

VarioFil®

Plug & Perform



Compact spinning line – invest in your success



VarioFil® – invest in your success

VarioFil® spinning line is the ideal turnkey production unit for manufacturers that have a wide range of products, small lot numbers or specialized products. It is not limited to using only one material or a particular process. Customized conversion packages allow the unit to be adapted to the market requirements quickly. BB Engineering GmbH can cover the whole production chain, from chips to yarn, including plant design components, e. g. chips handling, air treatment systems etc.

Our value is your benefit

- First-class yarn
- High-precision dosing of master batches and additives
- Production capacity up to 730 kg/h per extruder
- WINGS technology by Oerlikon Barmag

Plug & profit

- Individual machine configuration
- Turnkey line from one source
- Fast and easy start-up due to pre-assembling and testing before shipment

Reduced operating costs

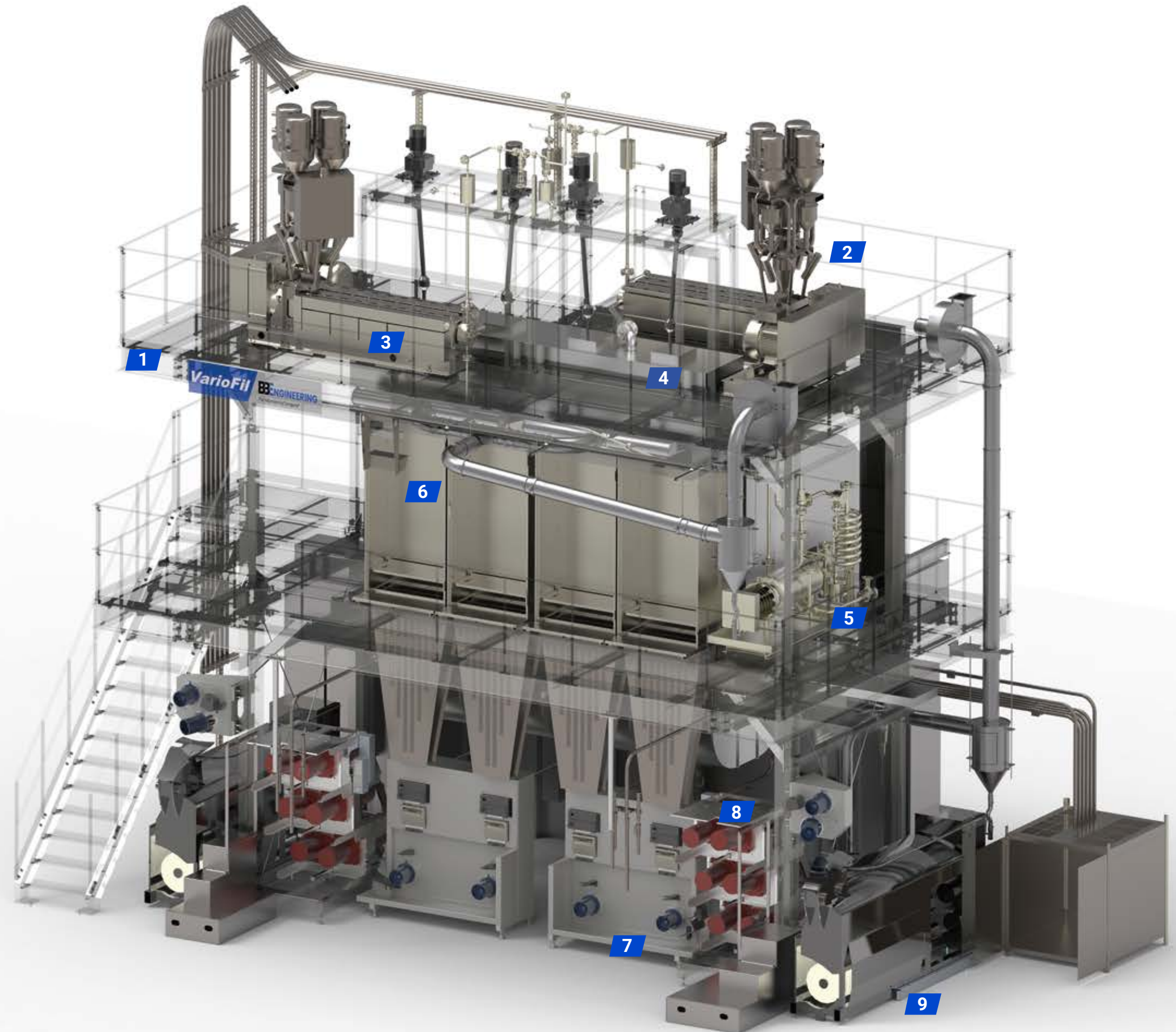
- Simple operation
- High production speed with extended mechanical capability
- Efficient energy management
- Low maintenance costs
- Low energy costs
- Waste management

As flexible as your needs

- Configuration for various yarn types (POY, FDY, HTY, LSY, HMY) and denier
- Processing of various polymers (PET, PP, PA amongst others) – even PET waste
- Processing of all colors
- Broad overall and filament titer range

Overview

- 1** Steel frame
- 2** Dosing system
- 3** Extruder
- 4** Spinning head
- 5** HTM System
- 6** Quenching unit
- 7** Take-up unit
- 8** Godets
- 9** Winder





Steel frame

VarioFil® is a flexible compact turnkey solution. Due to its standalone steel frame, it can be integrated into almost any production hall without any further civil engineering.

The rugged steel construction with up to three platforms supports all key components and grants best admission to all areas:

- First platform for operation of quenching and spinning area, e.g. for spin pack change.
- Second platform for operation of extrusion components, e.g. spin pump change.
- Third platform for maintenance of the dosing system / buffer hopper system.

The complete frame is zinc-coated to prevent corrosion of steel parts.



