



# TECHNOLOGY report

# SML

EXTRUSION LINES – ENGINEERED TO PERFORM ▶

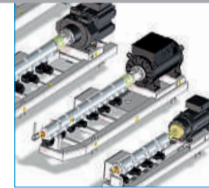
LENZING | AUSTRIA edition no. 18 2/11



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EDITORIAL



**Karl STÖGER**  
Managing Director

Dear Reader,

Welcome to a new edition of "Technology Report". The main object of this publication is to keep you up-to-date with the latest developments at SML.

In order to cope with accelerated business growth, this year we have extended our production facilities with another large assembly hall and upgraded our power supply. This means that we are now capable of performing test runs for really big machines such as 6m-wide CPP lines or 12-up stretch film lines. The ability to operate large and complex extrusion lines at full capacity before they are sent to a customer is unique in the industry and a distinct SML advantage. Moreover, it greatly alleviates project risk for the client.

Towards the end of last year, the growing demand for extrusion lines and a sharp rise in SML's market share caused long lead times. I am grateful to those customers who showed patience when having to wait longer than usual for a new SML line. Now our enlarged production facilities are helping us to again reduce the delivery period for new orders to customary and competitive levels. The fact that we have been able to recruit large numbers of new and talented personnel for engineering and services has also played a considerable role in this improvement.

In the run up to the ITMA in Barcelona, which is this year's major textile machinery fair, we have reworked and reengineered our complete range of Austrofil spinning lines. Numerous technical details have been refined, maintenance simplified and output levels raised. The range of machines available for both high tenacity yarns and bulk continuous filaments has been further enlarged.

I hope that you will find the topics contained in this "Technology Report" of interest. And should we succeed in arousing your curiosity, please contact us for more information. We look forward to hearing from you.

Yours sincerely

## AUSTROFIL HT – refined for higher capacity

SML multifilament spinning lines have enjoyed sixteen years of success based on excellent performance, top yarn quality, high production output, short delivery times, quick start-ups, after-sales services and effective customer support.

Due to these facts and continuous improvements related to the market demands, we have become market leader in the field of Polypropylene HT compact spinning lines. 200 machines have been installed all over the world. This long time experience resulted in a very sophisticated technology which fulfills all the yarn production requirements in a, sometimes very rough, environment.

As this successful design is very well accepted in the market it was kept generally. Nevertheless a fine tuning was done for the new generation of this spinning line in order to increase the performance. These improvements start with the extruder and the spinning head, and extend to the stretching section.

The new, low-noise extruder drive gearbox with directly mounted, water-cooled AC motor is maintenance-free, as the cardan shaft has been eliminated, while the spinning head has been equipped with panel heaters for an optimized temperature profile.

The new stretching unit design includes godets, with ESM motors (energy saving higher torque), and optimized heater profile for improved uniformity. Based on this modification it was possible to increase the maximum winding speed from 3000 to 3500 m/min. The intermingling unit has been equipped with integrated suction for the spinnish vapours and new noise-absorbent material, which is also resistant to the spinnish. In addition, re-designed yarn detectors have been



Austrofil spinning line, HT 4 x 2

mounted on the intermingling unit and therefore no adjustments are needed when switching from two to four yarns. These upgrades, which are aimed at raising still further the comfort levels of customer operating personnel, are a direct result of SML's vast experience. Moreover, numerous sales represent a clear indication of the levels of user-

friendliness, reliability, sophistication and operational perfection already provided by SML equipment. In short, SML technological expertise clearly adds up to problem-free production.

**Christian MOSER,**  
Product Manager, Multifilament Spinning

**Josef SCHWARZENLANDER,** Design Engineer

## AUSTROFIL BCF TECHNOLOGY

Carpet yarn manufacturers have confirmed that replacing their old BCF equipment with new SML BCF technology has resulted in enormous raw material economies. The key to these cost savings is the patented SML texturizing unit, which provides excellent crimp and permits a 20 per cent reduction in yarn titer without any lowering of product standards. Apart from cutting material consumption, this texturizing system allows SML customers to run their complete product range with just one

system. Austrofil BCF lines are manufactured in a horizontal design and three types of machines are available: These are the BCF Monocolour, BCF Tricolour and now also the BCF Monocolour TWIN, which allows the production of different types of yarns with two extruders (size: 75mm), as well as titer or colour on the left and right side. A further advantage of the TWIN line is its increased output capability.

