



100%
eXtrusion
CAST FILM LINES

HYGIENE FILM

LINES FOR HYGIENE BACKSHEET



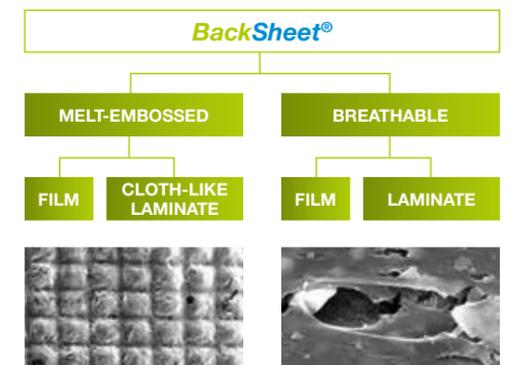
INTRODUCTION

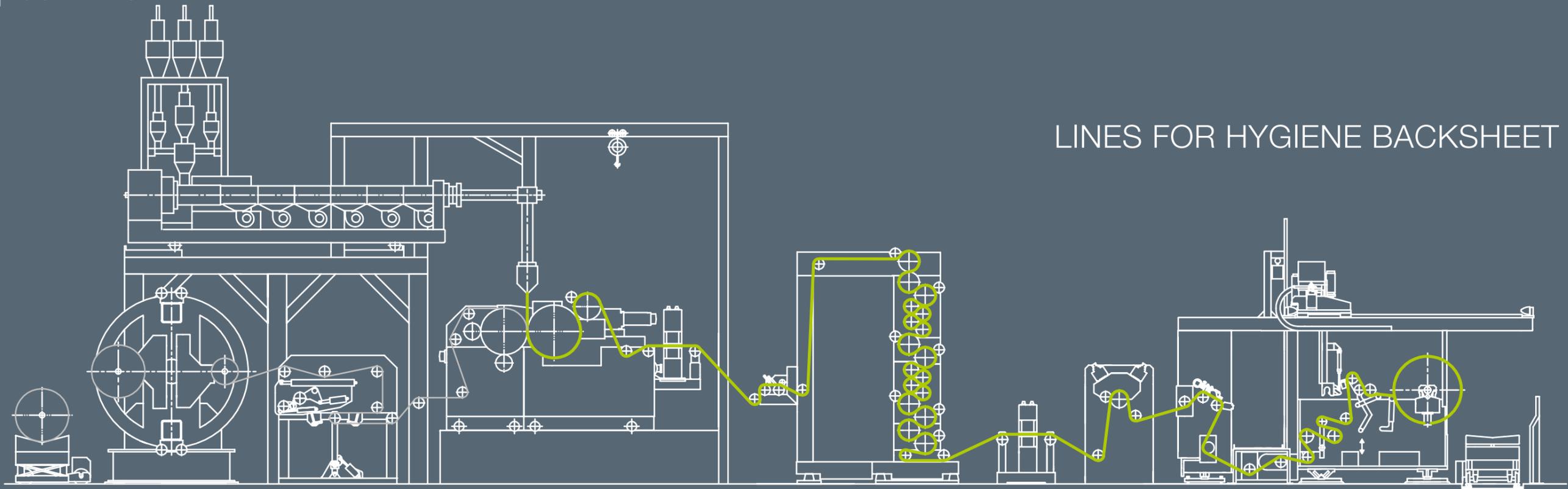
The use of hygiene products is steadily expanding worldwide. While growth rates in the developed markets are consistent, major new demand is coming from the rapidly growing populations in Asia, Africa and Latin America.

Higher living standards lead to a desire for greater convenience with regard to the use of disposable hygiene products. Breathable film, melt embossed film or cloth-like laminates are used for backsheets in baby diapers, for incontinence products, sanitary napkins, protective clothing, nursing pads, disposable bed pads and change mats.

The cast film process is the most cost-efficient method of producing backsheet film. Depending on the market volume and the variety of products, one or more downstream processes, such as lamination, printing or slitting, may be included.

SML is well prepared to integrate such processes into its extrusion lines, in order to offer optimized, individual solutions. Moreover, modular line design allows the realization of „all-in-one“ production lines for all the types of hygiene films shown here.



