

► **Austrofil® –  
MDY, FDY  
and BCF  
multifilament**

# Spinning Lines



**SML delivers high-performance spinning solutions that are fully tailored to customer requirements. Our Austrofil® CF spinning lines enable the production of yarns with outstanding properties.**

No matter which yarn you are seeking to use, we at SML can always supply the **ideal process** to guarantee **efficient production**. It is the accumulated expertise and decades of experience in **multifilament spinning line** engineering that have **made us market leaders** in this field.

### **The multifaceted world of spinning**

Austrofil® CF (continuous filament) lines by SML are designed to manufacture fully-drawn, medium-drawn or bulk continuous filament yarns. All of them provide impressive results in terms of tenacity, elongation, and rest shrinkage – resulting in an endless variety of high-quality yarns that meet all kinds of requirements and trends.

### **Technical and textile industry**

**Medium-drawn yarns (MDY)** are often used in home textiles such as curtains, carpet backings or seat upholstery.

Due to their **high-tenacity, fully-drawn yarns (FDY)** are the ideal solution when it comes to belts, safety netting, ropes or sewing thread for various types of bags.

**Bulk continuous filament yarns (BCF)** are widely used for carpets, but also for window seals and even for water filters.



### **Creating a customised experience**

At SML, we hardly shy away from new ideas. On the contrary, we appreciate being surprised by our customers' creativity. Our design team already made extraordinary applications possible, such as for artificial hair and dental floss. Thanks to SML's technology center at the headquarters in Austria, we are very flexible and can check specific requests for their feasibility.

### **Comfortable to control**

Every line can be comfortably operated and controlled by SML's advanced control system SMILE, a software solution that supports complete remote control and easy maintenance. SML's digital data generation and analysing tool bitWise provides a wide range of entirely new opportunities for data-driven decisions with a clear focus on optimisation of production processes.