**Christian MOSER,**  
Product Manager, Multifilament Spinning

# PET/PE – for food packaging

In recent years, consumer behaviour has changed considerably with the result that the percentage of foods packed in PET/PE composite films has increased markedly.

A variety of processes are available for the production of these composites:

- Co-extrusion
- Adhesive lamination
- Hot melt lamination
- Extrusion lamination
- Thermo lamination

A large part of PET/PE films are manufactured using thermo lamination, which as opposed to the alternative processes has the advantage of offering

highly efficient and economic production. Moreover, where sufficient space is available, retrofitting existing plant capacity with the required equipment is relatively straightforward.

The PET sheet is produced on a standard roll stack and edge trimmed to the required width prior to lamination, while the PET regrind can be returned to the extruder immediately and inline.

The PE laminating film is only added when the PET sheet meets every requirement and this procedure is also utilised during product changes. While PET sheet is generally only subject to adjustments with regard to its thickness and width, a variety of characteristics can be achieved in the composites through the use of differing PE laminate films. This means that production changes can be carried out quickly and composite film waste is minimal, which constitutes a major advantage especially in comparison to co-extrusion.

The unwinded PE laminated film is guided over deflecting and spreader rollers with controlled tension. Automati-



Fully installed line in SML premises



Infrared heating

tic edge regulation can be integrated as an option.

Both the PET sheet and the PE laminating film are appropriately heated by using IR radiation. Sheet and film temperatures are measured by pyrometer and regulated in accordance with the set values. The sheet and the film are then combined in a roller nip and following lamination the composite passes over a cooling roller. The advantage of thermo lamination over adhesive lamination is that no adhesive or hot melt preparation and application are needed.

Moreover, if required, the thermo laminated composite can be slit inline, where-

as in the case of adhesive lamination, the adhesive must be allowed to cure for a suitable period prior to slitting. Consequently, it can be said that as opposed to thermo lamination, all other systems are considerably more complicated and expensive from a process technology and plant size standpoint. Depending on thickness, production speeds of 60-70m/min are possible. The bonding strength relates largely to the characteristics of the lamination film, although typically it is in the 4N/15mm range, which is sufficient for most of the food packaging applications.

**Roland HÖRLESBERGER,**  
Product Manager, Sheet extrusion

## SMILE – More than just a control system

Enhancing its standard functionality we have integrated additional features into our PLC system SMILE.

### Process analyzer:

The data storage system PC is connected to the PLC of the SML extrusion

line. All major line parameters are saved into a database and can be retrieved and analyzed accordingly. This set-up allows for all relevant data to be recorded based on either time or events. Supplementing the conventional cyclical data recording (peak, difference or

average values) the status of the line is saved. Based on this data material, frequency of occurrence, response times, average or maximum duration of incidents and their causes can be evaluated. If adjustment of a particular parameter occurs only sporadically, or is of great importance for the process (e.g. set values), this can also be recorded separately. All selected adjustments on the extrusion line can be displayed at a glance.

### Main benefits:

- Supervision of production
- Traceability and detailed documentation
- Data export to Excel
- Reduction of reaction time
- Enhancement of process safety
- Weakness and problem analysis
- Energy monitoring

The process analyzer is available for all SML extrusion lines included in our cur-

rent range of products. It can also be offered as an upgrade into most of our lines that have been delivered since the year 2000.

### Power consumption measurement:

As yet another newly introduced standard feature we have installed a power measurement module into the PLC hardware and programmed a specific customized functionality into the software. All three phases of the mains input are measured, providing various values, such as peak and effective voltage and current. The active power and the power factor  $\cos \phi$  are determined. One has the option to trigger power consumption measurements according to ones requirements. With power consumption and energy efficiency gaining more importance, SML has reacted swiftly by integrating the measurement module.

Thus we are providing our customers an easy access to monitor the real power consumption of the entire line in the particular operating point of the extrusion process.