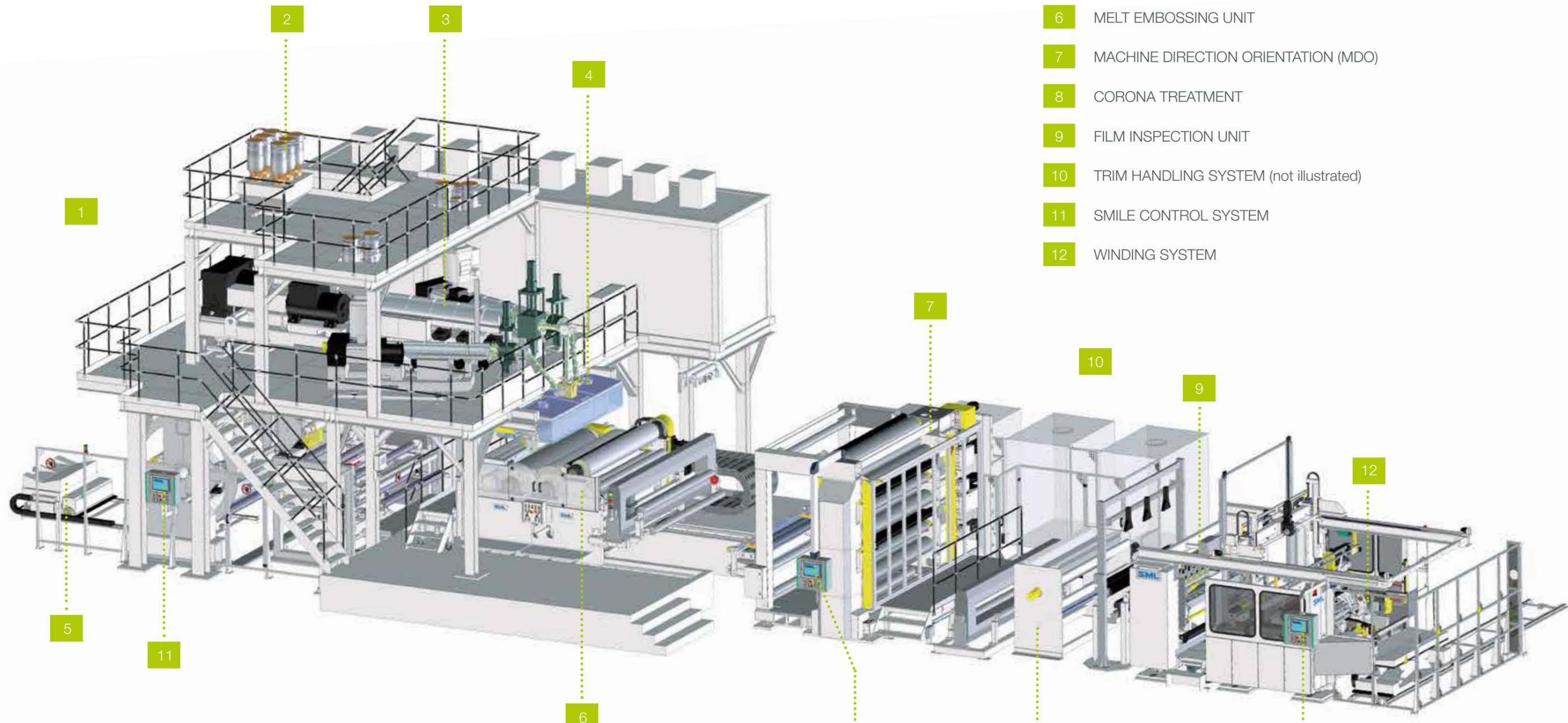


LINES FOR HYGIENE BACKSHEET

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dry air drying system



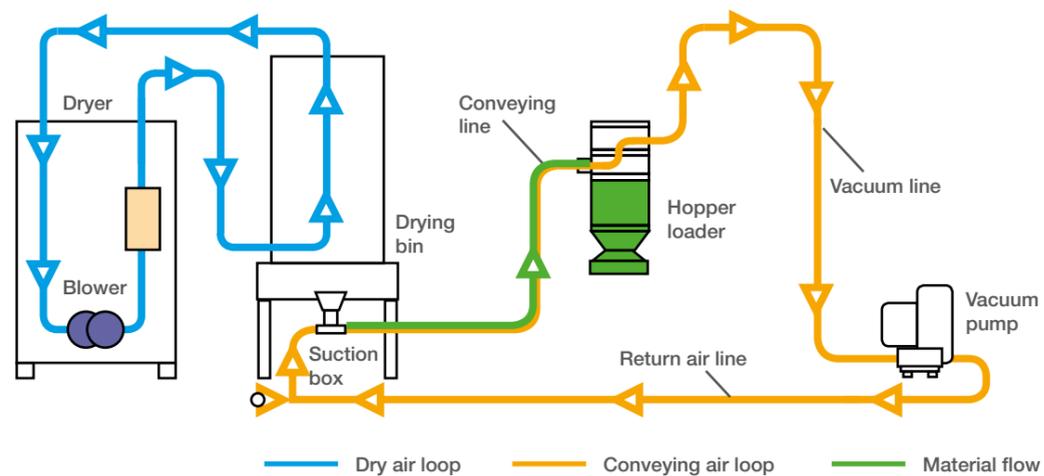
multilayer extrusion unit

1 RAW MATERIAL DRYING SYSTEM

Compounds with a high CaCO₃ content are used for breathable hygiene films. The mineral fillers are hygroscopic and must be dried prior to the extrusion process. SML employs economical and highly energy-efficient dry air systems for this purpose.

Adequate drying is a precondition for good film quality.

