



TECHNOLOGY report

SML

LENZING | AUSTRIA edition no. 11 1/08



2 | Waste of energy
in extrusion



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stack concept



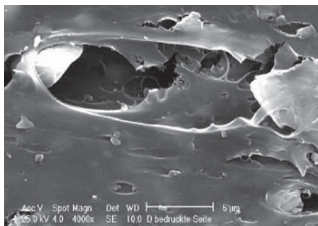
4 | The spare parts
department

Production processes for hygiene back sheet films

SML delivers cast film lines and coating lines for back sheet products for the hygienic industry. These products are used for baby diapers, incontinence diapers, sanitary napkins and so on. There are various production processes possible.

1. Breathable film

Initially, breathable films for the hygienic



Microscope picture of micropores in breathable film

industry were introduced to the Japanese market in 1983. By 1990 production also began in the United States. Since 1995 the market has been booming in Europe. Within the last decade more than a dozen breathable film lines have been delivered by SML.

In most cases breathable diaper film is a 3-layer film based on a PE compound containing approximately 50% CaCO₃. The lowest film thickness is 15 g/m². Production speed exceeds 300 m/min. The primary film is extruded through flat dies on a cast roller stack, before it is entered into a mono-axial stretching unit. By the mono-axial orientation in machine direction micropores are generated. These micropores in the breathable film offer increased air circulation and the



Winder 2000 Aerofilm

escape of water vapour, thus contributing to the baby's comfort and avoiding irritation of the baby's skin. Yet, at the same time they prevent the leakage of liquids. A special technical feature is the cascade algorithm of the automatic die control. Thus the results of thickness measurement before and after stretching are combined, compensating for an irregular neck-in at the die and the stretching unit and allowing for correct mapping.

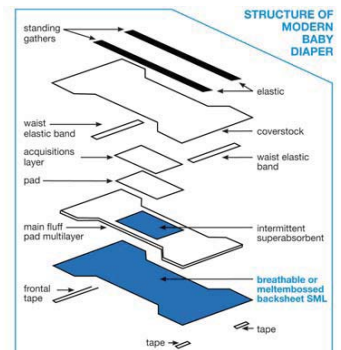
2. Breathable laminate

To the layout of a breathable film line an unwinding station for nonwoven and a lamination station with a porous coating head for hot melt are added, and thus a breathable laminate can be produced inline. Of course, the lamination process also can be done in a second step, using unwinds for both the breathable film and the nonwoven. The inline concept, which SML is famous for, offers important savings in production cost.

3. Melt-embossed film

The standard product for diapers is melt-embossed film. Films consist of 3 or 5 layers. 5 layers are especially used for minimized film weights and high speeds. With the proprietary dry embossing pro-

cess SML offers the latest technology. The film is processed in a nip between a cooled rubber roller and an embossed steel roller. The film is not contaminated with water.



There are the following advantages in comparison to the water bath technology:

- Matt surface
- Uniform coefficient of friction
- Low embossing pressure resulting in increased life span of the rubber roller
- No cost for water treatment
- Low maintenance requirements

EDITORIAL



Karl STÖGER, Managing Director

Dear Reader,

It is our pleasure to present you with this new edition of the SML Technology Report. To

share as much information as we can with our readers, we have again tried to include a wide variety of topics in this issue. Purchases of capital goods are usually carefully planned investments. Price, performance, quality and expected life span are the classic aspects to influence buying decisions. Not less important, however, are other things like energy efficiency, productivity over time or the maintenance requirements of a machine. Naturally, we always tend to look at the price first, but it is equally important to get all the other aspects considered as well, because buying cheap can become expensive in the end. An article about energy waste in extrusion is meant to sensitize us to this ever more important issue and to show SML's efforts to make the extrusion process more ener-

gy efficient. Hygienic film extrusion systems are a core competence in SML. A summary of the various production processes available from us shall give you an overview of what we have to offer. A new modular roll stack design brings more flexibility and a boost to our sheet extrusion applications.

Globalization is everywhere. As a global player we take the emerging markets very seriously. India, for example, has developed to be a significant marketplace for our extrusion lines. A prompt service support as well as a quick and unbureaucratic availability of spare parts is indispensable to our customers. An interview with the head of our spare parts department shall give you an insight into how SML tries to achieve 100% customer satisfaction. We hope you find this copy of the Technology Report interesting and informative. Please enjoy reading it.

