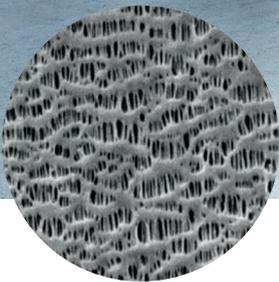
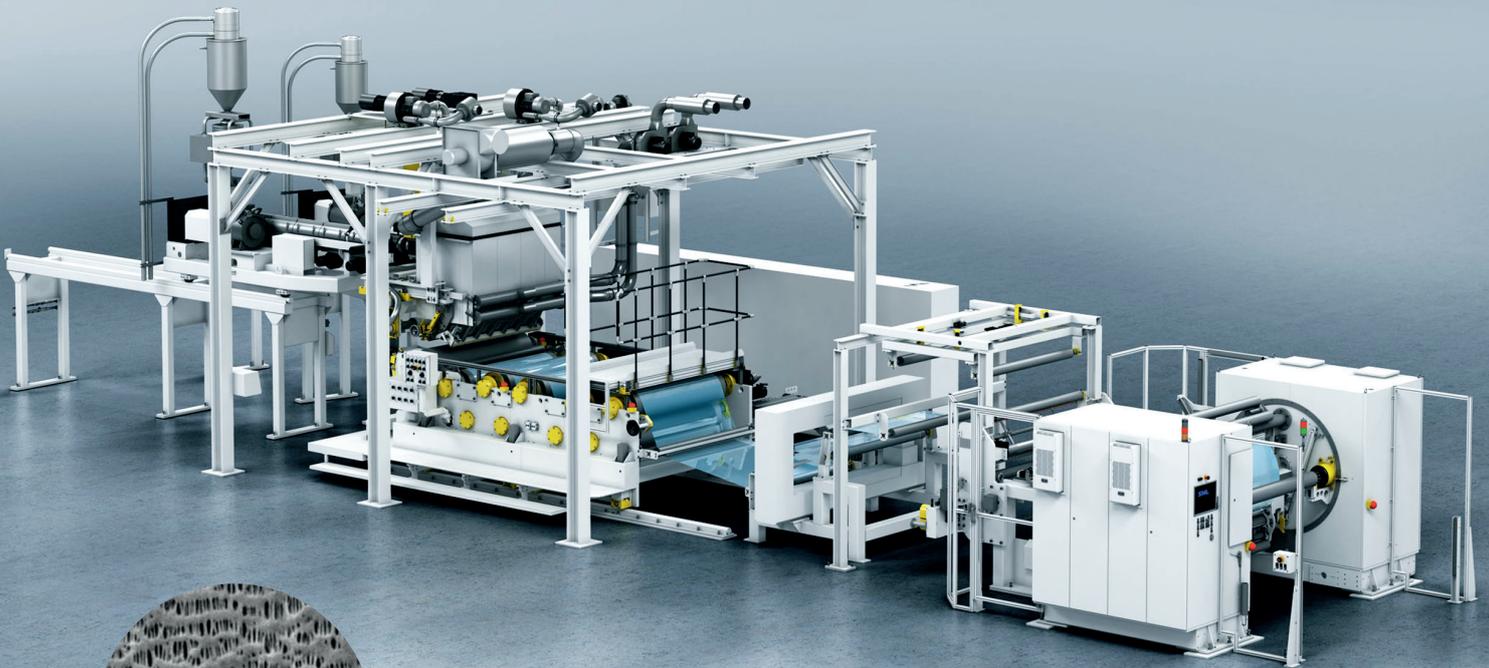


# SML

EXTRUSION LINES – ENGINEERED TO PERFORM ▶



LiBS

LITHIUM ION BATTERY  
SEPARATOR FILM (LIBSF) LINE

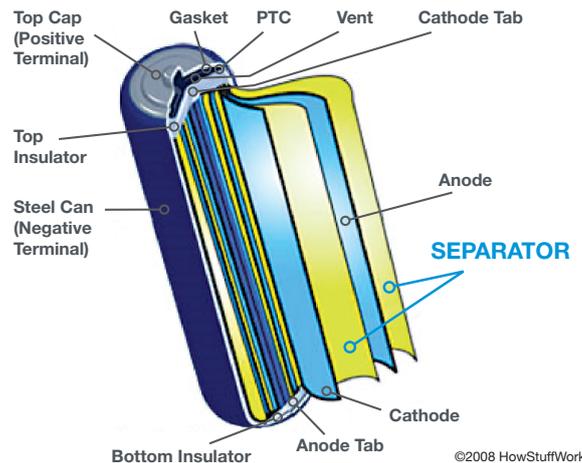
The market for lithium ion battery separator film is growing steadily, as the film is used in rechargeable batteries for mobile phones, laptops, e-vehicles and hybrid cars. The battery separator membrane is a microporous film that is inserted between the positive and the negative electrode in a liquid, electrolyte gel, or molten salt battery. Its function is to prevent physical contact between the positive and negative electrodes, while serving as an electrolyte reservoir to enable free ionic transport.