Dosing unit

The gravimetric dosing and blending system grants high-precision dosing of masterbatches and additives down to 0.5 kg/h. The system can be designed with up to seven components to support individual compound recipes. Each component uses continuous gravimetric blending (loss in weight principle) to achieve excellent dosing accuracy. Inclined screw feeders improve the metering accuracy and prevent undesired dribble effects.

High-temperature design to process dried material on request.



Extruder

VarioFil® lines are equipped with high-quality BBE extruders known from Oerlikon Barmag and Brückner machines.

The utilization of top-quality, low-wear materials – in particular for the extruder cylinders and the extruder screw – ensure long-term, error-free operation.



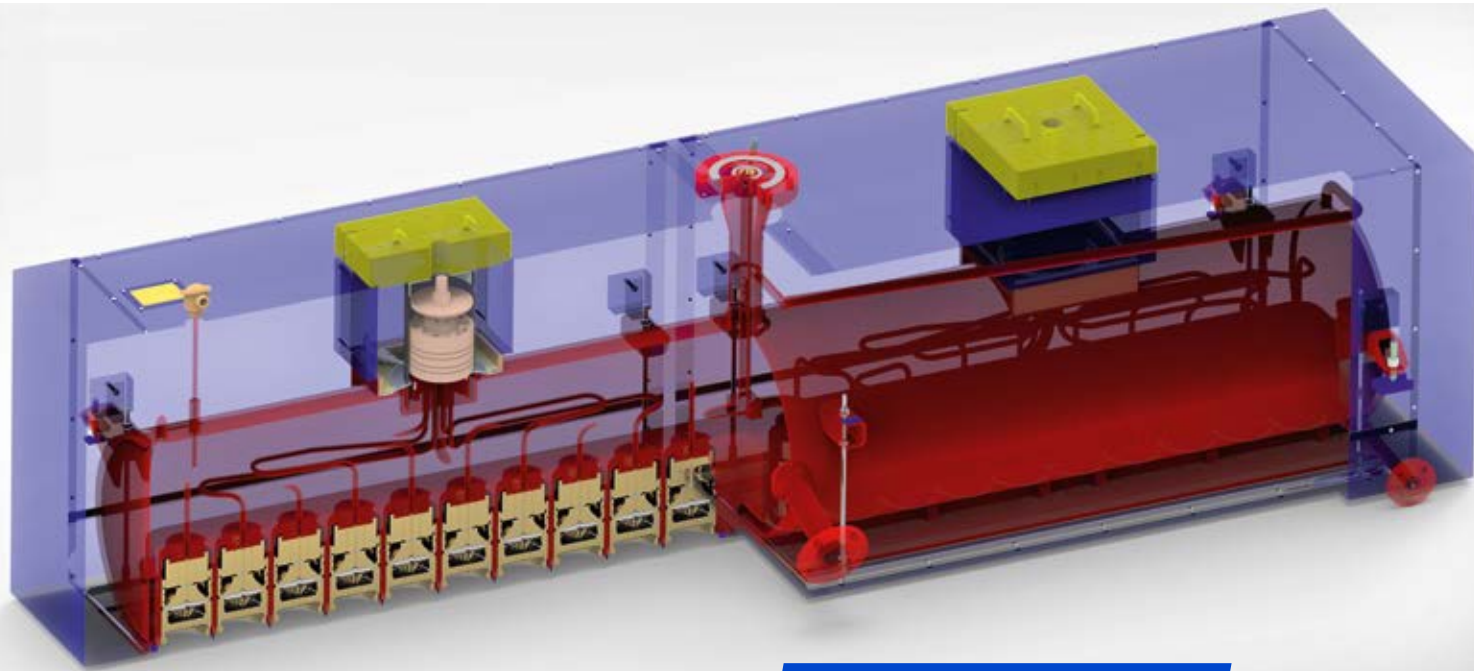
The screw geometries with special mixing components have been defined to ensure short dwell times in order to keep the thermal and mechanical load of the melt to a minimum. This ensures excellent melt and hence first-class yarn quality especially in case of dope-dyed yarns.



Filter

In the case of recycled raw material such as rPET chips or bottle flakes, an additional filtration of the melt might be necessary. Therefore, a wide range of filters can be integrated into the VarioFil® machine concept. One example is the long-life CVF 6XX series (continuous vertical filter). It uses candle filters with a filter area up to 8 m².

The use of polymer filters for critical polymers is mandatory to ensure a stable spinning process and achieve high-quality products.