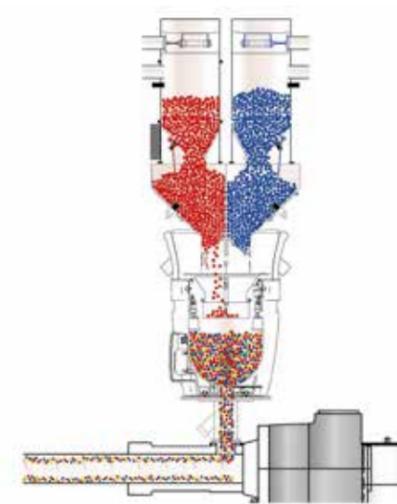
After drying, the material is fed to the extruders by dehumidified air, which guarantees that the material does not reabsorb moisture. This system consists of 2 dryers - one for virgin material and the second for the recycled material.



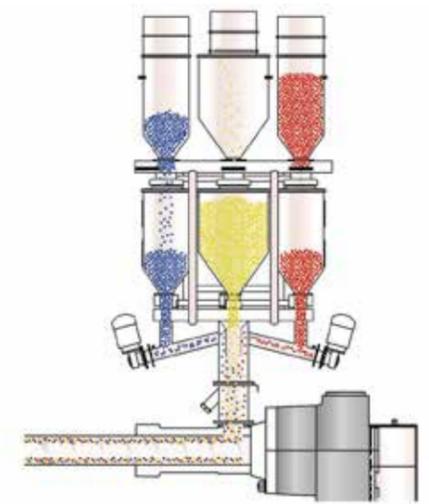
2 RAW MATERIAL FEEDING AND DOSING

In view of the fact that raw material makes up for the major portion of the cost for the production of hygiene films, it is essential to ensure efficient use in every film layer. A wide range of gravimetric batch blenders and continuous gravimetric feeders, suitable for high-temperature polymer processing, and with up to six components per extruder, enable recipes to be run with great accuracy and repeatability.

Moreover, the complete dosing system, as well as all the material supply vacuum pumps, filters and valves, are fully integrated into the SMILE control system.



gravimetric batch dosing system



continuous gravimetric dosing system



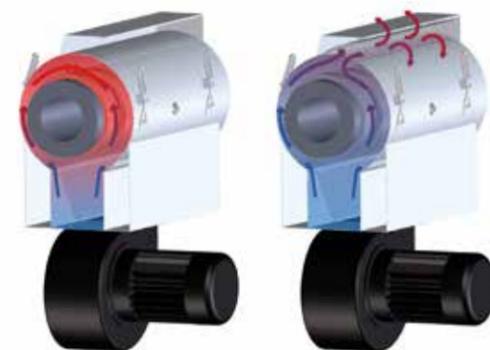
extrusion tool unit

3 EXTRUSION EQUIPMENT

SML extruders for hygiene films are of universal design and suitable for all relevant polymers and compounds which are used in this market. A selection of standard versions is available, with screw diameters ranging from 60 to 150mm. As a rule, the extruders with a 33 L/D ratio and bimetallic barrels are powered by energy-efficient, low-maintenance, water-cooled AC motors.

All extrusion screws have armoured flights, in order to increase their service life. This is most important, owing to the high mineral filler content of the used compounds. The screws also have a special design to improve the mixing of the different raw material used for hygiene films.

All extruder barrels are heated using the SML advanced heating system. A gravity-closing flap prevents escape of hot air from the system, thus retaining the heat in the barrel.



SML advanced barrel heating systems

Effective melt filtration, for the removal of impurities, unmelted or cross-linked particles, is most important. SML installs hydraulic piston filters in its hygiene backsheet lines. Optionally all adapters can be equipped with insulation between extruder and feedblock.

EXTRUDER CHARACTERISTICS:

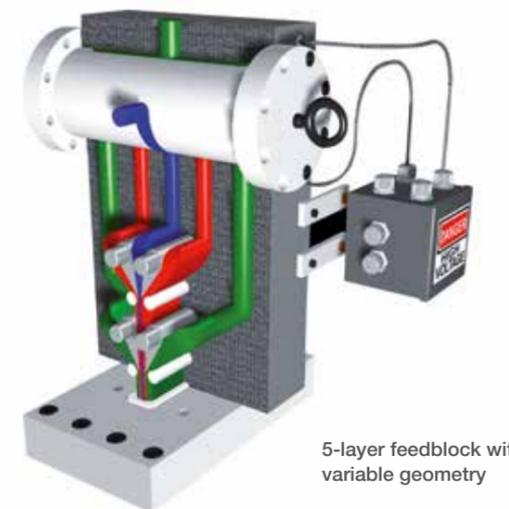
Extruder size	60/33	75/33	90/33	105/33	120/33	135/33	150/33
PE+CaCO ₃ -compounds for breathable film [kg/h]	135	235	330	500	600	700	900
LDPE/HDPE/PP-blends for melt embossed film [kg/h]	125	210	300	420	550	650	800



SML die splitting system

4 FEEDBLOCK AND FLAT DIE

As the leading supplier of hygiene film lines, SML relies exclusively on respected partners for its feedblocks and flat dies.