Microporous membranes are characterized by their thickness (between 10 and 40µm), small pore size (<1µm) and low porosity (~40%).

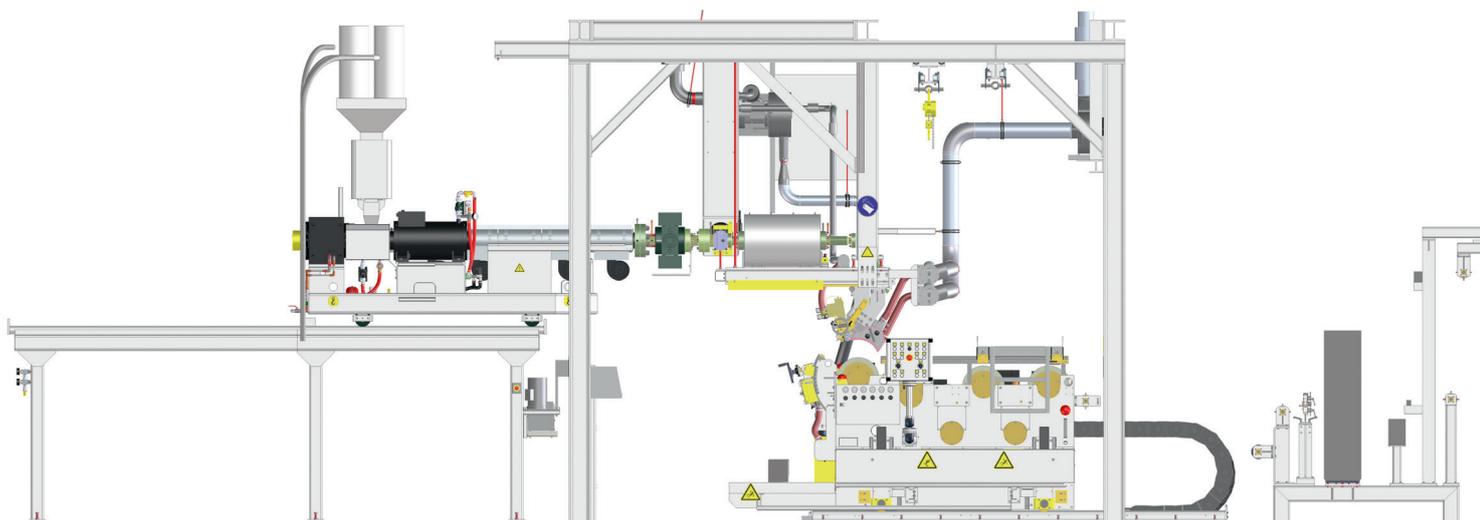
Either a dry or wet production process is used, both of which include an extrusion step to create a thin film and employ one or more orientation steps to generate the pores.