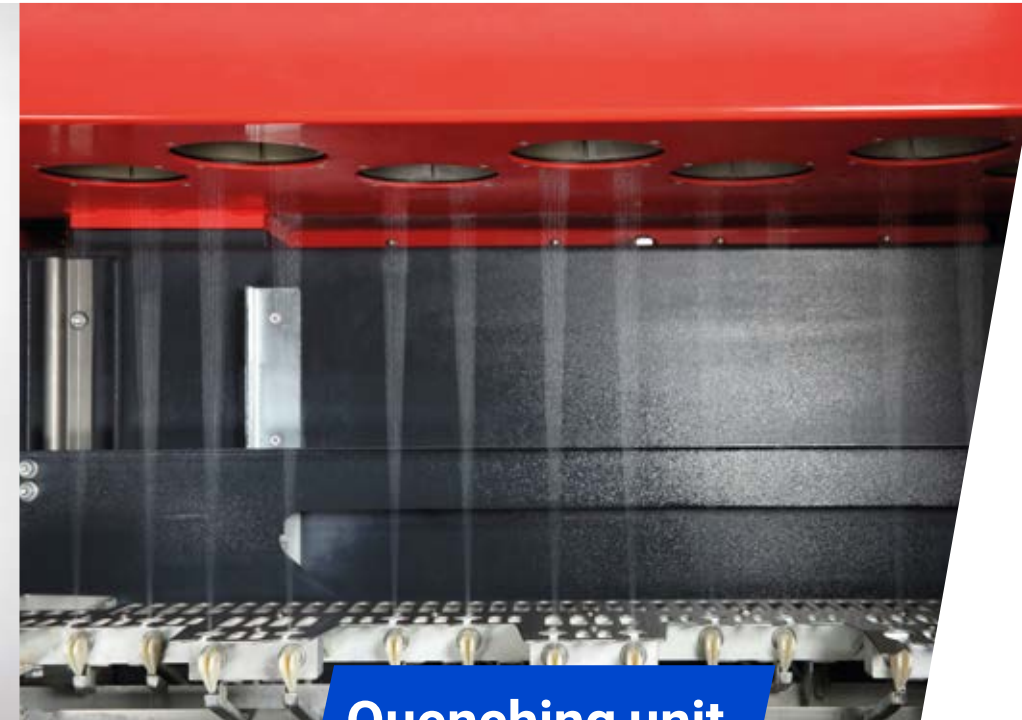
Spinning head

All VarioFil® lines are equipped with vapor heated spinning heads. The heat transfer medium (HTM) system ensures high temperature uniformity over all spin packs and melt pipes. The system includes safety valves, cooling and venting pipes.

Planetary spin pumps by Oerlikon Barmag guarantee precise metering of each individual thread and high yarn quality even at very high production speeds. The spin packs each allow the spinning of up to 576 filaments.*

Numerous temperature and pressure sensors grant live monitoring of the process to ensure high process quality.

*Depending on chosen type of winder.



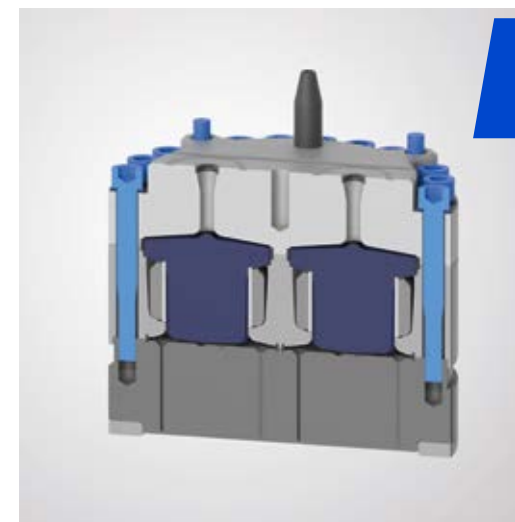
Quenching unit

The quenching system supplies an even, turbulence-free airflow for achieving excellent uster values. The airflow speed can be set using an electric drive unit.

Both standard X-Flow quench and radial EvoQuench by Oerlikon Barmag are available,

depending on the requested product. The EvoQuench system ensures excellent cooling for low dpf counts and an increased number of filaments.

If required by the process, a monomer suction unit can be integrated in the quench area.



Spin pack

The spin packs are characterized by outstanding flow condition and excellent temperature distribution, reflected in very short color change times. The proven "self-sealing" and "bottom-loading" principle has been retained to ensure simple, fast and error-free installation. In certain application cases such as nylon yarn we switch to "forced sealing" packs.

On request, the spin packs can be equipped with woven filter elements (3LA, 6LA). These filter elements have an up to 10 times larger filter surface compared to standard sand spin packs. The spin pack lifetime is therefore increased by two to three times.



Godets

The induction-heated HF series godets have also been taken from the proven large-scale Oerlikon Barmag spinning systems.

The electronics – especially developed for this system by Oerlikon Barmag – ensure the greatest degree of speed accuracy over the entire speed range.

The high-frequency heaters permit even temperature characteristics across the entire working length for optimal yarn heat treatment.



Take-up unit

Depending on the product, the yarn can either directly go to the winder (POY process) or can be further processed on a take-up unit (FDY or IDY process).

The take-up unit comprises of a spin finish system (either kiss roll or jets), a pre-intermingling system, an intermingling system and a heated godet stand. The godet stand consists of the proven induction heated HF godet by Oerlikon Barmag. Under the influence of heating and draw force, the physical yarn properties, e.g. tenacity, can be increased.



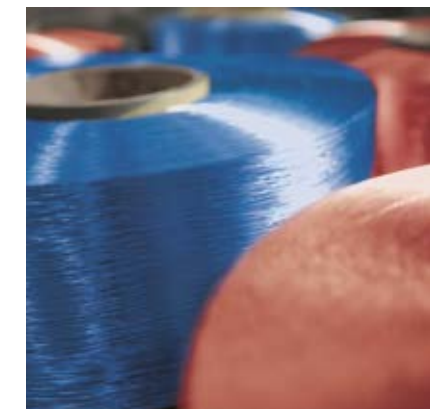
Winder

Regarding winders, we use only high-end technology by Oerlikon Barmag. There are several models available, and we will find the best fitting solution for your purpose. All winding units operate highly productive and energy-efficiently, preserving your yarn quality.

In cases of textile yarn, the WINGS family offers many options. For example, WINGS POY is a flexible