Yours sincerely

The thickness range of commodity films produced on melt-embossed lines is from 17 to 24 g/m²

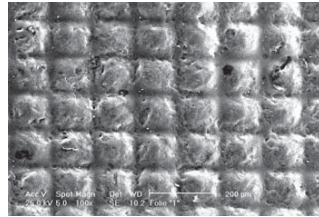
4. Melt-embossed laminate

For the production of melt-embossed laminate the PP nonwovens is entered right into the nip of the embossing roller of the melt-embossed film line.

5. Coated nonwoven

This technology permits the manufacture of a low cost diaper. A nonwoven of 10 to 12 g/m² is coated with 11 to 15 g/m² PE layer. This technology, already introduced to the South American market, is especially suitable for developing countries and emerging nations. SML offers a high-

speed coating line for a production speed of 500 m/min. Final web width is 2100



Microscope picture of embossed film

mm. Automatic unwinding stations with 1200 mm unwind diameter for nonwoven enable continuous operation and thus

unmatched productivity. All above mentioned lines are operated with a horizontal sliding winder 2000 Aerofilm. The winder 2000 Aerofilm is especially designed for winding hygiene back sheet products, enabling mother rolls on 6-inch cores with an external diameter of 1000 mm. Alternatively, multiple part bobbins with a minimum width of 120 mm can be slitted inline. No core preparation is needed. The start-up of new rolls is effected via electrostatic layon. During roll change an auxiliary contact roller is always in touch with the finished rolls.

Alexander BRUCKMÜLLER
Product Manager Cast Film Extrusion



Laminator unit of a coating line for nonwovens

NEWS

Three more BCF spinning lines sold

Recently, SML has recorded considerable success in the sale of 3 BCF spinning lines in a row. A Turkish carpet producer invested in two Austrofil BCF spinning lines for a total output of 11 tons per day. His aim is to reach independency from carpet yarn suppliers and highest flexibility in the start-up of his own yarn production. The most important advantage is to produce carpet yarn in a self-defined quality in contrast to a rather low investment. The third Austrofil BCF spinning line was sold to a Middle East customer.

Two cast film lines now available for demonstration

In the field of cast film extrusion two demonstration lines are available for demonstration runs from now on: One being a cast film line for CPP, CPET and CPA film with a total extrusion capacity of 1400 kg/h, equipped with one extruder Ø 150/33, one extruder Ø 90/33 and one extruder Ø 75/33. The trimmed film width is 2700 mm at a maximum mechanical line speed of 350 m/min depending on the processed raw material and film thickness. The film is wound up on SML's turret winder series 1200. The second line is a 5-up stretch film line for industrial pallet stretch wrap consisting of two extruders Ø 120/33 and two extruders Ø 60/28. The total extrusion capacity is 1860 kg/h. The maximum mechanical speed is 600 m/min. This stretch film line is equipped with SML's bleed trimless winder series 3000. If interested, please contact our sales team for demo appointments. (e-mail: nea@sml.at)

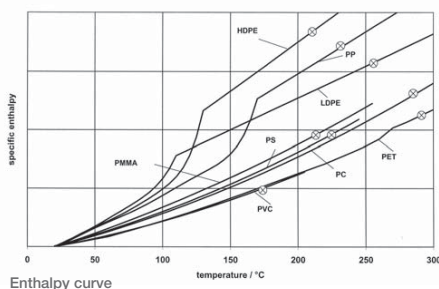
Sleeve Touch Technology pilot plant near completion

As introduced in Technology Report 02/07 SML's new pilot plant, a Sleeve Touch Technology line, will be available for trials starting July 2008. The new co-extrusion line will incorporate a haul-off unit for inline lamination and a coating module. The pilot plant can either be fitted with an airknife, a calender roller, a sleeve touch system or a coating module, thus being able to offer a very broad range of products and applications.

Why do we waste so much energy in extrusion?

As we all know, the energy resources of this world are limited, nevertheless consumption is increasing. And we need no prophets to tell us that with the rising demand the cost of energy will continue to go up over-proportionally. This is reason enough for us to think about avoiding energy wastage in extrusion. The energy required to convert pellets into extruded products like film is a 100% consumable, so nothing stays in the final product. What is the energy used for, and how can we reduce consumption?

Thermoplastics are processed above their melting point, so we have to heat them to the required level. The enthalpy curve of the polymer and the necessary process temperature tell us how much energy is required.



Enthalpy curve

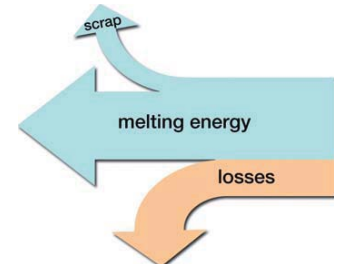
Hence, processing at lower temperature and using a polymer with low specific enthalpy is the first approach to save energy. But unfortunately more than only the melting energy is required for the process. Equipment like electric heaters, motors, gearboxes, pumps, chillers... is required. And the efficiency of these electromechanical systems depends on their design and their quality. There are hundreds of possibilities to waste energy, like inefficient motors, poor conductivity of barrel heaters, small-sized piping, etc. All of this energy is converted into heat, and in most cases this is more than necessary to heat up the factory. Additional equipment is required to take the heat out of the buildings.