**Wolfgang KIRCHGATTERER,**  
Head of Electrical Design & Automation



# Economy of scale

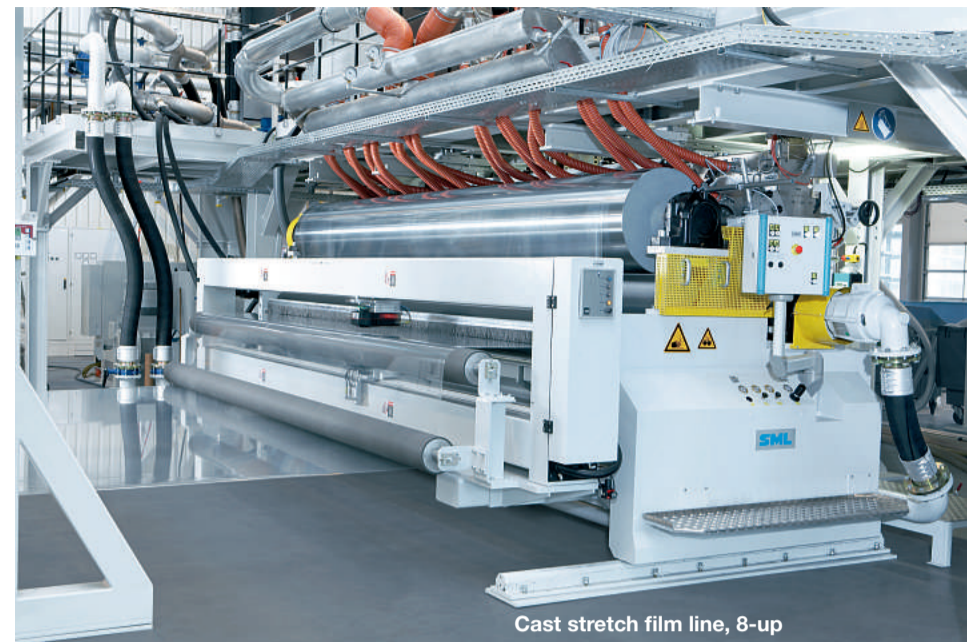
As a result of further expansion of our plant facilities in Austria during the first half of 2011, we are now able to test even the very largest extrusion lines at full capacity prior to delivery. This upgraded capability was first used in July 2011, when an 8-up cast stretch film line was put into operation and run at a production capacity of 2,500kg/h net film on the winder.

The full speed range of such large-scale machines can be tested and the complete output scope demonstrated. While the machine is still at our plant in Lenzing, customers can observe the easy start-up of their new stretch film line, as well as its low manpower requirement and high levels of energy efficiency combined with stable production.

## SML provides stretch film lines with the highest capacity!

For the economic manufacturing of stretch film 4 m-wide 8-up machines are proven workhorses for both typical 17kg machine rolls and 50kg jumbo rolls. Customers are free to choose between 5, 7, 9 or even 31 layers with a minimum of 4, 5 or 6 extruders. State-of-the-art encapsulation technology is available for every configuration required by the client. Furthermore, two types of speed level are on offer, as apart from the standard mechanical speed of 650m/min, our 8-up lines can also be ordered with a maximum speed of 750m/min.

SML lines are standardised and possess energy-efficient features such as



Cast stretch film line, 8-up

water-cooled AC-motors and new generation IR-heaters on the extruders, IR-thickness measurement, and highly valued cut-resistant rollers.

The 8-up machine is also on the pace with regard to the “downgauging” trend. This implies that stretch film of less than 15µm can be produced without any compromises in relation to speed and