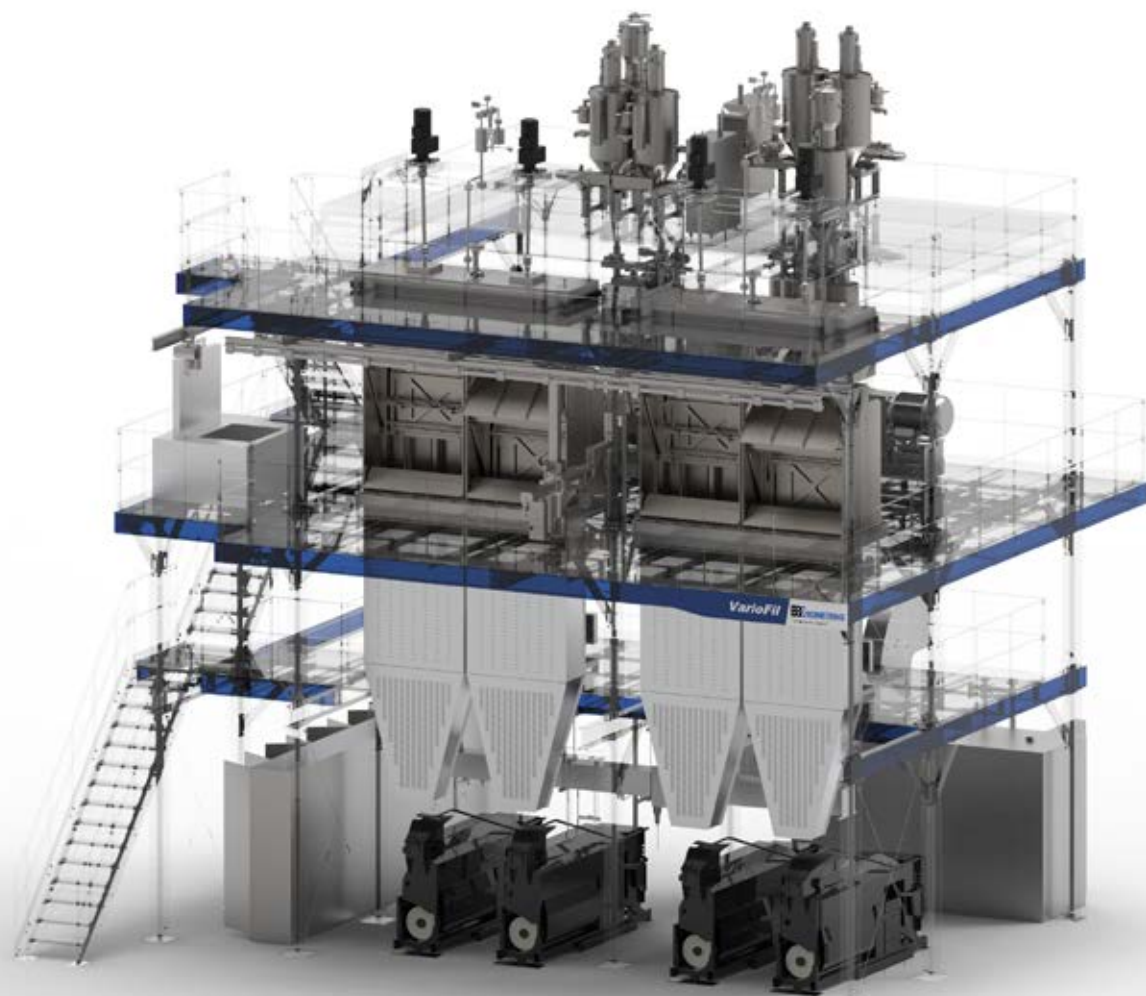
winder, which makes both POY and FDY processes possible on one machine possible. The WINGS POY HD allows high final titers of up to 600 den.

For industrial yarn, winders of the ACW series with low-wear and yarn-protecting bi-rotor traverse system or the ASW series with grooved roller and camshaft are suitable.



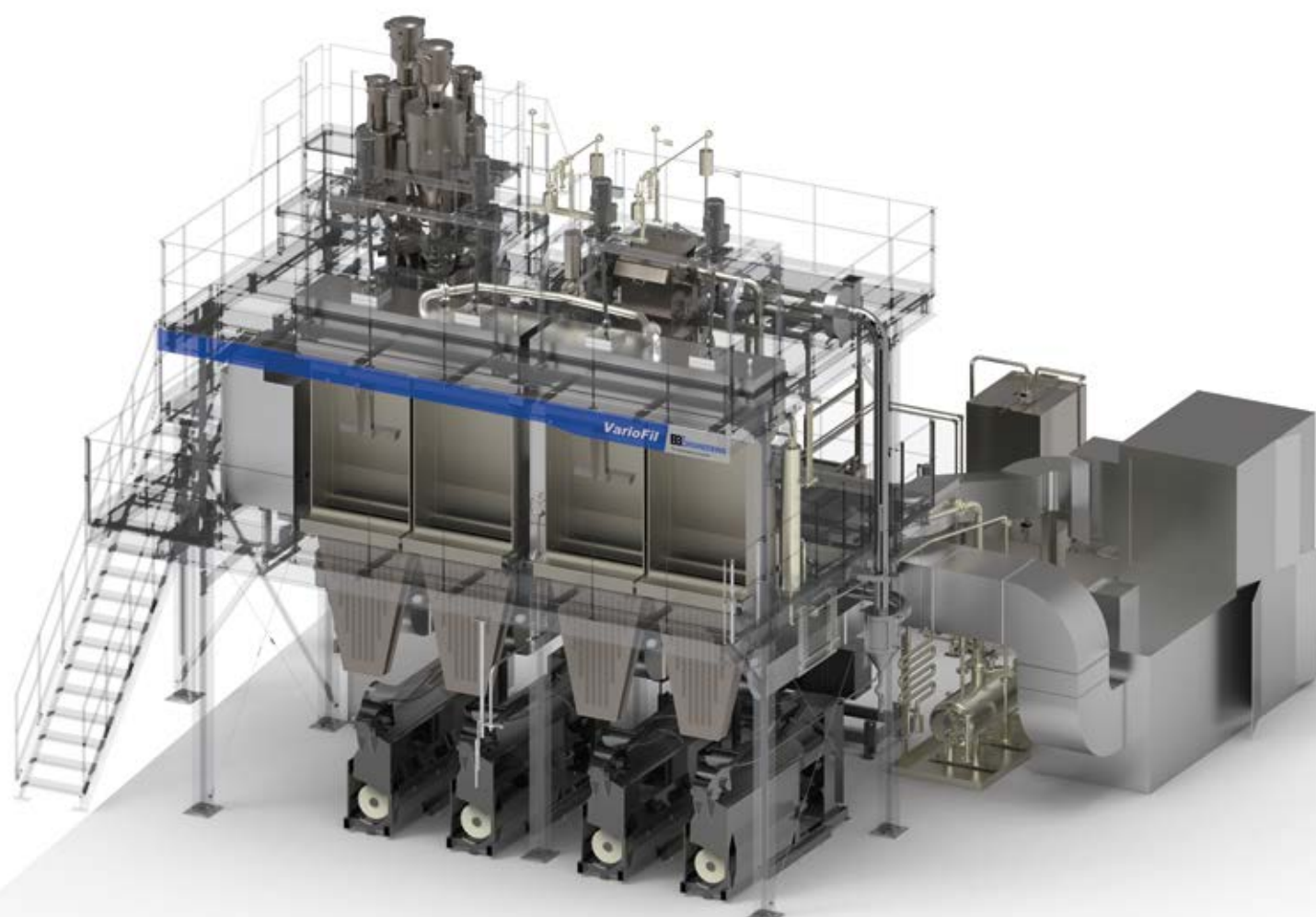
VarioFil® design examples

4 positions POY (PET, PA)