Energy savings start in the concept phase of a machine. Over-specified components, which are often necessary for multipurpose machines, have an impact on the total energy efficiency. Optimized single-purpose machines are superior in this respect. The process-relevant parts of the machine shall give best homogeneity and pressure generation at the lowest possible melt temperature. This is a key know-how of the machine supplier. Then it is possible to save energy by using highly efficient motors, heat insulation, etc. Although these components are expensive, they will pay off sooner or later. The expected life span of extrusion lines is about 20 years! With a total energy saving potential in the range of 15 - 20% enormous savings are possible.

One positive contribution to energy savings is the SML high-speed extruder (HSE). Although the melting energy pumped into the polymer (enthalpy) is similar to conventional extruders, it is possible to save about 10% of the total energy by reduction of gearbox and heat convection losses. Raw material wastage is energy waste, too. Hence, the reduction of start-up scrap and trims is important.

Our very new thin shell calender roll gives better heat distribution at the

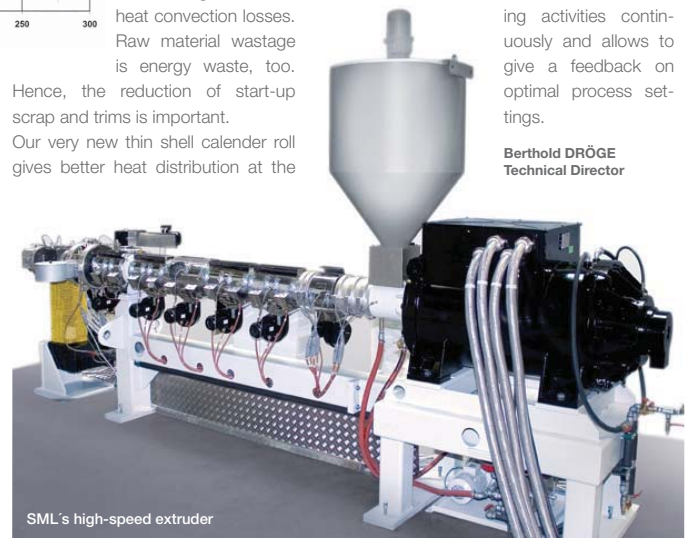
sheet edges, allowing to reduce the edge trim by 40% on certain product thicknesses. Apart from better product quality of semi-crystalline products it is possible to run at higher water temperature level – so in a number of cases cooling tower water can be used instead of expensive chilled water.



The correct tuning of a line is always possible and should be done periodically. Imagine the huge losses of badly tuned heating and cooling zones or badly tuned inverters! On request, we can integrate an energy consumption monitor to our lines. The energy consumption is displayed on a trend graph. This enables you to check

the result of line tuning activities continuously and allows to give a feedback on optimal process settings.

Berthold DRÖGE
Technical Director



SML's high-speed extruder

Modular roll stack concept

Film and sheet extrusion is one of the key product segments of SML, thus we invested time and effort in modernizing our roll stack technology. The target was to engineer a new modular concept that can serve a wide range of known applications. The result is already in operation at a new SML customer, a multi-national corporation producing on three continents.

The new roll stack concept is based on a vertical design and it will particularly satisfy the requirements for thicker sheet. The design concept is strictly modular, allowing a number of applications in the following range:

- roll face width from 1200 mm to 3400 mm
- roll diameter starting with Ø 400 mm to Ø 800 mm
- max. 180 KN closing force
- max. 50 m³/h water flow capacity per roll
- roll gap range from 0 mm to 40 mm

These specifications include most applications realized on 1800 mm and 2400 mm roll stacks. The focus is on high-

quality industrial sheet applications like HIPS, ABS, PVC, PVC foam, PP, HDPE, PC, PMMA.

The modular concept includes a number of basic features and some special options. It is possible to use all kinds of rolls, like standard rolls, embossed rolls, the special SML deflection compensated roll or others. When embossing comes into play, then our new concept will convince with an easy and fast change of rolls. After removal of the split bearing housing and disconnection of the gearbox the roll can be rolled out of its position, making use of the support rail. The gearbox and the gap adjustment stay in place. Standardized main bearings are used for the rolls, assuring easy availability around the world. The optional automatic central lubrication unit reduces the maintenance effort and possible mistakes or oversights.