Line Description Austrofil® CF MT/HT ▶ 8



Products CF FDY ▶ 9



Line Description Austrofil® BCF ▶ 12



Products BCF ▶ 15



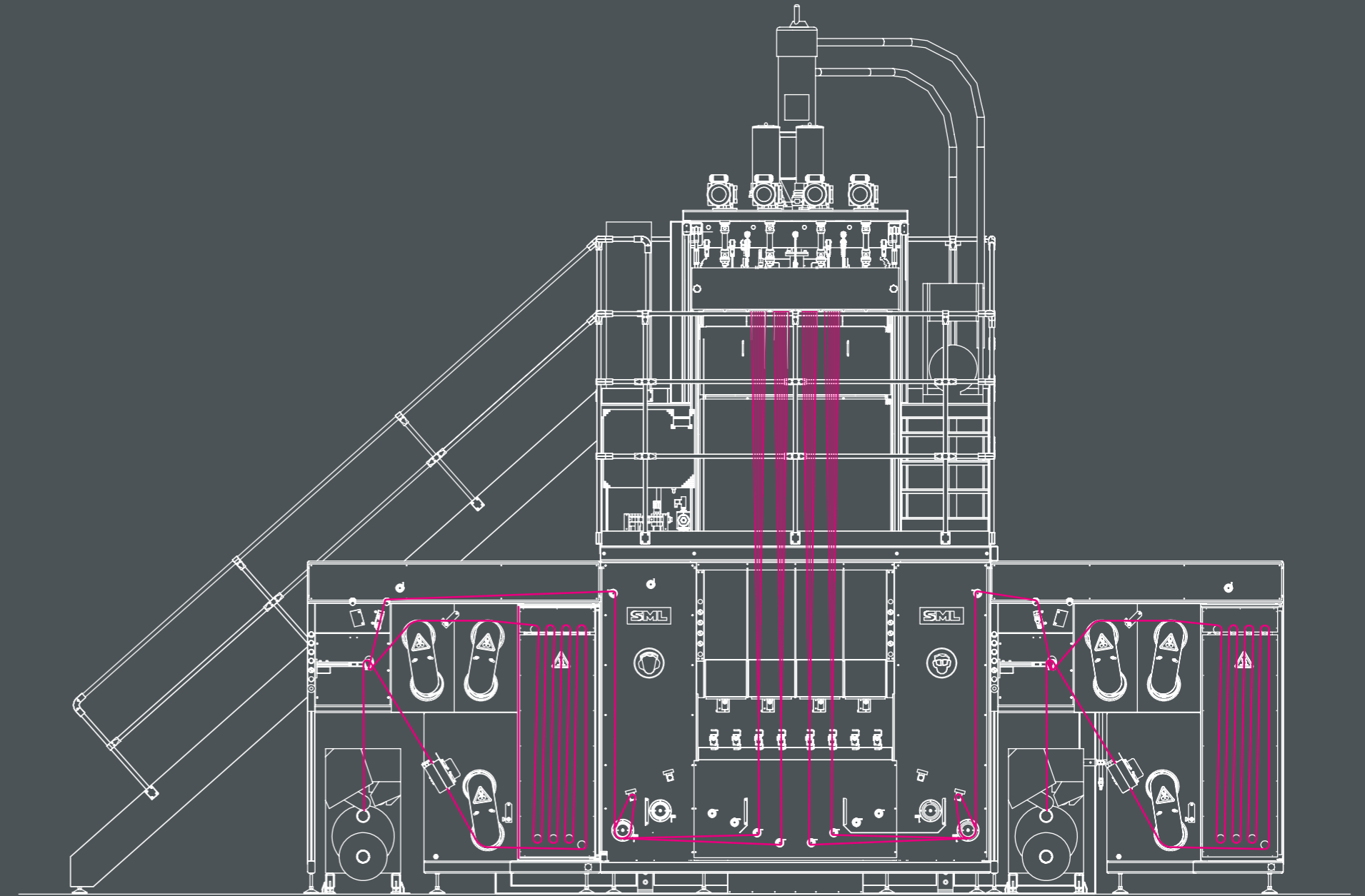
Component Description ▶ 18



Spinning lines  
for MDY, FDY  
and BCF yarns

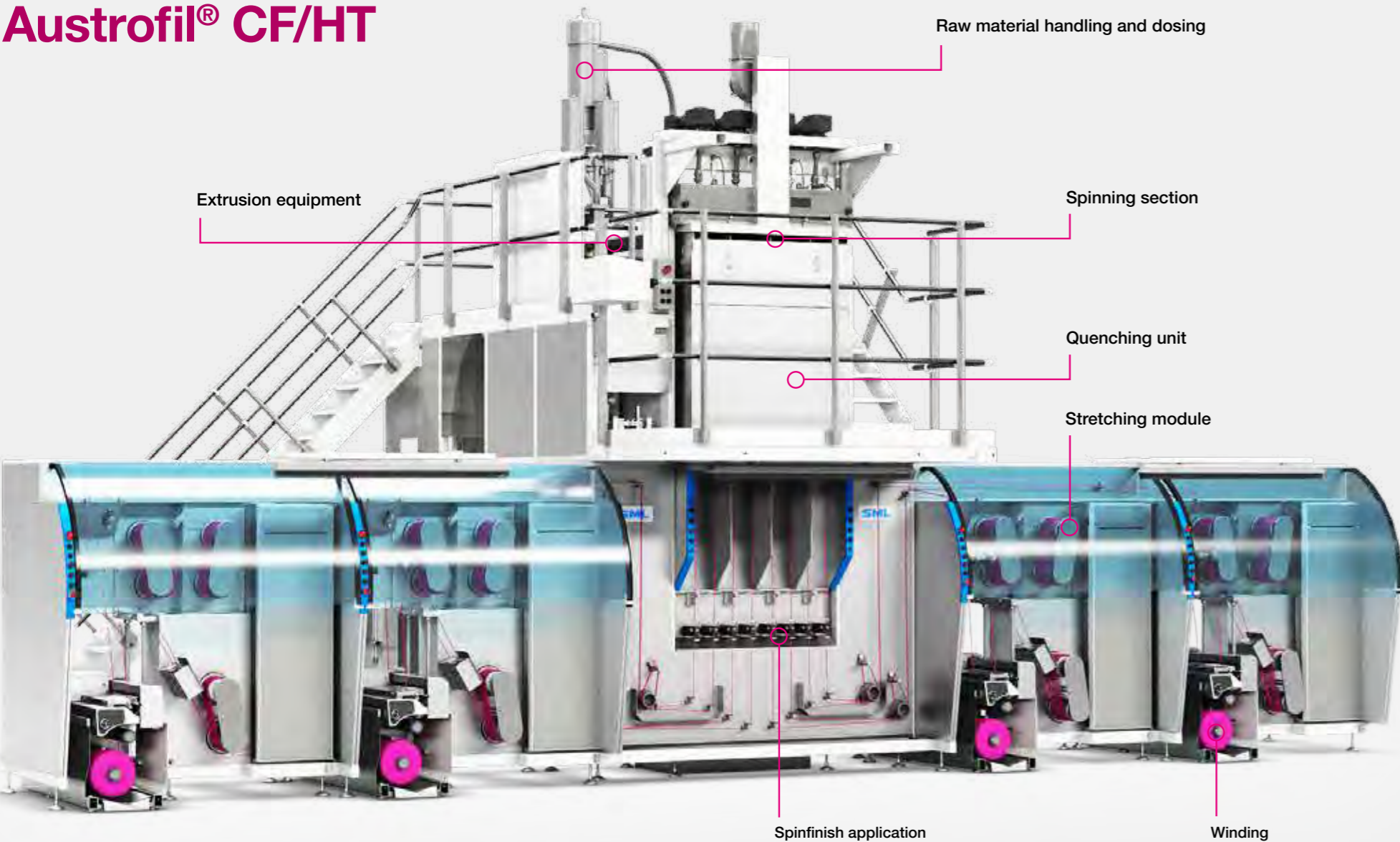


# The core of our idea: Spinning lines for technical and textile yarns



# Line description

## Austrofil® CF/HT



## Typical FDY Products





# High performance and flexibility Austrofil® CF MT/HT extrusion lines

With different line configurations,  
our Austrofil® CF MT/HT lines solutions  
**for individual challenges.**

The outstanding characteristics of spinning lines developed and  
manufactured by SML are technical precision and reliability.  
Years of experience have enabled the fine-tuning of every core  
component that produces yarns from the granulate to the  
finished bobbins.

### Flexibility and reliable components

SML's CF lines are very compact and easy to operate, whether to  
produce medium tenacity (MT) or high tenacity (HT) yarns. Even  
quick product changes are possible, which gives our customers  
maximum flexibility in production.

**Austrofil®**  
CF HT 4x(2|4)



### Equipment that is fully geared to the market

All Austrofil® lines are equipped with the latest extrusion  
technology ensuring a top melt quality and colour uniformity.  
Of course, the lines include high-speed winders, which reliably  
guarantee automatic bobbin changes.