Configuration			
Polymer	Polyester (PET)	Polyester (PET)	Polyamide (PA)
Capacity	Up to 600 kg/h	Up to 400 kg/h	Up to 150 kg/h
No. of extruders	2	1,2 or 4	1 or 2
No. of yarn ends	4 × 10	4 × 10	4 × 12
No. of yarn ends per winder	10	10	10
Available stroke	120 mm	120 mm	97 mm
Titer range den (final)	300 – 600	50 – 300	30 – 100
Winder	Oerlikon Barmag WINGS POY HD	Oerlikon Barmag WINGS POY	Oerlikon Barmag WINGS POY
Dimensions	13 × 13 × 12 m	10 × 12 × 12 m	10 × 11 × 12 m

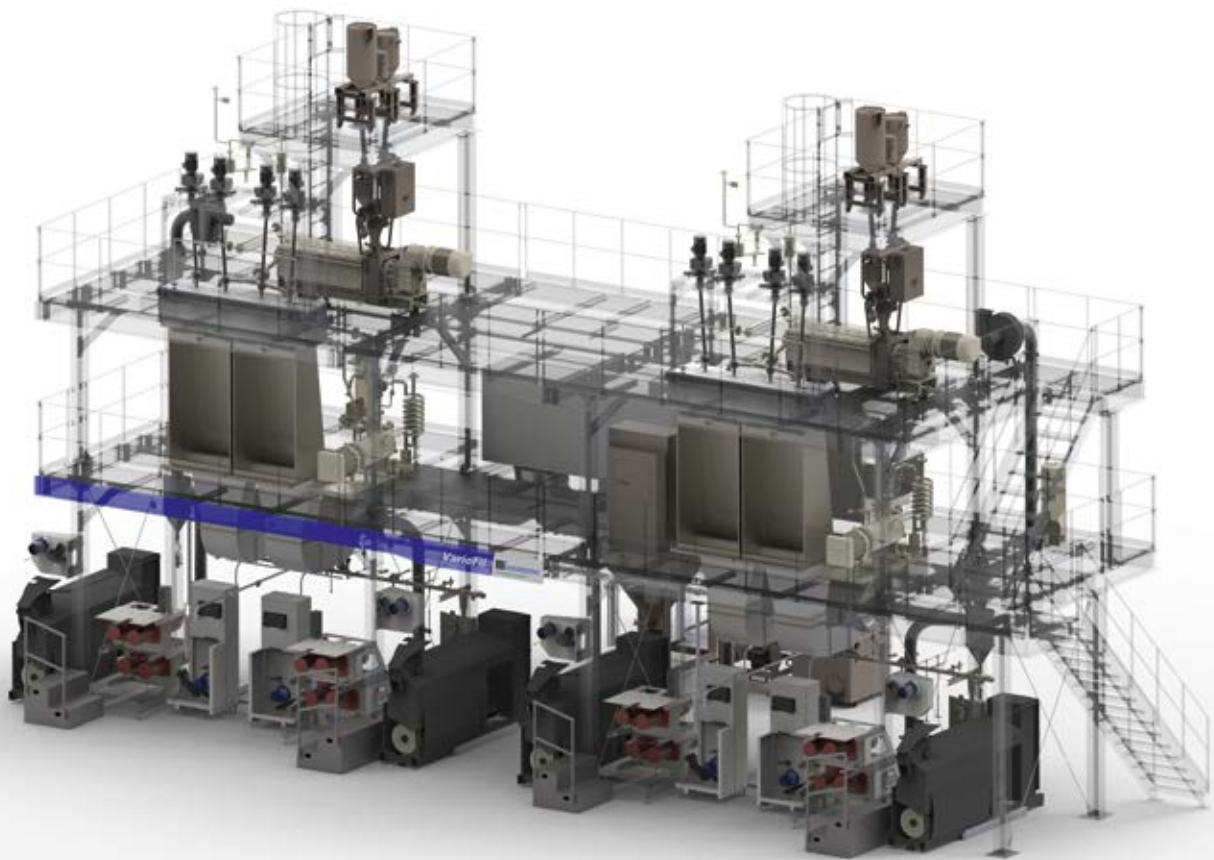
4 positions POY (rPET)