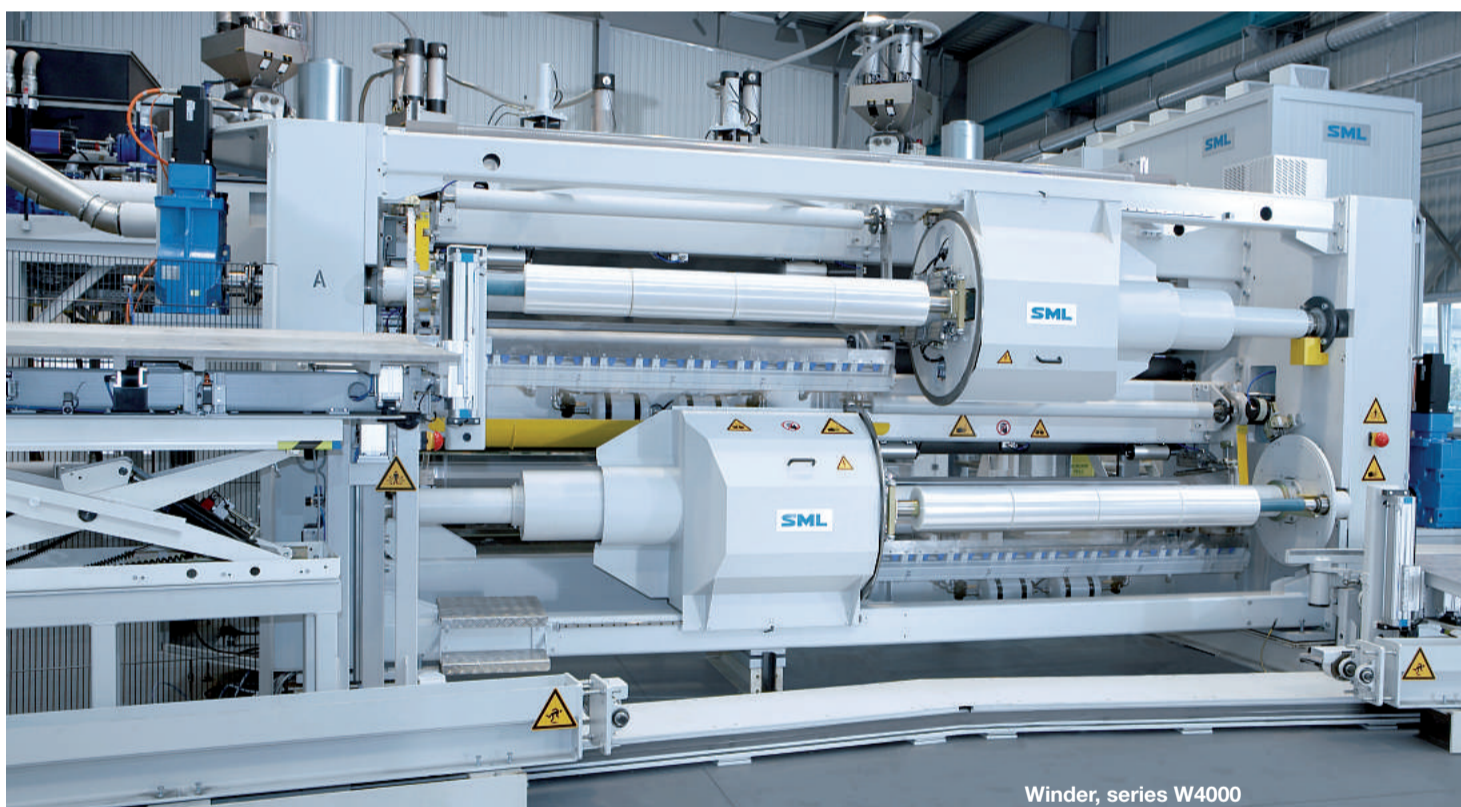
film quality. Thus the design of the machine can meet the sizeable demand for film thicknesses of 10-45µm.

In addition, the latest “Thin Core” technology is now also available for 4m-wide stretch film lines. As a result of this development, stretch film producers are in a position to save more than 50 per cent of the usual core weight of a machine roll. If a cost comparison is made with a standard 1.250g core, the savings achieved are remarkable, as is the reduction in the carbon footprint.

As it is usual for all types of stretch film lines from SML, a choice between a recycling re-pelletizing unit or a vertical scraptruder for the re-feeding of fluff is available for the processing of edge and bleed trims.

Although SML has recently received numerous orders for 8-up cast stretch film lines, development work continues. It will not be long before the first 12-up, 6m-wide stretch film line goes into operation. Do not forget to pass by SML, snatch this opportunity and have a look on Austria's workhorses.