5-layer feedblock with variable geometry

A 3-layer feedblock with two extruders is standard for the production of breathable film, while a 3-layer feedblock with three extruders is needed for cloth-like laminates. In the past, the melt embossed film had a 3-layer structure, but in order to allow down-

gauging of the film weight and to achieve enhanced film properties, 5-layer feedblocks with three extruders are generally installed today.

Our co-extrusion flat dies with a T-shape channel are capable of incorporating fixed or variable internal decking systems. This feature facilitates the efficient variation of the net film width.

Depending on the manufacturer, dies are either chrome- or nickel-plated, but in both cases automatic die-control via electrically heated bolts is standard.

DIE SPLITTING SYSTEM

The die splitting system enables quick and safe die opening for cleaning purposes. The die remains in its original position, the machine continues to be heated.



unwinder for
nonwoven

5 UNWINDER FOR NONWOVEN

A fully automatic unwinder is integrated into the design of lines for the production of cloth-like laminates. The PowerFlex turret unwind can be used for substrates with a maximum roll diameter of 1,500mm. Core clamping is done shaftless, with pneumatic actuated chucking heads, which can be equipped with adaptors for all common core diameters. For loading and unloading, integrated lifting tables are employed, which bring maximum flexibility and minimum changeover time for roll handling.

An ultra lightweight carbon-fiber dancer roll controls the unwinding tension, while the non-woven roll is center-driven by an AC servo motor. For the splice, the new roll is automatically synchronised to line speed. Splicing is done with a driven bump roll and a pneumatically operated chopping knife. With a defined splice geometry and a position detection, the splice length is minimized.

Each unwinding position is motor-positioned in cross direction and can be linked to an edge guiding system for appropriate positioning, to avoid additionally required guiding equipment.



melt embossing
unit with thickness
measuring frame

6 MELT EMBOSSING UNIT

Apart from the extrusion section, the melt embossing unit has a significant influence on the final product quality.

SML USES THE DRY EMBOSSING PROCESS, WHICH OFFERS NUMEROUS BENEFITS IN COMPARISON TO THE WET PROCESS:

- No water on the surface of the silicone roll
- Lower embossing pressure => long service life of the silicone roll
- Less maintenance
- No water treatment required
- No water sediments in the line and on the product
- Uniform of the film coefficient of friction (COF)

The unit consists of a silicone pressing roll, an embossing roll and a post-cooling roll, which are all equipped with separate water temperature control systems and AC drives.

The surface of the silicone pressing roll is contact-cooled by two steel support rolls. The pattern on the embossing roll is imprinted on the film surface and determines gloss and roughness.

Both the embossing and the silicone pressure rolls are equipped with a quick-change system, that facilitates fast roll changes for different end-product surfaces.

The nip pressure between the rolls is individually adjustable on both sides and thus guarantees uniform embossing of the film across its entire width.

For the production of cloth like laminates a nonwoven reel gets unwound and will be coated with an extruded film in the melt embossing unit.

For breathable film production the melt embossing unit allows higher production speed and results in a softer film, which is wanted for baby diapers. The complete melt embossing unit is in horizontal and vertical direction and the actual position of the unit is displayed in the control unit and in the line protocol.



clothlike production

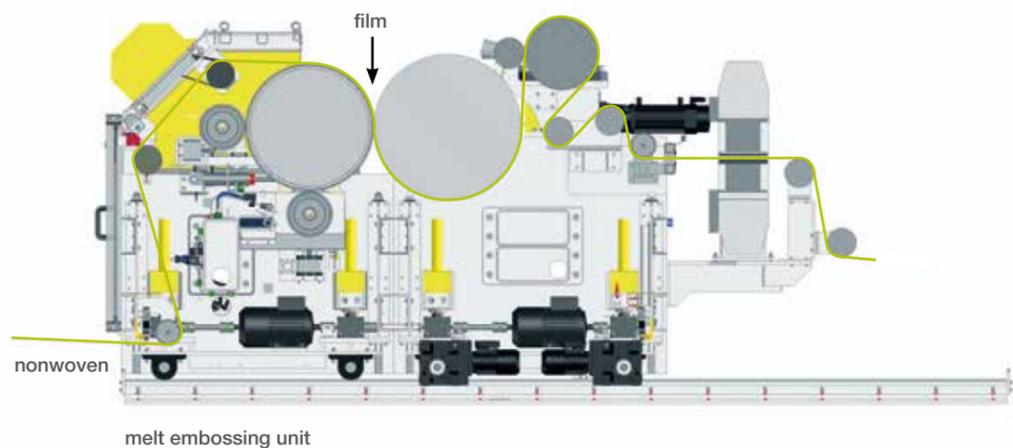
The unique design of our melt embossing unit enables the production of the three main backsheet products for the hygiene industry on the same line!

- melt
- clothlike
- breathable

SML places the thickness-gauge unit directly on the chill roll frame behind the last chill roll, to achieve the shortest possible

distance from the extrusion die to the measuring point. This results in minimum space requirements and very accurate film thickness regulation. SML supplies automatic gauging systems with beta-ray sensors.

After leaving the melt embossing unit, the film is guided to the winder via cut-resistant guiding rolls. These have a specially-hardened surface for high film grip and long service life!