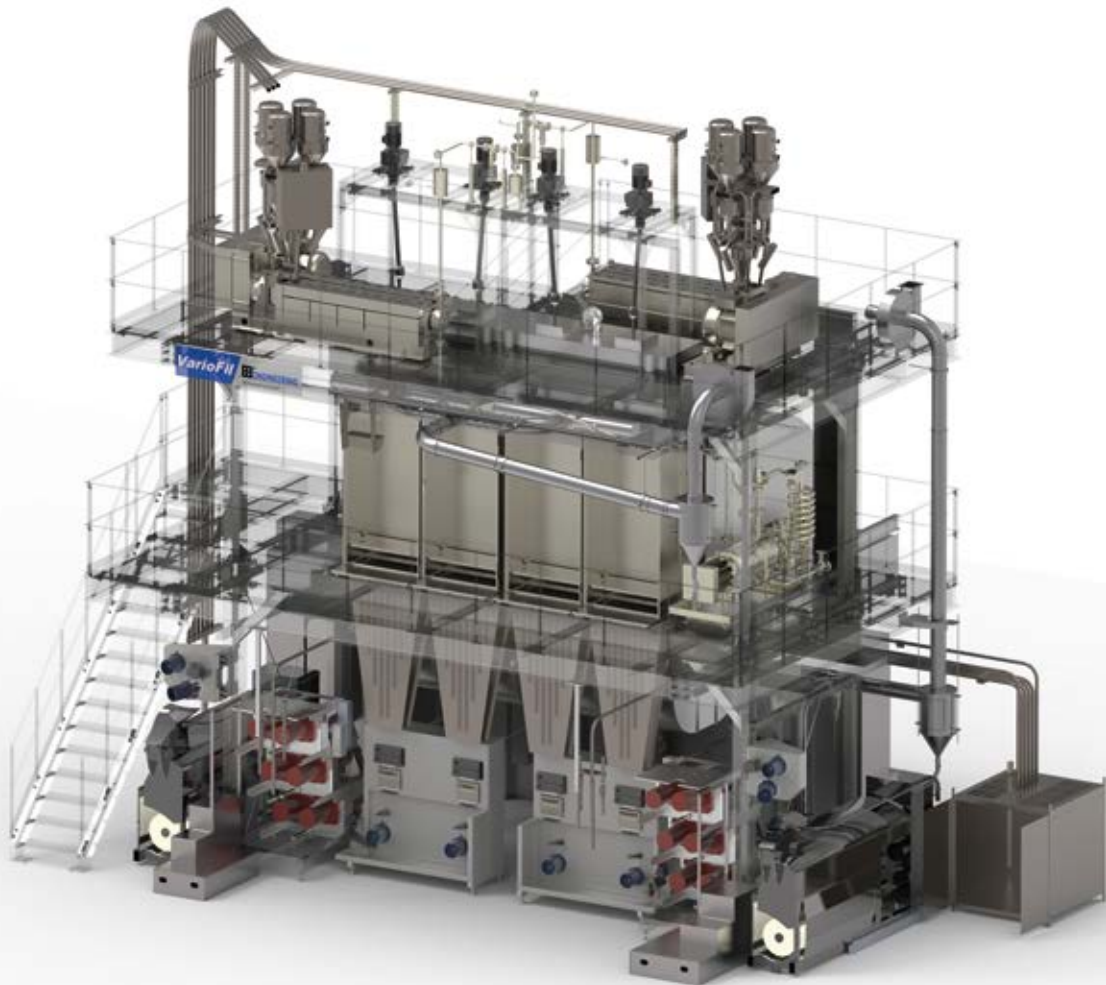
Configuration	
Polymer	Polyester (PET) – Bottle flakes
Capacity	up to 440 kg/h
No. of extruders	1
No. of yarn ends	4 × 10
No. of yarn ends per winder	10
Available stroke	120 mm
Titer range (final)	200 – 300 den
Winder	Oerlikon Barmag e-save WINGS POY
Dimensions (L x W x H)	11 × 10 × 10 m

VarioFil® design examples

4 positions FDY (PET, PA)



2 positions FDY (PP)



Configuration		
Polymer	Polyester (PET)	Polyamide (PA)
Capacity	up to 480 kg/h	up to 105 kg/h
No. of extruders	2 or 4	2
No. of yarn ends	4 × 10	4 × 12
No. of yarn ends per winder	10	12
Available stroke	120 mm	97 mm
Titer range (final)	150 – 840 den	30 – 70 den
Winder	Oerlikon Barmag e-save WINGS POY	WINGS POY
Dimensions (L x W x H)	10 × 22 × 12 m	10 × 22 × 12 m

Configuration	
Polymer	Polypropylene (PP)
Capacity	up to 280 kg/h
No. of extruders	1 or 2
No. of yarn ends	2 × 10
No. of yarn ends per winder	10
Available stroke	120 mm
Titer range (final)	200 – 1200 den
Winder	Oerlikon Barmag e-save WINGS POY
Dimensions (L x W x H)	6 × 11 × 9 m

VarioFil® design examples

2 positions IDY (PET, PA)



Configuration	
Polymer	Polyester (PET), Polyamide (PA)
Capacity	up to 280 kg/h
No. of extruders	1
No. of yarn ends	2 × 12
No. of yarn ends per winder	6
Available stroke	250 mm
Titer range (final)	210 – 840 den
Winder	Oerlikon Barmag e-save ACW IY
Dimensions (L x W x H)	11 × 12 × 13 m

6 positions POY BICO (PET + PA.6 orange type)



Configuration	
Polymer	Polyester (PET) / Polyamide (PA.6)
Titer den (final)	160
Capacity	Up to 300 kg/h
Ratio PET:PA	80:20 – 85:15
No. of extruders	1 per polymer
No. of yarn ends	6 × 10
No. of yarn ends per winder	10
Winder	Oerlikon Barmag WINGS POY
Dimensions	15 × 14.5 × 10 m