### Elaborated heat treatment process

The HT series features a hot air oven in which the yarn is gently  
and evenly heat-treated, allowing them to be stretched as far as  
possible. This enables customers to produce yarns in the highest  
tenacity range.

### Equipment that works immediately

SML's engineering experience makes it possible to get systems  
up and running quickly at the customer's site. A big advantage is  
that local material qualities - no matter where you are in the world  
– can be tested in advance at our headquarters in Austria. This  
allows us to tailor the system precisely to high quality results.

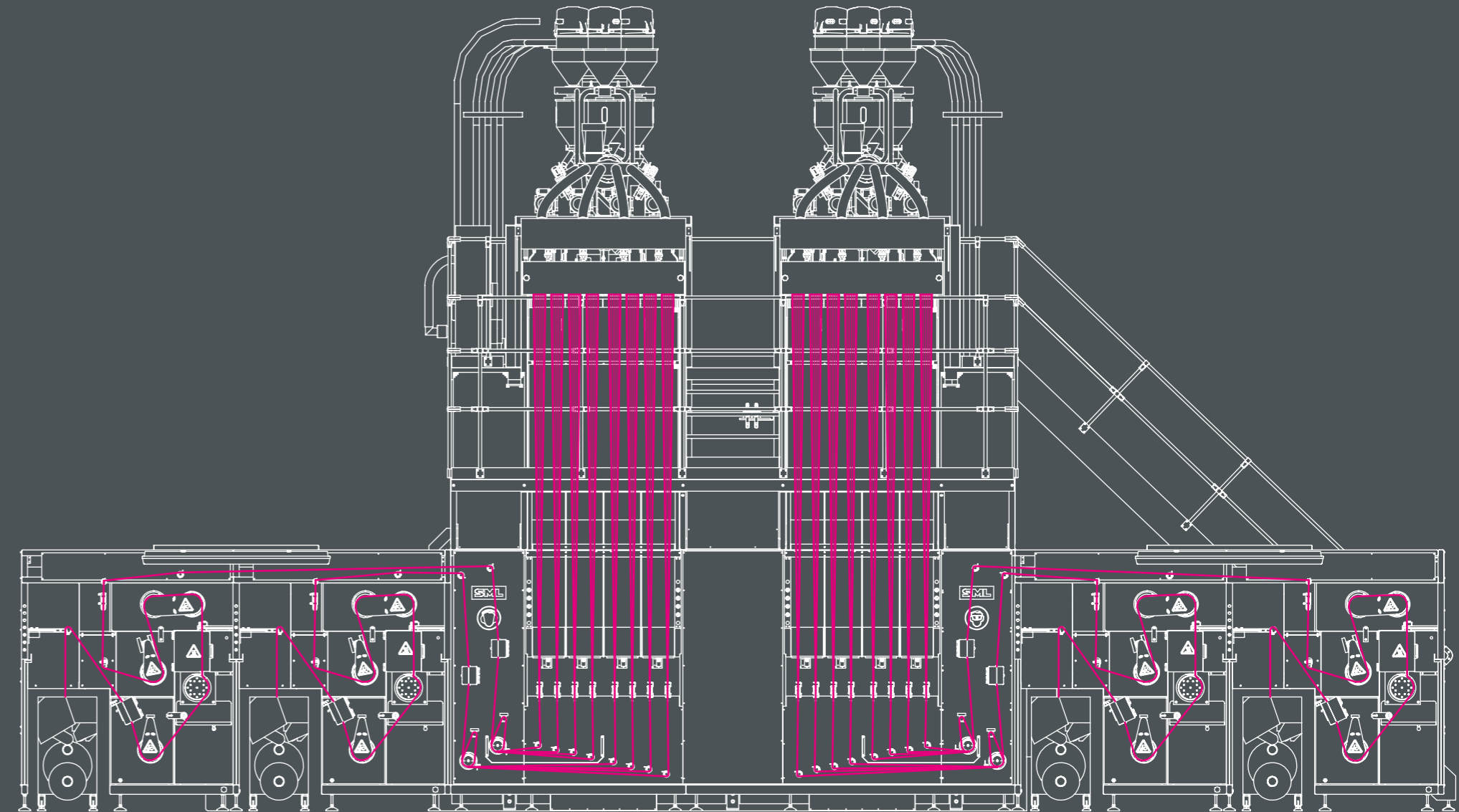
### Technical data

Products	Medium and high tenacity yarn
Polymer	Polypropylene, MFR 10 – 35
Titer range	150 - 4,000 den   165 - 4,400 dtex