MDO unit

7 MACHINE DIRECTION ORIENTATION (MDO)

SML has accumulated 45 years of experience in the stretching of films and has designed excellent MDO units for a wide range of applications. The MDO process creates micro-pores in the film, which make it breathable. The water column and the water vapour transmission rate (WVTR) can be adjusted by means of the recipe and the stretching ratio.

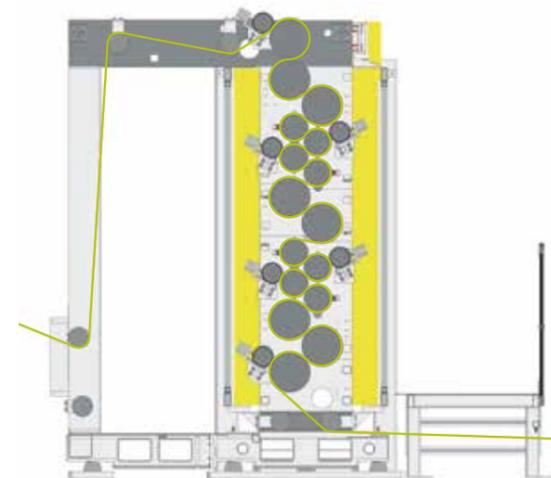
The modular design of the MDO allows the retrofitting of preheating or annealing rolls. For comfortable line start-up, the unit is equipped with a manual film feeding device. There is also a MDO unit with one gap available.

THE MDO UNIT FOR BREATHABLE FILM CONSISTS OF A MASSIVE, MODULAR MACHINE FRAME THAT INCLUDES:

- A preheating section
- The first stretching section
- The intermediate annealing section
- The second stretching section
- The final annealing and cooling section.

The two stretching sections allow for more flexibility with regard to the processing window, for the differing compounds used in the production of breathable films.

All rolls are separately driven and temperature-controlled. Good film preheating and annealing are very important with regard to mechanical properties and the further production steps for hygiene products.



MDO unit for breathable film



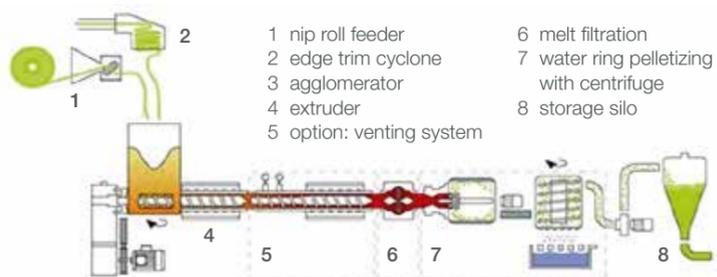
corona

8 CORONA TREATMENT UNIT

In order to prepare the films for subsequent offline-printing processes, it is necessary to install a corona treatment unit. This is equipped with an electrically driven, water-cooled treatment roll and a nip roll to avoid backside-treatment of the film.

9 FILM INSPECTION SYSTEM

An optical film inspection system facilitates quality and process control for all hygiene products. The system is installed directly in front of the winder and consists of an illumination bar and cameras. The measurements of the inspection system are displayed on a separate screen and can be stored for documentation and quality control.



edge trim recycling unit

10 TRIM HANDLING SYSTEM

The edges of the film are first trimmed before the stretching or the corona unit and a final trim is cut directly at the entrance to the winder. Naturally, all the edge trims can be re-fed to the main extruder, which ensures the cost-efficiency of the production line.

The edge trims are transported to the agglomerator of the recycling unit by a blower system. Afterwards the recycling unit melts and repelletizes the edge trims, which are then dried and sucked to the dosing station of the main extruder.

Great flexibility offers the recycling unit with regard to the use of recycled pellets on different extruders. In addition, it is the most efficient solution as far as product changes during film production and the reuse of waste and off-spec rolls are concerned.

If the line is also designed for breathable film, the recycling unit is equipped with a venting unit at the barrel.



e-container

11 SMILE CONTROL SYSTEM

An innovative, intuitive and operator-friendly human-machine interface (HMI) with two 17-inch touch screens provides all the functions needed by operators and maintenance personnel to handle the complete line. Everything, from the input of the ratio of each raw material to the parameters of the winder can be dealt with from the main terminal, which is located in the casting section. A second touch screen at the winder that is linked to the main terminal allows winding parameter adjustment directly in the field of vision for the process.

Different access levels and features such as alarm management, recipe administration and remote service via ethernet/internet are standard. For extended trend analysis and quality documentation, data can be transferred to a data logging system via a separate PC, or existing data collection systems. The electrical equipment is either installed in an e-container or, depending upon the space requirement, in e-cabinets. Both customised solutions are supplied complete with electrical engineering, wiring and air-conditioning equipment. Only first choice and proven components are used for each device.