VarioFil® configuration examples

Polymer	FDY			POY		HTY		
	PET	PA 6 & 6.6	PP	PET / PBT	PA 6 & 6.6	PET	PA 6 & 6.6	PP
Processspeed (m/min)	4000 – 4800	4600 – 4800	3000 – 4500	2550 – 3250	4200 – 4500	2500 – 3200	2500 – 3200	2000 – 2500
Titer final (den) unplied	30 – 500	12 – 100	75 – 1000	20 – 600	20 – 150	100 – 3200	20 – 1260	75 – 1500
Titer range per machine* (min.den/max.den)	1:3	1:2	1:4	1:3	1:2	1:3	1:2	1:3
Filament count (unplied)	12 – 288	7 – 96	18 – 288	8 – 576	7 – 144	10 – 384	7 – 210	36 – 288
Filament count dpf round (spun dyed)	0.5 – 5.2 (1 – 5)	1 – 4.2 (1 – 4)	2 – 7	0.34 – 6.3 (1 – 6)	0.4 – 4.3 (1 – 4)	Consulation with technical department		
Yarn ends per position	8 / 10 / 12	8 / 10 / 12	6 / 10	8 / 10 / 12	8 / 10 / 12	4 / 6 / 8	6 / 8 / 10 / 12	4 / 6 / 8
Elongation (%)	> 29 – 35	42 +- 6	25 – 30	> 120	> 65	Consulation with technical department		
Tenacity (g/den)	> 3 – 4	> 3,8 – 4	> 3 – 5	> 2	> 3,6			
Material spec.	Dull, semi dull, full dull, bright, super bright	Dull, semi dull, full dull, bright, super bright	Dull, semi dull, full dull, bright, super bright	Dull, semi dull, full dull, bright, super bright, R-PET	Dull, semi dull, full dull, bright, super bright	Bright	Bright	Bright
Filament profile (examples)	Round, delta, trilobal, hollow etc.	Round, trilobal etc.	Round, delta, trilobal, hollow etc.	Round, delta, trilobal, "dryfast", hollow etc.	Round, trilobal etc.	Round	Round	Round
Machine parts data								
Electric control system	Siemens Simotion designed by Oerlikon Barmag			Siemens Simotion designed by Oerlikon Barmag				
Material handling	Crystallizer, dryer, conveying system	Conditioner, conveying system		Crystallizer, dryer, conveying system	Conditioner, conveying system	Crystallizer, dryer, conveying system	Conditioner, conveying system	
Dosing	Gravimetric continous dosing system with up to 7 additives, loss in weight principle			Gravimetric continous dosing system with up to 7 additives, loss in weight principle				
Extruder D/L [mm]	30, 45, 60, 75, 90, 105, 120 D / 24 or 30 × D = L (For PP only 30 × D)			45, 60, 75, 90, 105, 120 D / 24 or 30 × D = L (For PP only 30 × D)				
Spinning beam	vapor oil heated system for high temperature uniformity over all spinnpacks and meltpipes			vapor oil heated system for high temperature uniformity over all spinnpacks and meltpipes				
Spinning pumps	Oerlikon Barmag			Oerlikon Barmag				
Quenching	X-Flow / Evo	X-Flow	Two Step X-Flow	X-Flow / Evo	X-Flow / Evo	X-Flow / Evo	X-Flow	Two-step X-Flow
Number of godets	8	8	10	2	2	11 – 12	11 – 12	11 – 12
Godets information	By Oerlikon Barmag, Heated godets: e-save, multi-zone high-frequency induction heater, oil drop lubrication system			By Oerlikon Barmag, Heated godets: e-save, multi-zone high-frequency induction heater, oil drop lubrication system				
Winder	Wings POY, Wings HD POY, ACWW, WinFors	Wings HD POY, ACWW, WinFors	Wings POY, ACWW, WinFors	Wings POY, Wings HD POY, WinFors	Wings POY, ACW, WinFors	ACW IY	ACW IY	WinFors
Max. package diameter per winder (Ø)	440 mm	440 mm	440 mm	440 mm	440 mm	360 mm	360 mm	360 mm
Max. full bobbin weight	15 kg	10 kg	9 kg	15 kg	11 kg	9 kg	6 kg	6 kg
Positions on one steel frame	2	2	2	4(6)	4(6)	2	2	2
Downstream process	Warping, knitting, sizing, weaving, air-texturizing			DTY / ATY		Weaving, knitting, croching		
Applications example	Outdoor clothes, home furnishings, automotive fabrics etc.			Fashion, sports, home textiles, automotive etc.		Seat bealts, tires, airbags, geotextiles etc.		

*depends on melt pipe length and amount
of positions per extruder



Unlimited possibilities

Customized concepts

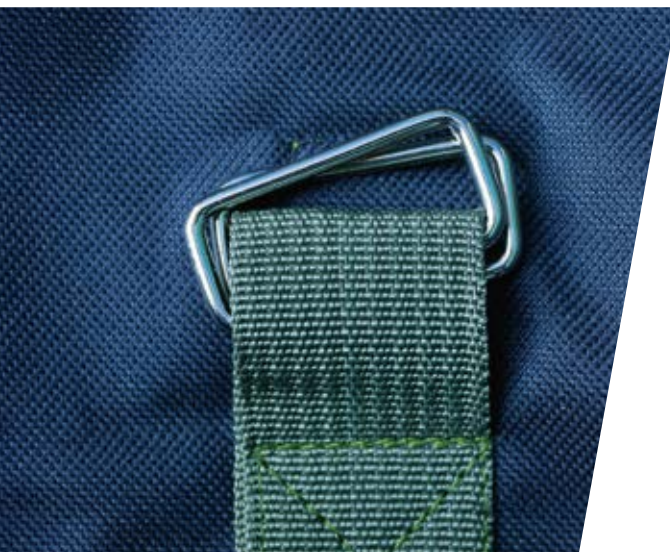
Numerous potential applications require diverse yarns, each with different properties. This is where we are your partner: you determine the end applications for your yarn. We ensure that your investment caters to these. With customized process consultation and tailor-made systems concepts.

Diverse processes for all applications

Heavy or low denier? High-tenacity, low-shrinkage or even super-low-shrinkage? HMLS or safety yarns? Polyester or polyamide? We have the right systems configuration for all your requirements.