### Line configuration

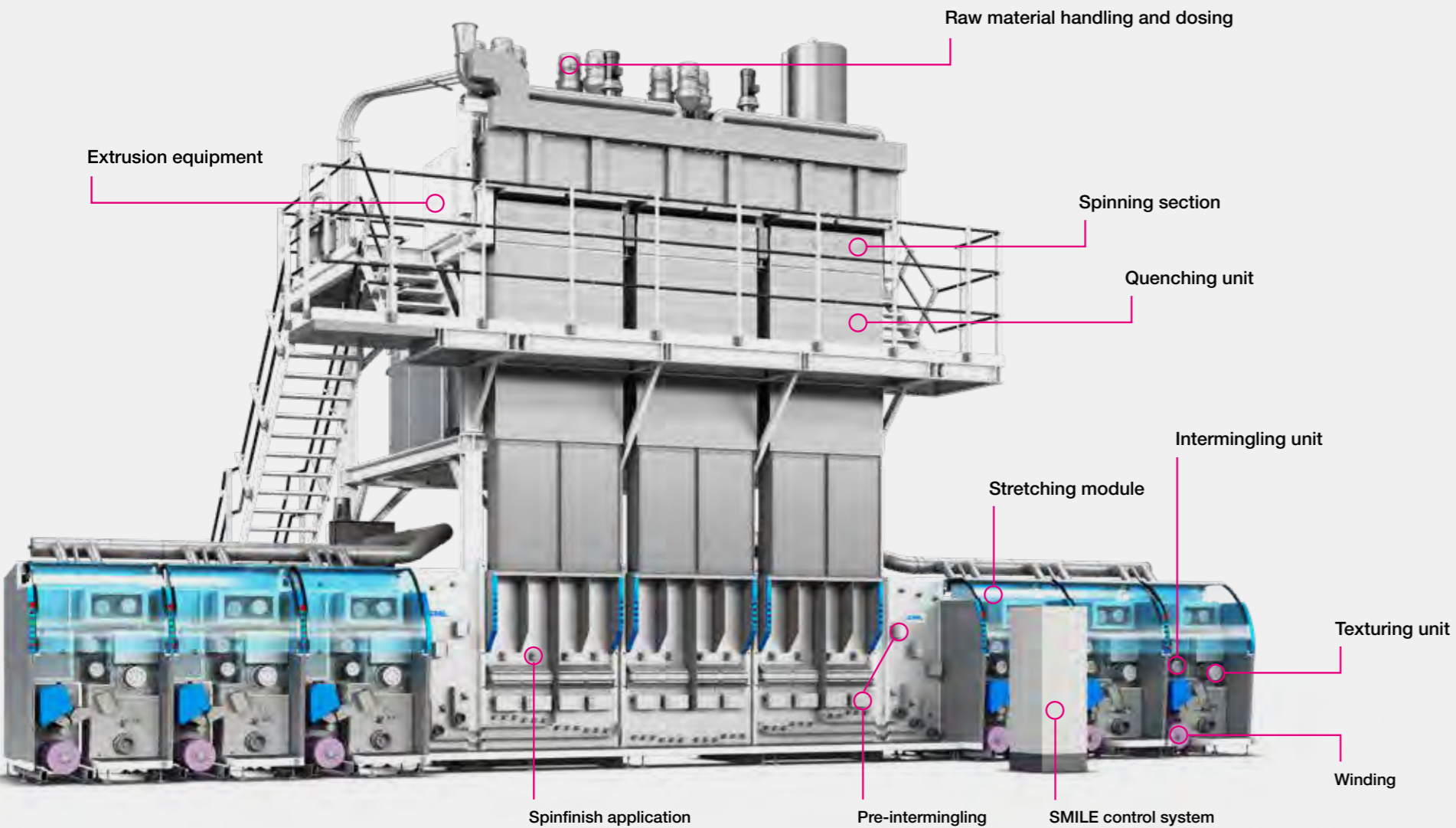
	Austrofil® CF MT/HT 2x(2 4)	Austrofil® CF MT/HT 4x(2 4)
Output	Max. 110 kg/h 2.6 t/d	Max. 160 kg/h 3.8 t/d
	The actual maximum output depends on the raw materials used and the tenacity or titer desired	
Total number of ends	4 or 8	8 or 16
Extruder	1 x 75/28	1 x 75/28
Dosing system	Continuous volumetric dosing with 2 additive components Option: 3 additive components	
Spinning beam	4 spinning pumps with 2 outlets, electrically heated	
Number of winders	2	4
Number of yarns	2 or 4	
Type	Automatic turret winder	
Winding speed	1,000 – 3,500 m/min	
Core diameter	75 mm	
Bobbin diameter	320 mm	
Dimensions LxWxH	8.1 x 7.2 x 6.0 m	11.1 x 7.2 x 6.0 m

# Spinning lines for BCF yarns



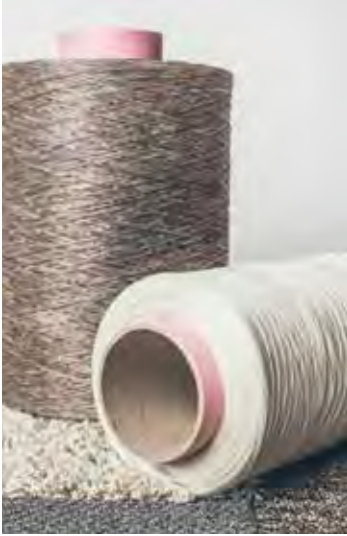
# Line description

Austrofil® BCF Tricolour 6x2



Typical BCF  
Products





# Technology that pays off quickly

The **Bulked Continuous Filament** process is the most efficient method of producing yarn for the carpet industry.

A special feature for the carpet making process is the uniquely high crimp that can be achieved with our machines, making it possible to reduce material usage by as much as 20%. The bottom line: an investment in an SML spinning line is an investment that pays off quickly!

SML's patented BCF texturing units are setting worldwide standards for high yarn crimp, longevity and the efficient use of raw materials. The outstanding quality of the yarns created with our high-tech spinning machines has led to us receiving a huge positive response from the market in this area.

They are one of the clearest examples of SML's innovative detail engineering with the continuous further development of core components. SML integrates high performance single-screw extruders with a 75 mm screw diameter in all of its BCF spinning lines. They guarantee, above all, top melt quality, the highest reliability and substantial productivity.

### Monocolour or tricolour

Within our **Austrofil® brand portfolio**, we build **four different types** of lines based on bulk continuous filament technology.