ADVANTAGES
<ul style="list-style-type: none"> Centrally operated touch-screen monitor, displaying all relevant data
<ul style="list-style-type: none"> Central control of all production parameters
<ul style="list-style-type: none"> Industrial Ethernet Powerlink connection to decentralised I/O points
<ul style="list-style-type: none"> Process data analyses
<ul style="list-style-type: none"> Integrated OEE (Overall Equipment Effectiveness)



control panel



12 WINDING SYSTEMS

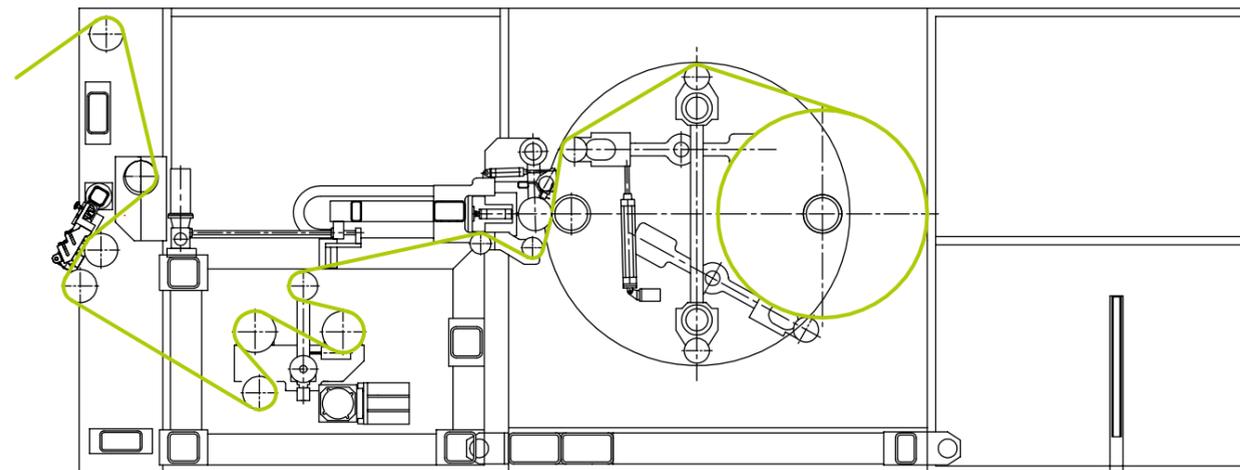
SML offers different types of winders for the production of hygiene films and laminates, such as turret winders for mother rolls and horizontal sliding winders for slit roll production.

For many years, SML has invested major efforts to build its own peak performance winders. Every new product, idea or requirement, which is spotted in the market, or is the object of a customer inquiry, is passed on to the R&D department. Following a detailed evaluation, SML then upgrades its winders with corresponding new features.

SML has developed different winding systems that focus entirely on the demands of film producers and their customers. All these winders have a solid, vibration-dampening steel frame con-

struction, which is able to resist the dynamic forces that are generated at high production speeds.

Each winder is equipped with a large, 17-inch touch screen.



WINDER W1050

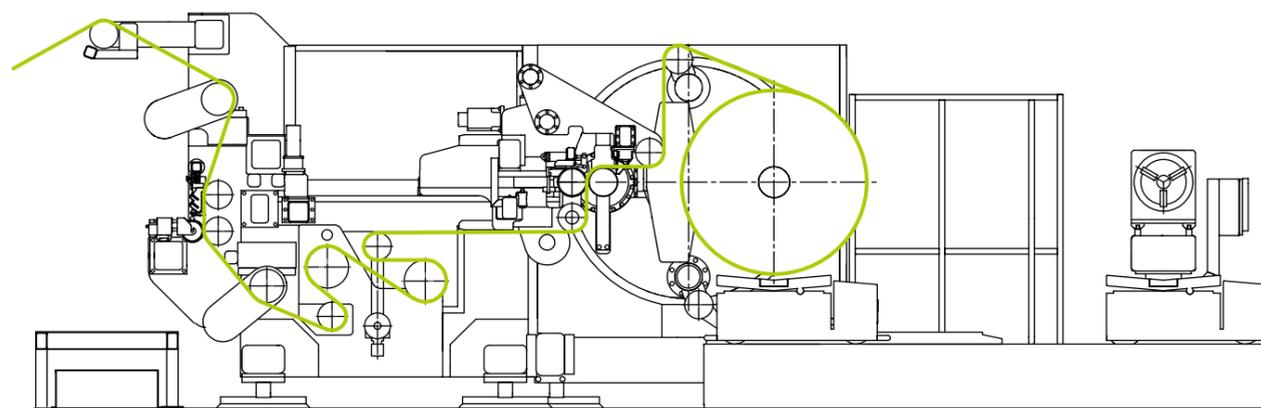
The winder W1050 is the basic turret winder for the production of thin castfilm mother rolls on 6-inch shafts, with a maximum winding diameter of 1,000mm.

An ultra lightweight dancer roll controls film tension, while the shaft is center-driven and the film is wound onto the roll in either a gap or contact mode.

Film cross-cutting is performed by a twisting knife and as a standard feature, the new winding core is prepared with double-sided adhesive tape.

As an option, the film can be fixed onto the new winding core by means of electrostatic charging, thus making core preparation unnecessary.