Thomas RAUSCHER,  
Product Manager, Cast Film Extrusion & MDO



Winder, series W4000

# New PS/PP thermoforming sheet extrusion lines

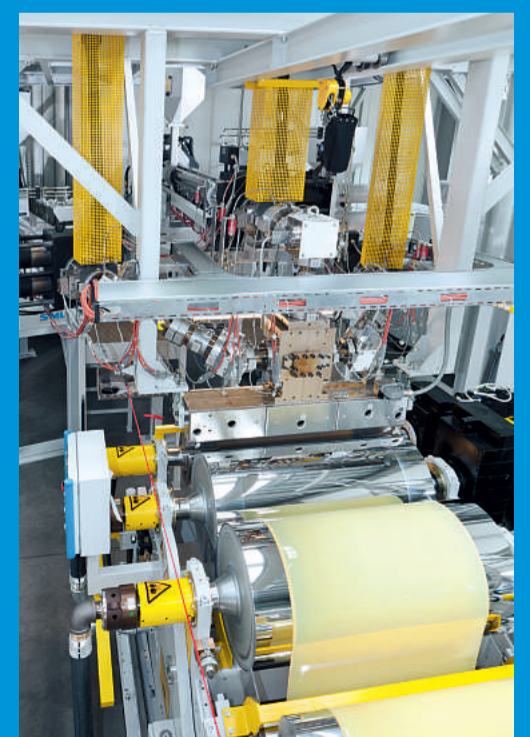
SML has identified PS/PP sheet lines require improved productivity and therefore has developed a number of important new technologies in this field. Our HSE75 and HSE90 extruders offer outstanding performance, while the new HO-LT extruder adds revolutionary functionality for barrier and other functional layers. The roll stacks are equipped with the latest generation of the SPG (smart parallel gap) roll and thus offer

superior cooling performance, which leads to high efficiency and narrow tolerances in combination with low energy consumption. The controls integrate our in-house manufactured winders or third party thermoformers for inline applications.

In 2011, more customers than ever put their trust in SML and its new technologies with the result that as compared

to previous years, orders doubled and the company's market share increased. We wish to thank our clients for their confidence and give an undertaking that we will continue to raise levels of performance. Indeed, more technology advances are well on their way and will be ready for release in the near future.

Berthold DRÖGE,  
Technical Director



# SML's single screw extrusion systems at a glance

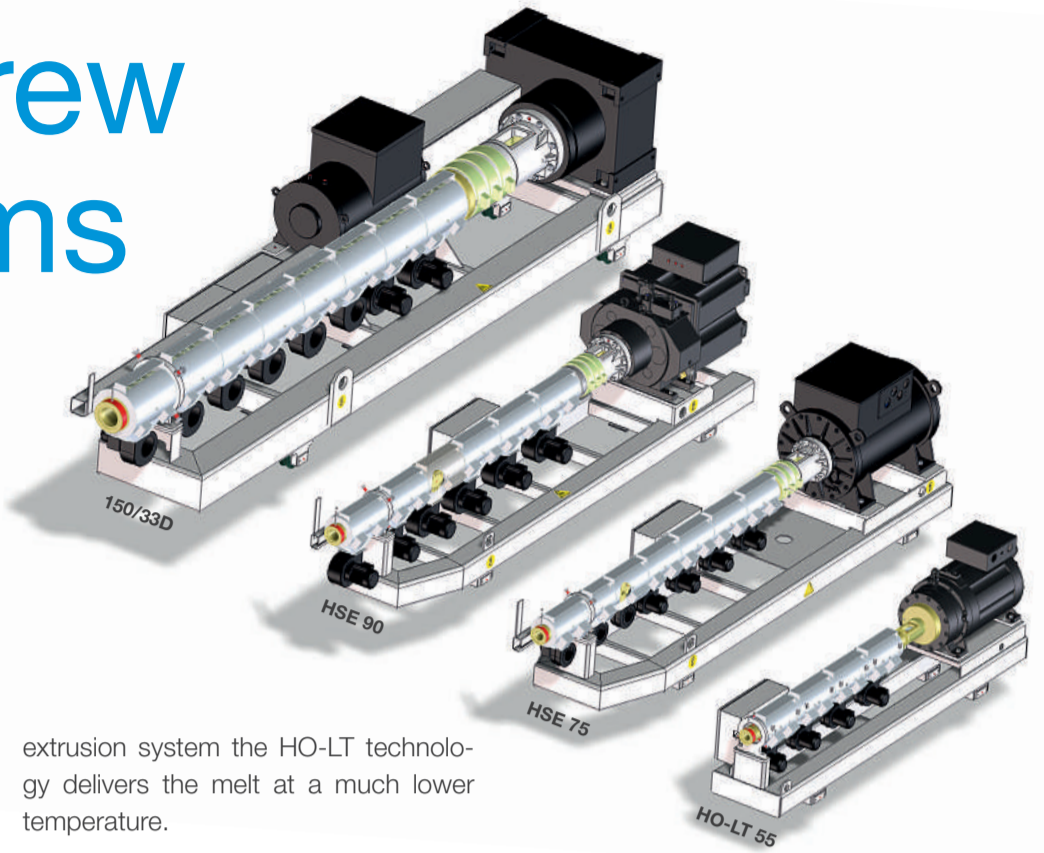
Within SML we master different concepts of extrusion systems. The target is to supply all of our individual product groups with the optimal extruder. And their needs are very different, which forbids us to build a 'World Standard Extruder'. Practically our extruders show specific differences that make them appropriate for the individual application. These are both process and mechanical specialities.