They are the ideal way to process the most popular synthetic carpet materials of the moment, such as PP. Our spinning lines can be set up with monocolour or tricolour technology, according to the yarn that is required.



### Technical data

Products	Carpets, rugs, door and window seals Carpets and rugs: mono- or multi-colored
Polymer	Polypropylene, MFR 18 – 27
Titer range	1,000 – 5,000 dtex

### Line configuration

	Austrofil® BCF Monocolor Compact 2x2	Austrofil® BCF Monocolor Twin 4x2	Austrofil® BCF Tricolor 4x2	Austrofil® BCF Tricolor 6x2
Output	Max. 160 kg/h 3.8 t/d	Max. 320 kg/h 7.6 t/d	Max. 320 kg/h 7.6 t/d	Max. 480 kg/h 11.5 t/d
	The actual maximum output depends on the raw materials used and the titer			
Total number of ends	4	8	8	12
Extruder	1 x 75/28	2 x 75/28	3 x 75/28	3 x 75/28
Dosing system	Continuous gravimetric loss-in-weight dosing with 3 components			
Spinning beam	4 spinning pumps with 2 outlets, electrically heated	8 spinning pumps with 2 outlets, electrically heated	12 spinning pumps with 2 outlets, electrically heated, thermal oil for heat transfer	18 spinning pumps with 2 outlets, electrically heated, thermal oil for heat transfer
Number of winders	2	4	4	6
Type	Automatic turret winder	Automatic turret winder	Automatic turret winder	Automatic turret winder
Winding speed	1,000 – 3,500 m/min	1,000 – 3,500 m/min	1,000 – 3,500 m/min	1,000 – 3,500 m/min
Core diameter	73 mm	73 mm	73 mm	73 mm
Bobbin diameter	320 mm	320 mm	320 mm	320 mm
Dimensions LxWxH	7.6 x 6.5 x 6.9 m	12.5 x 6.0 x 6.9 m	14.0 x 8.5 x 7.1 m	15.5 x 6.6 x 9.1 m

# Dosing and handling with great accuracy Raw material

CF spinning lines from SML are equipped as standard with very precise volumetric dosing systems for exact and reproducible colour effects. This dosing system consists of a main unit and two ancillary components for additives such as colour masterbatch or UV stabilisers.

As an option, gravimetric systems are also available for the highest accuracy in terms of colour uniformity.

### Your Advantages

- ▶ Top melt quality and colour distribution
- ▶ Volumetric dosing system for high and reproducible colour effects



3-components dosing system



Extrusion units 75/28D

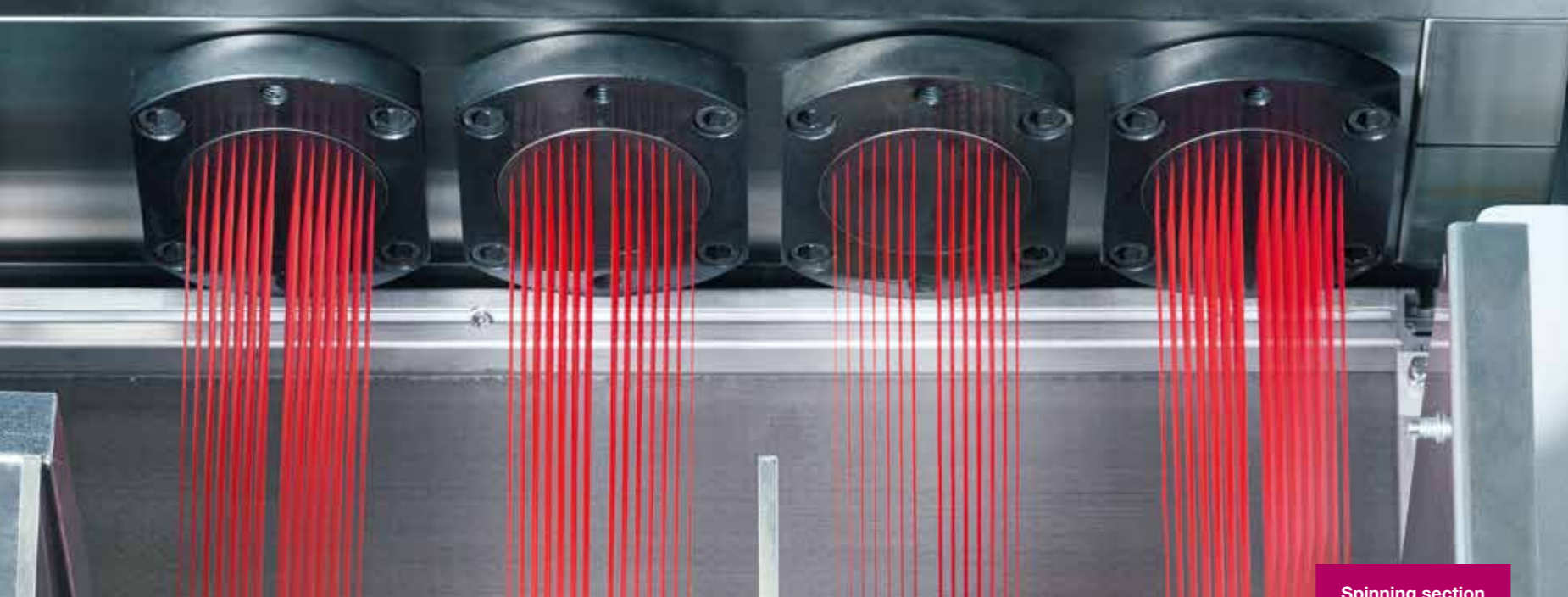
# Always state-of-the-art Extrusion unit

SML's CF spinning lines are equipped with highly efficient single-screw extruders with a 75mm screw diameter and a L/D ratio of 28. A barrier screw design and a subsequent static melt mixer in the adapter pipe ensure high output, extraordinary melt quality and high colour uniformity.