During indexing, the incoming film is attached to the surface of the finishing roll with an auxiliary contact roll. The finished roll is removed by a semi-automatic trolley.



WINDER W1200

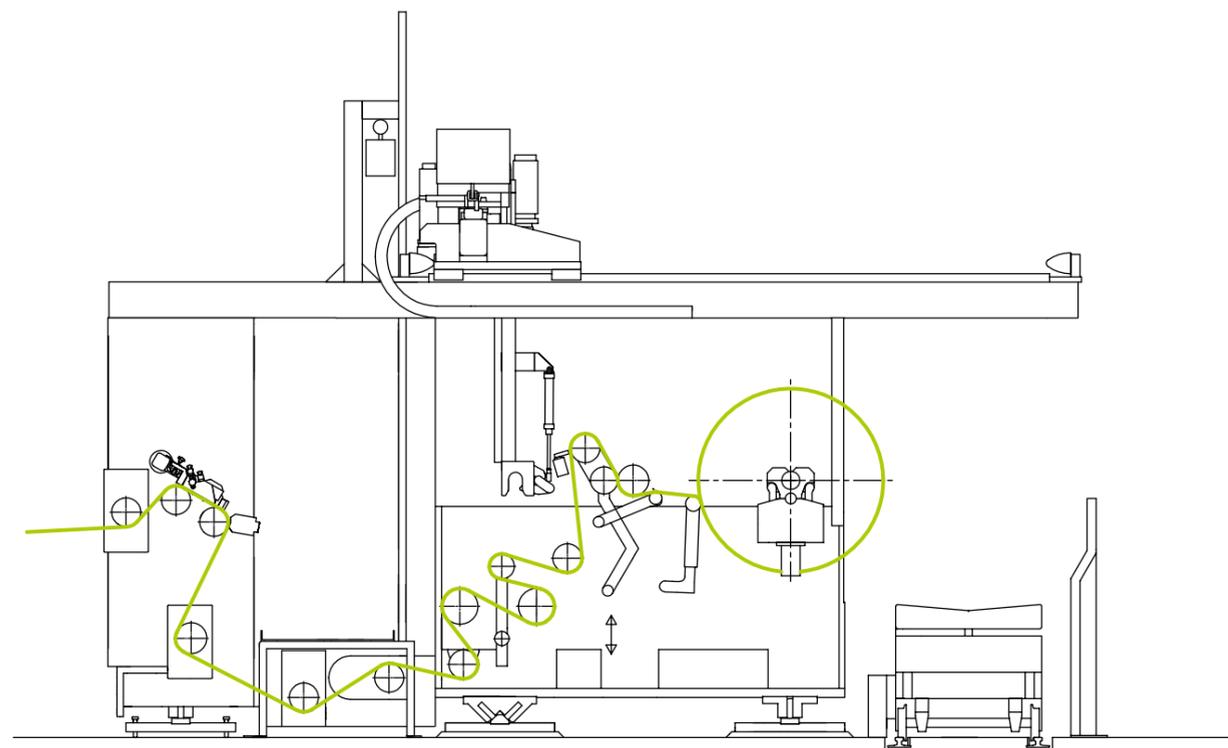
The winder W1200 is the thin film turret winder for large widths of up to 5.2m and maximum roll diameters of 1,200mm.

An ultra lightweight dancer-roll controls the film tension, while the shaft is center-driven and the film is wound onto the roll in either a gap or contact mode.

Film cross cutting is performed by a twisting knife and as the film is fixed onto the new winding core by means of electrostatic charging, no core preparation is necessary.

During indexing, the incoming film is attached to the surface of the finishing roll by an auxiliary contact roll. This winder can either be operated with winding shafts or shaftless.

A semi-automatic trolley, together with a shaft pulling device, is available as an option for the handling of heavy rolls or shafts.