The linear roll movement is hydraulically operated. The pneumatic-hydraulic transformer reduces energy and noise, and the use of pure steel piping avoids known

problems of tubes. One key component is the stop element used for the gap adjustment of the rolls. It is designed from the very beginning for electric gap adjustment and is functionally robust. Compared to hydraulic servo control it gives more safety and is easy to maintain. Of course, it is positioned to allow a free view

into the roll nip. If required, the nip force can be measured on one or both nips. The main gearboxes are available in standard helical design or in very special planetary design for critical optical applications.

And there is a standardized interface between the gearboxes and the rolls, so the gearbox can be up-graded from standard to the high precision type when needed.

We have paid extra attention to make this machine user-friendly and easy to maintain. All components are arranged neatly, leaving enough space for future extensions. Optional equipment like pre-cooling

rolls for PVC foam, unwinders for laminating film, a roll cleaning device and others are easy to integrate. For the American market we offer a UL approved version.

This actual roll stack concept underlines the intention of SML to expand its business in the sheet sector with quality



SML's new, modular roll stack concept

products that are fit for purpose. This standardized vertical roll stack will be integrated in the future SML sheet extrusion lines and has also all the necessary features to be successful in the retrofit market.

Berthold DRÖGE, Technical Director



Christian MALZNER, Area Sales Manager

INDIA – business opportunities in a fast growing market!

Over 1.1 billion people live in India. India is on a clear course to overtake China in the long term as the most populous country on earth with its staggering population growth of 15 million people per year. What is more, the Indian economy is growing at a pace in line with its huge population expansion. With a growth rate of some 9.4% (2006/07, estimated) India has one of the 6 fastest expanding economies worldwide. The GNP is 904.2 billion USD (2006, estimated) putting India among the world's top 12 economic giants. The booming economy in India is resulting in the growth of a powerful middle class characterized by growing purchasing power, an increasingly consumption-oriented lifestyle and a lively interest in imported products. Studies have fore-cast a tripling of the per capita income of Indian consumers by 2025, although still at a relatively low level in international comparison at 783 euros. The enormous number of consumers in highly populated India, however, will nevertheless lead to immense market growth.

The target groups are on the one hand the upper class, which group is expected to grow to some 23 million people by the year 2025. But also the young and well educated middle class with a strong buying power, totaling some 200 to 350 million people (depending on the definition used). A western style of life and

consumer habits favoring processed products such as ready-made meals is very much in trend with these population groups. The immense demand for consumer goods in the middle classes means the Indian market is one of enormous potential for SML, with constant growth in the demand for quality in every kind of product, such as food packaging for example. This is the reason why many leading Indian companies are investing extensively in top quality machinery from Europe. In the flexible packaging market segment, in particular, CPP lines with very high extrusion outputs and large widths are being extensively implemented so as to be able to cope with demand on the one hand, and to achieve maximum plant efficiency and economy on the other. Smaller firms continue to set their sights on small-scale plants in order to maintain their flexibility and to keep fitting times and waste as low as possible. Especially for newcomers a narrower line

would be the key for success since high flexibility is required in the market. In the 2nd phase, a wide line provides high efficiency for



established commodity products. Extrusion coating and laminating lines for the production of complex composites with various layers - including barrier layers - are in use in the flexible packaging sector. Like anywhere else in the world PET is booming as a substitute of PVC in the field of rigid packaging. The road infrastructure in India is becoming ever more important. Their condition although is not up to Western standard and will require major investments in the future. Expert estimates put the investment requirement for the coming 10 years at around 500 billion dollars.

The development of the road network has resulted in a significant demand for geotextiles. High-tenacity PP yarns, produced on SML multifilament lines - AUSTROFIL, are a major component of geotextiles. A number of companies in India already operate SML AUSTROFIL lines and these are used among other purposes for the production of technical yarns for belts, ropes or sewing yarn. The current boom in the Indian carpet industry is offering many business opportunities. Among others, the PP BCF yarn required for carpet production is produced either as a BCF monocolour or BCF tricolor yarn with SML AUSTROFIL spinning lines. The hygienic films sector points to a further trend in the Indian plastics industry. Hygienic products are needed in enormous quantities as a result of the high share of youthful population with a low average age and a high birth rate (22.1 per 1000). The backsheet film needed for these products is manufactured using either a cast film line for melt-embossed film or a cast breathable line for high-quality hygienic films. SML has strengthened its presence on the Indian market significantly over the past few years and has built up a wide distribution and service structure. SML has a highly positive view of the Indian market with its many chances and opportunities.