The extruders are driven by an air-cooled AC motor, coupled to a water-cooled gearbox. In addition, continuous screen belt filters for melt filtration are available as an option.

### Your Advantage

- ▶ Easy access to the extrusion unit, positioned on an elevated platform



Spinning section

## Spinning head

The CF spinning lines from SML exclusively use full metal spinning beams which are equipped with electrical plate heaters that stand for robustness and proven durability. In addition to the remarkable temperature uniformity, the design of the melt channels of equal length, which leads to an equal melt residence time in the channels, also ensures the excellent stability of filament production.

The spinning pumps divide the internal melt flow into two or more smaller ones as well as feeding the mounted spinpacks. An absolute vertical yarn path ensures an excellent spinning quality and a reliable production.

### Your Advantages

- Absolutely vertical yarn path for equal filament take-up and reliable production
- Equal melt residence time in the electrically heated spinning beam

## Quenching Unit

SML's efficient quenching units supply cooling air with an ideal temperature and airspeed to the filaments for proper cooling. The temperature and horizontal airspeed are individually adjustable, which facilitates the easy processing of different resin types and makes the whole cooling process reproducible.

### Your Advantage

- Individually adjustable horizontal quenching zones

## Spinfinish application

To lubricate the surface of fibres, spinfinish oil is used which has the effect of increasing the suppleness and gentle treatment of the yarn. The oil is supplied very accurately to ceramic applicator nozzles by means of precision metering gear pumps. A single oil pump outlet for each yarn ensures that the equal amount of oil is applied to the yarns. The spinfinish tank is equipped with a level sensor to ensure a continuous oil supply for the yarn and a filter that prevents blockage in the supply system.

### Your Advantages

- Gentle treatment of the yarn
- Application of the exact required amount of spinfinish oil for each yarn
- Failure free maintenance due a level sensor and filter



Spinfinish application



# Texturising unit

The patented texturing unit ensures BCF production with unique quality and high crimp, enabled through a state-of-the-art nozzle. Through a lamella free design, the complex texturing jets can handle yarns of the whole titer range. Another reason why the texturing unit of SML remains unmatched on the market is that in course of production up to 20 % of the raw materials can be saved.

## Your Advantages

- BCFwith high crimp and outstanding quality
- Production within all titer ranges
- Effective use of raw materials



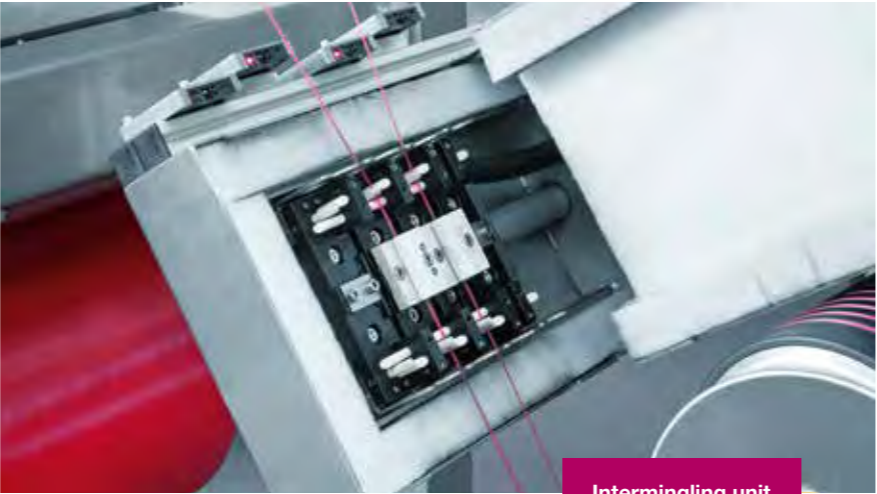
Texturising unit

# Intermingling unit

For SML's CF spinning lines, first class ceramic intermingling jets are used which are mounted in a noise-insulated box made of stainless to cover the whole titer range only two different sets of intermingling jets are required. The number of intermingling knots (compacted zones of yarn) is determined by the pressure of the air supply with low air consumption.

## Your Advantages

- Only two different intermingling jets cover the whole titer range
- Adjustable number of intermingling knots
- Low air consumption and reduced energy costs



Intermingling unit



Winding

# Winding

All SML's CF spinning lines are available with fully automatic turret winders for 1, 2, 4 and even 8 end operations. Depending on the yarn product, SML offers different winding technologies for high tenacity and/or high elongated CF production. Perfect yarn bobbins are also achieved at the highest winding speeds due to the excellent winding quality.