PET recycling: From waste to value

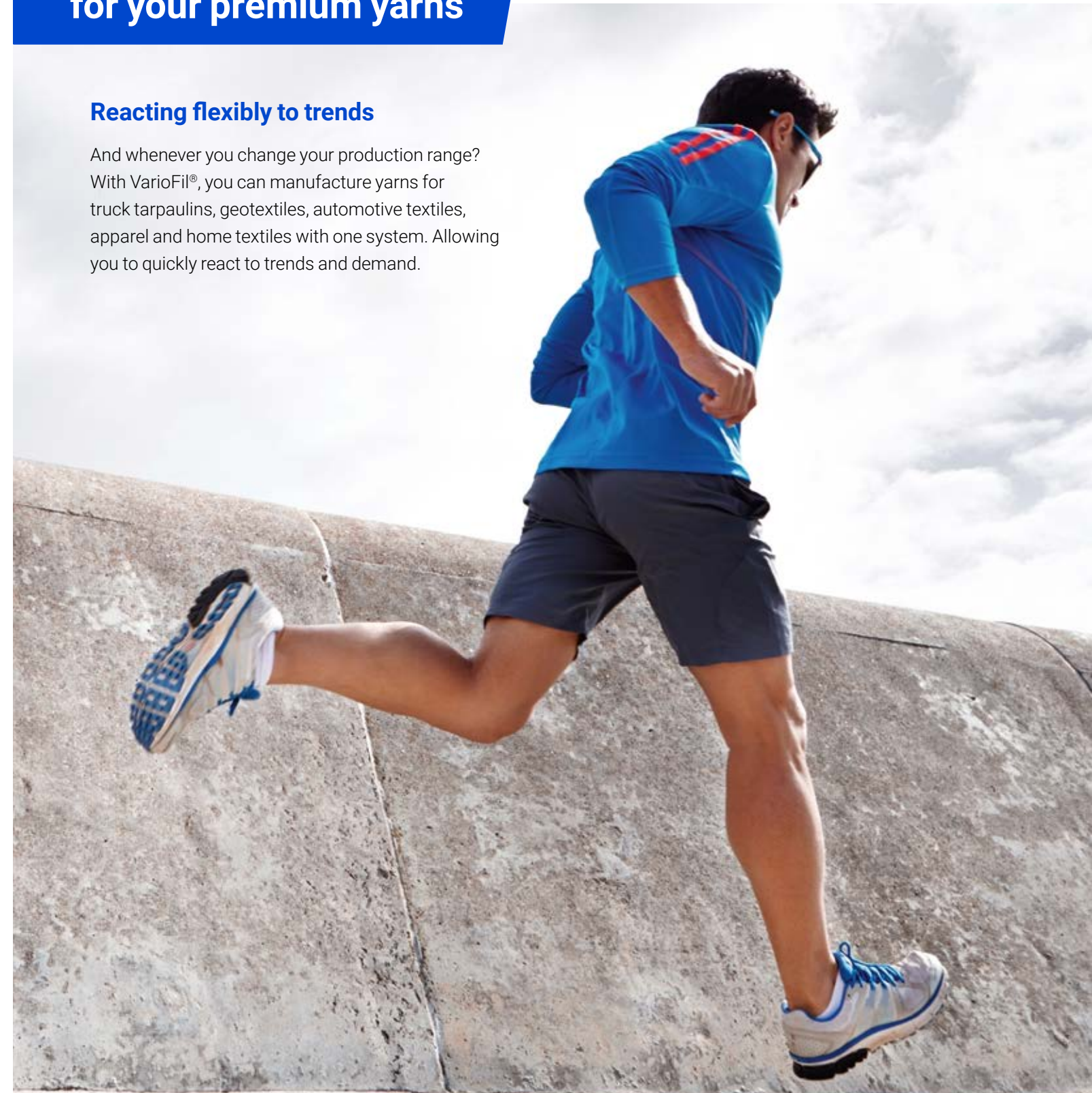
The VarioFil® R version processes rPET chips and bottle flakes directly into high-quality recycled fibers. For this purpose, the line is equipped with several technological features such as a special extrusion system, the latest metering and blending technology and an advanced two-step melt filtration. Even the increase of the IV possible.



for your premium yarns

Reacting flexibly to trends

And whenever you change your production range? With VarioFil®, you can manufacture yarns for truck tarpaulins, geotextiles, automotive textiles, apparel and home textiles with one system. Allowing you to quickly react to trends and demand.





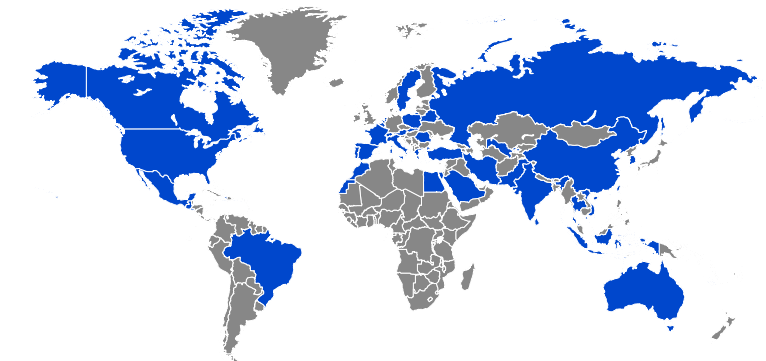
BBE Valueneering

Innovative services in the field of machines and plant design for more than 20 years.

Our business is development, engineering, design and manufacturing of extrusion and filtration technologies as well as complete spinning (VarioFil®) and recycling (VacuFil®) machines for the plastics and textile industry. The services offered range from the design and planning phases all the way through to the implementation of projects. Innovation, quality and trust are our greatest strengths from which you will benefit. Founded in 1997 as a joint venture between Oerlikon Barmag, a subsidiary of Oerlikon Textile GmbH & Co. KG and Brückner Group GmbH, the company nowadays employs more than 160 members of staff at its Remscheid-Lennep location.

Worldwide operation

All over the world companies trust in our products and services. Closely partnered with Oerlikon Barmag Customer Services, we provide a global service network comprising about 20 service stations, over 60 agencies and hotline support for finding solutions to the challenges you face.



● Countries with BBE customers



Let's get in touch

Our experts look forward to hearing from you and are ready to answer any questions you may have.

@ sales@bbeng.de

+49 21 91 95 10 300

www.bbeng.de

BB Engineering GmbH
Leverkuser Str. 65
42897 Remscheid
Germany
Fon +49 2191 9510 - 100
sales@bbeng.de
www.bbeng.de