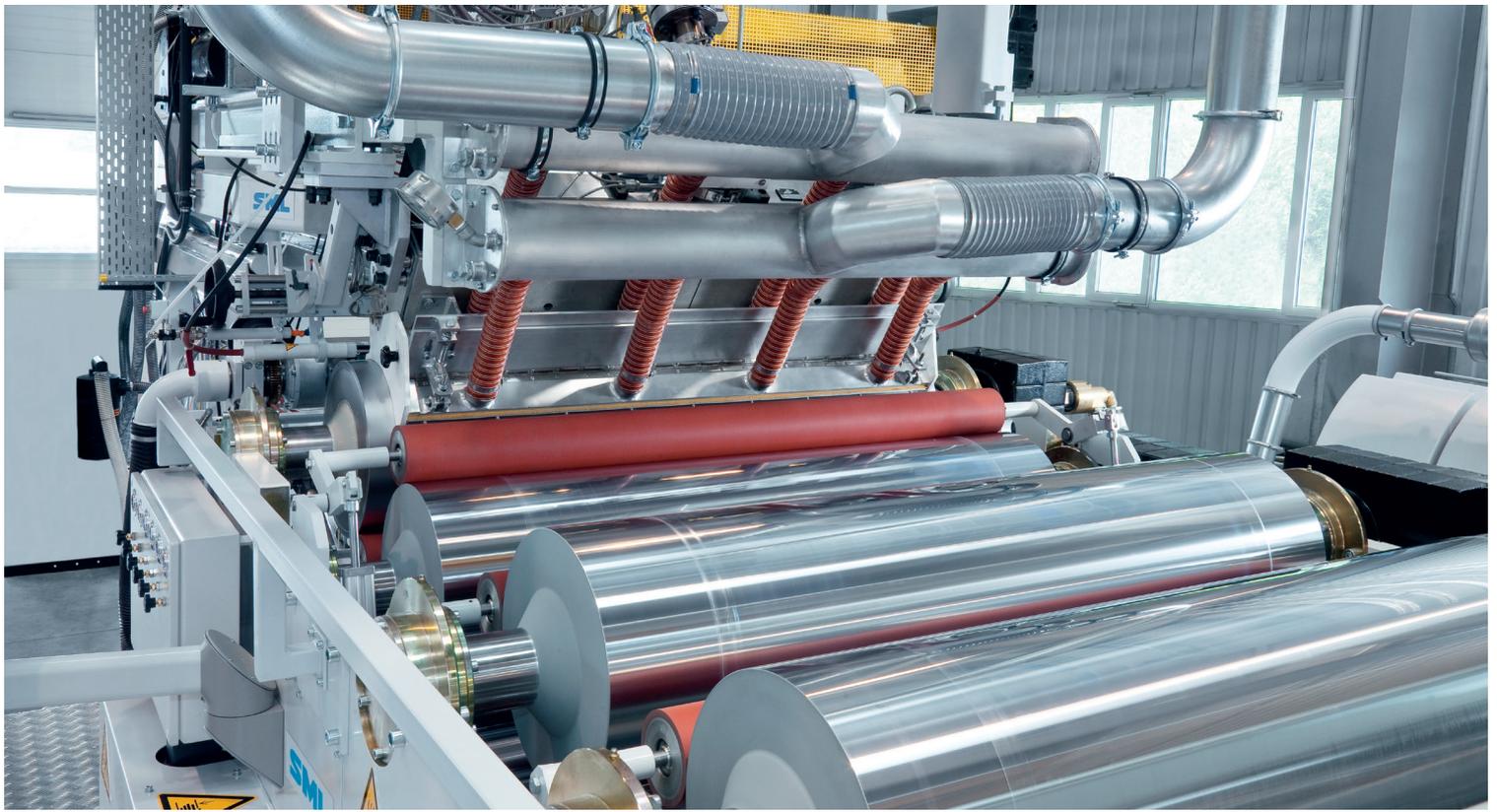
SML provides dry process extrusion lines for the production of mono-layer or co-extruded battery separator films.



### THERE ARE THREE MAIN PRODUCTS ON THE MARKET:

- PP-based mono-layer film
- PE-based mono-layer film
- PP-PE-PP three-layer film





### EXTRUSION:

- Fully integrated extruder mounted gravimetric dosing system
- Single screw extruders or twin screw extruders
- Hydraulic piston filter, melt pump and disk or candle filter
- Inline die splitter for easy die cleaning
- Automatic coat-hanger-die or 3-layer-multi-manifold-die
- Double chamber vacuum box with two exhaust van

### TAKE-OFF AND ANNEALING STATION:

- Electrostatic and pneumatic edge pinning system
- Airknife or softbox for film fixing
- 6 to 10 annealing and cooling rolls, individual driven and tempered
- Rubberized nip roll at each annealing and cooling roll

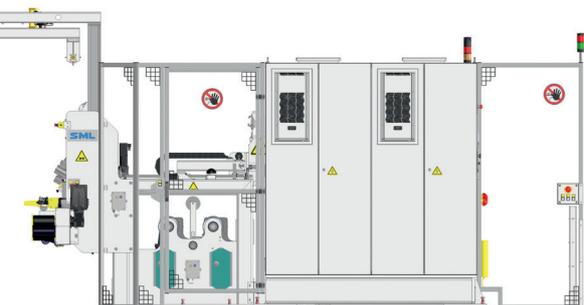
### THICKNESS MEASURING UNIT:

- Frame with beta sensor (Kr-85) or IR-sensor or x-ray-sensor
- Automatic profile control system
- Film inspection system

### WINDER:

- Fully automatic turret winder W1050
- Integrated edge trim cutting
- S-wrap for tension separation
- Ultra-light carbon-fibre dancer roll
- Contact and gap winding mode
- Low winding tension and low contact pressure adjustable
- Shaftless core clamping
- Cross cutting with twisting knife

Future trends are moving in two directions. The first involves a reduction in film thickness, which is necessary for small, high-capacity rechargeable batteries like those used in mobile phones. The second relates to extra-thick separators, which are required for applications such as e-vehicles.



# SML

EXTRUSION LINES – ENGINEERED TO PERFORM ►

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

Bundesstrasse 1a  
A-4860 Lenzing, Austria  
Phone: +43-7672-912-0  
Fax: +43-7672-912-9  
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)

100%  
eXtrusion  
CAST FILM LINES

ANALYSES | DEVELOPMENT

PRE-TESTED PERFORMANCE | DELIVERY ON TIME

SERVICE SUPPORT | CUSTOMER SATISFACTION

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