## Standard winder data for CF lines

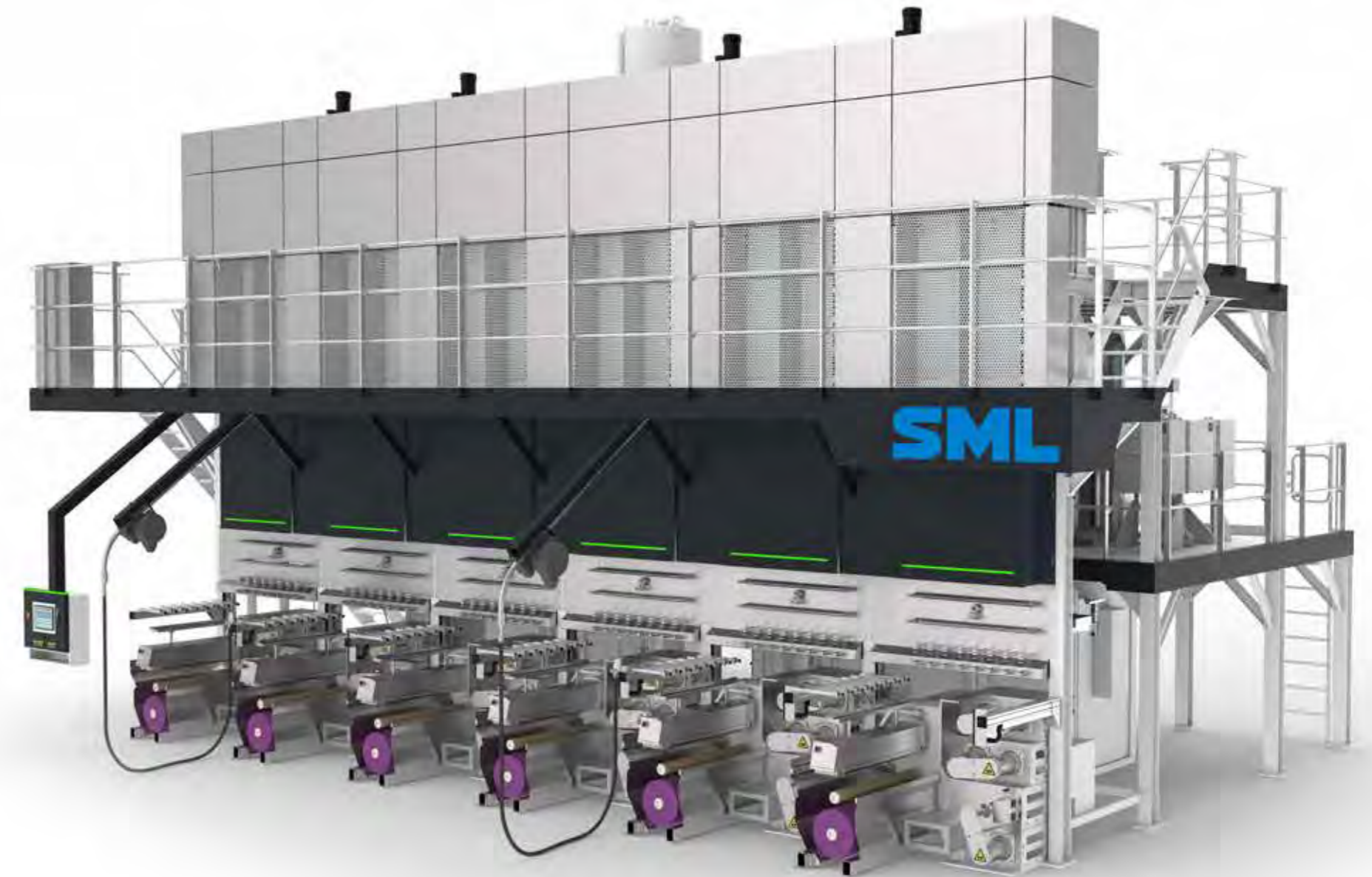
No. of yarns	2/4
Core diameter	75 mm
Traverse length	250/120 mm
Bobbin diameter	Max. 320 mm
Winding speed	1,000 - 3,500 m/min

## Your Advantages

- Production of 1, 2, 4 and 8 ends possible
- High performnce automatic winders with a separate user interface
- Perfect winding quality for low and high elongation and tenacity

# Proven technology – **new design**

When it comes to line performance, high quality and precise interaction of the internal components are particularly important. But who says **extrusion lines** shouldn't **look great too**?



# Technology that makes you smile

## SMILE® control system

Not sure if a technology can really make you smile? Now, let the facts about **our ingenious machine** control systems **convince you**.

SMILE is SML's machine control and operation concept, allows the **highly precise synchronisation** of all the components **in an extrusion system**. If an extrusion system is the powerful body, then SMILE is the **driving soul that brings that body to life**.

### 100 % developed in-house

The dynamic controller system is entirely developed in-house and has undergone significant further development in recent years. SML's long-standing competence in the field of automation and machine control provides loads of innovative and exceptional features.

### Centralised all-in-one concept

SMILE's central control station system allows the management of each production process with a wide touch screen attached to the Austrofil® multifilament spinning line. More than 1000 signals come together here, collected by many sensors, transducers and motors and transported via modern Ethernet bus systems.

This data includes sensory measurements like temperatures, speeds and pressures as well as actuator readings from valves, hydraulics, drives and positions. Thanks to SMILE, all of these components are interconnected and can be perfectly synchronised with each other. This fine-tuning allows customers to run their multifilament spinning lines at the very best performance level.



### Intuitive machine control

At SML, we believe machine control and operation should be highly intuitive and self-explanatory. SMILE is therefore an integral part of our coherent and user-friendly overall line concept.

- ▶ 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
- ▶ Remote control, remote update and remote service (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

### 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

### Systematic 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 store production parameters
- ▶ Documentation and detailed reporting of production processes
- ▶ Automatic alarm functions via e-mail or text message for quick debugging

### Interconnectivity and third-party integration

SMILE has many 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 OPC-UA, complete end-to-end process control beyond SML extrusion lines

### Tailored to specific requirements

SMILE can be tailor-made to client's specific requirements. This is blazing the way to new manufacturing concepts as well as delivering product properties.