The spare parts department – the company within the company

The SML Spare Parts Department with its exceptionally well trained team of specialists makes a major contribution to the success of the company. Manfred Ablinger has led this perfectly coordinated group for many years. Own warehousing of many standard spare parts has made it possible to send out spares a customer orders by 2 pm within the same day. Manfred Ablinger explains the secrets of success in his department in this interview.

How would you describe your function at SML?

M. ABLINGER: The Spare Parts Department handles all spare parts orders and repairs that are needed. This begins with the customer inquiry and continues with the offer, receiving the order, delivery, producing the export documents, invoicing and payment. The Spare Parts Department can in fact be seen as a company within the company SML with the goal of making all our processes as simple and as fast as possible.

What qualifications must your employees bring with them?

M. ABLINGER: An employee must have technical knowledge and complete familiarity with our machine range especially for putting offers together and clarifying

the technical requirements with the customer. On the business side a detailed knowledge of dispatch and handing of export transactions is essential.

What significance do you see in being able to rely on a thoroughly effective team?



SML's spare parts team

M. ABLINGER: The customer demands a swift solution for the problem when faced with a machine stoppage and must do so in order to ensure that the line stays productive. In many cases people in the production plant are not fully aware of all the country-specific or bureaucratic hurdles that can get in the way when urgently needed spares have to be imported.

On the sale of a new plant, when does your service begin?

M. ABLINGER: As a rule customers already receive a recommended spare parts package when they purchase a new plant. Recommended wear parts and spare parts are put together in this package, taking country-specific circumstances into account.

Do you offer upgrades and modernization of existing machines?

M. ABLINGER: Upgrades are an important contribution to the economy of a plant. The best method here is a service visit to the plant and to evaluate possible improvements together with the customer.

How do you cope with stress and hectic in your department?

M. ABLINGER: That is a good question. It is a principle that only people who are extraordinarily stress resistant shall work in the Spare Parts Department. Stress and hectic are part and parcel of the job, and for this reason it is essential that they are seen in a positive light.

What is the recipe for success of your department?

M. ABLINGER: Our success recipe in my view is handling all processes without bureaucracy and with the high throughput times that can be achieved by this means. In addition, essential decisions for the Spare Parts Department are made directly on the spot.

What efforts would make your team even more effective?

M. ABLINGER: I am thinking here about tackling language courses and participation in special dedicated seminars. The extensive know-how within the Starlinger Group can be used through active communication with our sister companies.

Thank you for the interview.

The best sheet is only as good as the roll

Understanding that the best thermoforming sheet is only as good as its wound-up roll quality, a perfect winding system is an important precondition for selling thermoforming sheet to outside markets. Just imagine what impression a badly wound-up roll would create with converters you supply.

As a specialist in winding technology SML has taken this fact very seriously and developed an answer to it with the recently introduced fully automated winder series 1100. This winder concept takes a large amount of handling responsibility off the operator while still allowing for full production flexibility. It can be equipped for 3-, 6- or 8-inch winding cores and is suited for winding of mother rolls with pneumatic winding shafts or inline-slit part bobbins by means of friction winding shafts. Best winding quality is achieved through low and sensitive web tension with pre-configured or individual taper curves, in both gap or contact winding mode. Fully automatic roll change is effected in a very short cycle time by a sturdy chopping knife and a counter blade in combination with a web transfer unit. An overhead robot removes and handles the loaded winding shaft while the wound-up rolls are stripped off and transported away from the winding unit by a semi-automatic lifting table assembly on rails. The complete winding unit is characterized by minimal floor space requirement and a very compact design.

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EVENTS 2008

EVENT	LOCATION	DATE
CHINAPLAS	Shanghai, CHINA	17.04. - 20.04.
INTERPACK	Düsseldorf, GERMANY	24.04. - 30.04.
STRETCH & SHRINK FILM CONFERENCE	Barcelona, SPAIN	20.05. - 22.05.
PLASTPACK AFRICA	Durban, SOUTH AFRICA	22.05. - 25.05.
ASEANPLAS	Singapore, SINGAPORE	26.05. - 28.05.
EXPOPLAST	Lima, PERU	28.05. - 31.05.
INT. FOIRE D'ALGER	Alger, ALGER	01.06. - 07.06.
ITMA ASIA & CITME	Shanghai, CHINA	27.07. - 31.07.
STRETCH & SHRINK FILM CONFERENCE	Atlanta, GEORGIA	13.10. - 14.10.
EXPOPLAST	Montreal, CANADA	20.10. - 21.10.
SALON D'EMBALLAGE	Paris, FRANCE	17.11. - 21.11.