**We distinguish between three basic extrusion technologies:**

- 1) The conventional single screw extruder is a flexible machine. With modular components like smooth or grooved feedbush, closed or vented barrel, high or low torque gearbox and different screws the machine can be tuned to the desired application. Our specialists own decades of experience and thousands of process test results of this type of extruder. The major portions of all manufactured extruders still belong to this segment.
- 2) The HSE extruder (High Speed Extruder) is a rather new type of extruder,

which was introduced some 5 years ago. The development was based on the requirement to increase the output of given extruder dimensions for specific standardized market segments in order to increase the production efficiency. These market segments are for instance PS+PP thermoforming or LLDPE stretch film machines. With our two HSE extruder sizes of 75 and 90mm diameter we achieve outstanding performance. Energy efficiency, fast material change, handy extruder dimensions and affordable investment cost are the key advantages of the HSE concept. Today our portfolio includes seven HSE models for PS/PP and two for LLDPE stretch film. Our fastest HSE models run at screw speeds of 1200 rpm.

- 3) Our brand new HO-LT extruder (High Output - Low Temperature) was developed following the target of increasing the polymer output on a given extruder size. But this time we did not use high screw speed, but a very high specific output of the screw. The HO-LT extruder is a high torque extruder which can process a wide number of different polymers on one screw with exceptionally low melt temperature. Its characteristics make it the ideal extruder for heat sensitive polymers. Currently we offer the HO-LT extruder in three different sizes. In comparison with the HSE



extrusion system the HO-LT technology delivers the melt at a much lower temperature.

A summary of the basic pros and cons is shown in chart A below. Please feel free to contact the SML extruder specialists for more details.

Berthold DRÖGE, Technical Director

**SML Single Screw Extrusion Concepts**

	Conventional smooth bore	HSE High-Speed Extruder	HO-LT High output - low temperature
Extruder dimensions	35 - 180	75 + 90	35, (55,75)
Output range	20-2000 kg/h	400-1400 kg/h	5-150 kg/h
Flexibility of polymers and MFI on one screw design	+	-	++
Energy efficiency	o	++	++
Suitable for gearless drive system	-	+	++
Quick start, fast material change	o	++	++
Easy screw change	o	++	++
Space requirement	o	++	+
Investment cost per kg	o	++	+
Mixing	+	o	+
Dispersion	++	-	++
High melt temperature	++	+	-
Low melt temperature	o	-	++
Venting	++	o	not possible

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**EVENTS 2011/2012**

EVENT	LOCATION	BOOTH	DATE
ITMA	Barcelona, Spain	H2 D119	Sept., 22 - 29
KOPLAS	Goyang, Korea	hall 4	Sept., 28 - Oct., 1
PLASTIMAGEN	Mexico City, Mexico	booth 521	Oct, 4 - 7
PLASTEX	Kiew, Ukraine	booth PC 6	Oct., 25 - 28
ICE	Munich, Germany	B6 460	Nov., 8 - 11
M-PLAS	Kuala Lumpur, Malaysia		Nov., 9 - 12
SAUDI PPP	Riyadh, Saudi Arabien	H3 522-2	Nov., 28 - Dec., 1
INTERPLASTICA	Moscow, Russia		Jan., 24 - 27
PLASTINDIA	New Delhi, India		Feb., 1 - 6, 2012
NPE	Orlando, Florida		April, 1 - 5, 2012

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