# Stop guessing, start knowing with bit.Wise data analytics

With bitWise, SML's customers can **analyse the entire process history** of a spinning line with a **single click**, rather than relying on **current snapshots**.

bitWise incorporates decades of experience in automation with the **latest technologies in data analytics** and provides for a wide range of **completely new opportunities** for data-driven decisions.

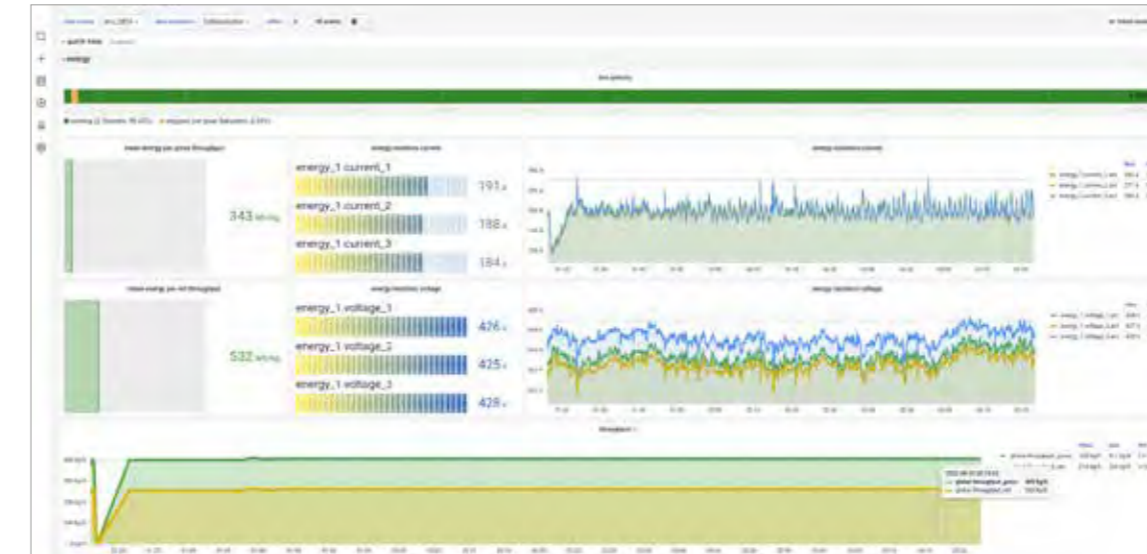
## In-depth view of all details

SML's spinning lines are equipped with hundreds of data-generating sensors. BitWise records and visualises this data up to 10 times per second. In addition, each manufactured roll is provided with a QR code that can be identified again. Putting everything together, manufacturers get an in-depth view of all the details involved in a production process – both in the present and in the past.

With bitWise, customers can look back at pressures within the system components and check whether there is a correlation with other measured values such as temperature or with the laboratory results of a finished product roll.

## Always connected, even on the go

BitWise is an 100 % on-premises-solution. This means that the data remains in-house on dedicated hardware, no cloud services are required. Nevertheless, customers can access bitWise in their company network via their VPN or a remote desktop solution.



## Optimising quality

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

- ▶ Monitoring of all quality-related process parameters, allowing quick corrective action
- ▶ Comprehensive tracking and documenting of product quality
- ▶ Making quality reproducible

## Maximising output

Recorded, aggregated and visualised data by bitWise helps to raise overall line utilisation and delivers 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.

- ▶ 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

## Open for vertical integration

At SML we understand that spinning lines represent a key part in a wider production chain. For end-to-end optimisation, bitWise therefore supports data exchange and vertical integration with third-party systems such as Manufacturing Execution Systems (MES), Enterprise Resource Planning (ERP) or Quality Assurance (QA). Customers can simply retrieve the data from the system.



## Choose your perfect interface

As with most technologies developed by SML, bitWise is highly customisable. The remote system can be retrofitted to all existing SML spinning lines.

# Outstanding end-to-end service support. Reliable assistance - around the globe, at all times.

## Always at your disposal.

Our dedicated customer service team offers reliable assistance to ensure the continuous operation of any SML extrusion line at all times. Regardless of how long a system has been in operation, we offer service to every customer.

- Long term experienced SML service technicians
- Support in all ways – via telephone, video call, chat, email and in person
- On-call service from 7 am to 10 pm CET
- Remote maintenance system
- Visual assistance via smart glasses as an option
- SML service technicians on call worldwide
- Quick on-site service

## Immediate assistance.

The remote maintenance system, which is available for every SML extrusion line, makes it easier to identify potential problems and provide a quick diagnosis. In order to find solutions, our service team works closely together with other departments at SML. This way, 85 – 90 % of all malfunctions can be solved remotely.

**Our highly-skilled technicians are at your service within 24 hours throughout Europe and within 48 hours in the rest of the world.**



## Up-to-date knowledge and experience.

Our service team consists of technicians who know SML's extrusion lines inside out, as they have been these themselves for many years. In order to keep their know-how up to date, all service employees continue to work regularly in everyday production. Their competence is reflected in the short reaction times to our customers' enquiries.

## Visual assistance in real time.

Through the use of smart glasses, our service team can provide real-time assistance worldwide. Whether our customers have technical problems, need help with product changes or maintenance work - they are guided step by step. This service is available for every extrusion line from SML.

Analyses  
Development  
Pre-tested Performance  
Delivery on Time  
Service Support  
Customer Satisfaction

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