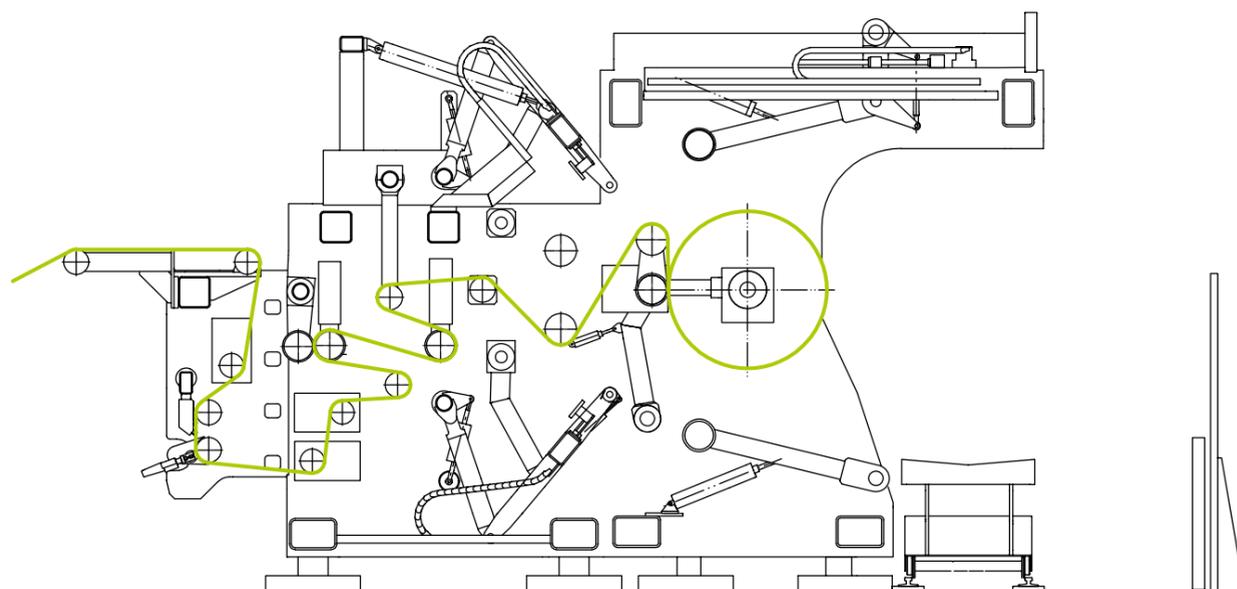
WINDER W2000 AEROFILM

The winder W2000 aerofilm is a horizontal sliding winder for the inline-slitting of part rolls to narrow widths. With over seventy units running in the field, the winder W2000 is the most popular and proven winder for cast film. Owing to the principle of horizontal shaft movement, the roll remains in an optimum winding position until the very last moment before cross cutting, thus guaranteeing perfect winding quality up to the last layer on the roll.

The winder W2000 aerofilm is designed especially for the winding of thin hygiene films and laminates, and is equipped with a twisting knife and an ultra lightweight dancer roll, for sensitive tension control. The film is fixed onto the new winding core by means of electrostatic charging and therefore no core preparation is necessary. A satellite roll optimizes the entrance angle of the film to the roll, which minimizes air entrapment between the layers.

The slitting process is completed without bleed trim cutting, adjustable banana rollers separate the inline slitted rolls. Depending on the product, slitting stations with razorblades or circular knives are integrated at the winder entrance.

The finished rolls and the winding shaft are transported onto a moveable lifting table by an overhead robot, which pulls the rolls from the clamped shaft. The complete roll and shaft handling process is fully integrated into the automatic mode of the winder.



WINDER W5000

The latest SML development is the winder W5000, a linear turret winder (LTW), which combines the advantages of a horizontal sliding and a turret winder and sets new winding standards for cast film. The winder W5000 is a turret winder which, prior to cross-cutting reduces the free length of the web to a minimum by means of individually moveable winding stations, which guarantees perfect winding quality up to the last layer on the roll.

Before roll changes, the active roll moves horizontally into the centre of the turret, which prevents any further movement while the new shaft is turned into the cutting position by the turret. In addition, as soon as the roll leaves the stationary main contact roll, an auxiliary contact roll guides the film.

The film is cross-cut by a twisting knife.

After cross-cutting, the finished roll is again moved horizontally from the central to the outer removal position and is then pulled from the shaft by a lifting trolley. The winding shaft constantly remains fixed on one side of the winder, which allows a higher load and less deflection as compared to conventional winding systems. In particular, larger diameters can be achieved for inline slit rolls.

Another feature of the winder W5000 is the possibility of installing an additional cutting unit, which then provides the ability for winding in both directions. If 3-inch shafts are used on a large width, a centre support with adjustable positioning can be installed.

Inline-slitting can be carried out without bleed trim and, depending on the product, slitting stations with razorblades or with circular knives are integrated at the winder entrance. The complete roll handling process is fully integrated into the automatic mode of the winder.



THE MAIN FEATURES OF THE WINDER W5000 ARE:

- A maximum winding diameter of up to 1.6m
- Inline slitting without bleed trims
- Clockwise and counterclockwise winding direction
- Auxiliary contact roll for perfectly finished rolls
- Center support for increased winding diameter on 3-inch cores

Winding	winder W1050	winder W1200	winder W2000	winder W5000
Film weight range	12 - 100 g/m ²	12 - 100 g/m ²	10 - 100 g/m ²	10 - 100 g/m ²
Maximal mechanical speed	400 m/min	400 m/min	500 m/min	500 m/min
Maximal winding width	2,800mm	5,200mm	2,800mm	6,200mm

Winding on 3-inch	optional	no	yes	yes
Winding on 6-inch	yes	yes	yes	yes
Max. mechanical diameter ¹	1,000mm	1,200mm	1,300mm	1,600mm
Winding direction	top outside	top outside	top inside	both

Winding tension	10 - 100 N/m			
Contact roll pressure	50 - 300 N/m			

Roll handling	semi-automatic	semi-automatic	automatic	automatic
Oscillation	frame	frame or winder	frame or winder	frame or winder

¹ Depending on end film width and product

HIGHEST QUALITY PRODUCTS



SML

EXTRUSION LINES – ENGINEERED TO PERFORM ▶

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