_K-Show
Shaft:	4
Shift:	KW37
Starttime:	10.9.2019, 15:51
Station:	B
Tags:	show, lab
Thickness:	12.6
Trial:	K-SHOW_12mic
Trigger:	meter

SHOW METRICS

GENERATE A REPORT

### MAXIMISING OUTPUT

Data recorded, aggregated and visualised by bitWise helps to raise overall line utilisation and deliver 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 of production processes.

- 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

### ON-PREMISE SOLUTION

bitWise is a 100 % on-premise solution. Your data stays in your company, on dedicated and secured hardware, no cloud services required.

### CUSTOMISATION AND RETRO-FIT

As with most technologies developed by SML, bitWise is highly customisable. bitWise can be retro-fitted to many existing SML extrusion lines optimising production processes, cutting costs, raising the OEE and ROI of existing investments.

### OPEN FOR VERTICAL INTEGRATION

Extrusion lines are a key part in a wider production chain. For end-to-end optimisation, bitWise supports data exchange and vertical integration with third-party systems, e.g. Manufacturing Execution Systems (MES), Enterprise Resource Planning (ERP) or Quality Assurance (QA).

HIGHEST QUALITY PRODUCTS



NOTES:

# SML

EXTRUSION LINES – ENGINEERED TO PERFORM ▶

#### **SML - Head Office**

SML Maschinengesellschaft mbH  
Gewerbepark Ost 32  
4846 Redlham, Austria  
Phone: +43 7673 90999 0  
E-mail: [sml@sml.at](mailto:sml@sml.at)  
[www.sml.at](http://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 Darul Ehsan,  
Selangor, Malaysia  
Phone: +60 3 7955 9098  
Fax: +60 3 7955 9981  
E-mail: [yen@sml.at](mailto: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](mailto: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](mailto:sml@sml.bj.cn)

#### **SML - North America Service Inc.**

Suite 204  
85 Eastern Avenue  
Gloucester MA 01930  
USA  
Phone: + 1 978 281 0560  
E-mail: [jom@sml.at](mailto:jom@sml.at)

100%  
eXtrusion  
SHEET LINES

ANALYSES | DEVELOPMENT

PRE-TESTED PERFORMANCE | DELIVERY ON TIME

SERVICE SUPPORT | CUSTOMER SATISFACTION

[www.sml.at](http://www.sml.at)