

Synthetic staple fiber production The right solution for every need



Your benefits

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From Melt to Fibers Solutions along the textile value chain

Place your business ideas in professional hands! Consulting, engineering, plant construction, high-tech machinery and lifecycle management – the whole package from a single source. Many years of experience in textile machine construction and our strong global network form a solid basis and the perfect prerequisites for us as your solutions provider.

Define your yarn properties from the very outset

From melt to fiber, from polycondensation or extrusion to synthetic staple fibers – we have your value-added chain under control. And you increase your profits. Because an optimized manufacturing process encompassing all production steps provides you with the greatest-possible influence on the quality of your end product. And your production costs. Add to

this the fact that our brand strength will make financing your project a profitable investment.

Extensive experience in engineering and management competencies help us deliver even complex projects and processes. You can rely on that!





Synthetic staple fiber production with Oerlikon Neumag technology

More than 4 million tons of installed production capacity worldwide speak for themselves. Oerlikon Neumag staple fiber plants stand for highest product quality and absolute reliability.

The idea

Synthetic staple fibers are produced by the main conversion steps: extrusion, melt spinning, drawing, crimping, cutting and baling. The design of the key components as well as the composition of components in highly reliable production lines and the process know-how determine the fiber quality, efficiency of the production and ultimately the overall success.

The benefit

We have developed the processes and engineered dedicated from melt to fiber production lines:

- From 4 300 tons per day
- One-step or two-step technology
- Polypropylene, polyester, recycled polyester, polyamide and more
- Commodity or special applications



e-save provides you with a competitive edge

With e-save, Oerlikon Manmade Fibers introduced a label for particularly energy-efficient systems, machines and components back in 2004. Over the past years, e-save has established itself as the trademark of a comprehensive efficiency program. This underlines the preeminent role of Oerlikon Manmade Fibers when it comes to commercial success and sustainability.

Compared to other concepts available on the market, our staple fiber solutions convince in terms of

- Energy: with up to 20% lower energy consumption in spinning and fiber line area
- Economics: with up to 50% fewer operating staff due to a capacity increase up to 300 tons/day
- Environment: with up to 10% lower steam consumption due to lower free area on calender drier godets



Commodity, bicomponent or special fibers with two-step plants

Our two-step staple fiber plants are designed to meet the highest quality requirements at the lowest operating costs.

The largest plants with production capacities of up to 300 tons per day guarantee high production yields under absolutely stable conditions for the production of high quality PET cotton-type fibers. Beyond this, we offer two-step lines for the production of staple fibers with the most diverse properties made using PET, PP, PA or bicomponent for a wide variety of applications such as hygiene and medical products, geotextiles and concrete reinforcements.

PET cotton-type fibers

A major competitive advantage of the 300-ton-per-day staple fiber plant for commodity fibers is the considerably higher profitability per ton of fiber compared to smaller plants, which is essentially based on the energy efficiency of the large-scale plant.

Our technology offers a further advantage with the possibility of dyeing fibers directly in the spinning process. Because the large plants are always connected to a polycondensation plant, fibers cannot be dyed until processing. With side stream extrusion, however, the master batch can be mixed directly into the spinning process. This means, for example, that black fibers can be produced directly. Later dyeing is no longer necessary.

Your benefits:

- Higher profitability per ton of fiber
- Capacities up to 300 tons per day
- Side stream extrusion

Specialties

And in addition to cotton-type and bicomponent fibers other special fibers can be optimally produced in the twostep process:

- PP fibers for hygiene nonwovens
- PP short cut fibers for concrete reinforcements
- PET hollow fibers for insulation and filling
- PET fibers for geotextiles and other needled felts
 PLA fibers for apparel





Technical data

Polvester staple fibe

Titer range [dpf]	1.0 – 17.8
Production speed [m/min]	spinning line: 600 - 2,000, drawing line: 100 - 300
Capacity [tons/day]	30 - 300
Tenacity [cN/dtex]	3.6 - 6.0
Elongation [%]	18 - 55
Fiber condition	staple fiber: crimp and flat /converter tow
Stuffer box width [mm]	max. 1,000
Stuffer box load [dtex/mm]	6,000 - 12,000
Cutting length [mm]	1.5 – 300
Main application	Apparel, carpet, fiberfill

Titer range [dpf]	1.0 – 17.8
Production speed [m/min]	spinning line: 600 - 1,500, drawing line: 100 - 300
Capacity [tons/day]	10 - 45
Tenacity [cN/dtex]	3.2 - 6.0
Elongation [%]	35 – 100
Fiber condition	staple fiber: crimp and flat/converter tow
Stuffer box width [mm]	360
Stuffer box load [dtex/mm]	6,500 – 9,800
Cutting length [mm]	1.5 – 300
Main application	Apparel, automotive, carpet, filtration

Titer range [dpf]	1.0 – 17.8
Production speed [m/min]	spinning line: 600 - 2,500, drawing line: 100 - 300
Capacity [tons/day]	30 - 80
Tenacity [cN/dtex]	1.2 - 10.0
Elongation [%]	18 - 350
Fiber condition	staple fiber: crimp and flat/converter tow
Stuffer box width [mm]	up to 460
Stuffer box load [dtex/mm]	6,000 - 9,500
Cutting length [mm]	1.5 – 300
Main application	Geotextile, hygiene, reinforcement

Process Control System (PCS)

Draw chest 2

ancer rolle

Steam chest



Bicomponent fibers offer diverse application possibilities

Not only commodity fibers, but also bicomponent fibers are produced in the two-step process. Here, we offer solutions for self-crimping fibers, bonding fibers, super microfibers and hollow fibers, for example.

Bicomponent fibers offer a huge range of possible crosssections. In general, these fibers comprise of two different polymers, which give them specific properties. Bicomponent fibers with the corresponding cross-sections are manufactured depending on the desired application, for example:

- Fulfilling various requirements only in one fiber
- Achieving thermobonding properties
- Producing spunbond fleece with extreme properties
- Achieving "Super Micro Fibers" by
 - Splitting the two components through mechanical stress
 - Dissolving one of the two components
- Achieving a 3-dimensional self-crimping fiber

Core-sheath and side-by-side cross-sections are typical and often used in staple fibers. While core-sheath bicomponent yarns are frequently processed as bonding fibers for nonwovens, the focus when manufacturing side-by-side bicomponent yarns is on the desired self-crimping effect.

Our competence is based on many years of experience – we commisioned the first staple fiber plant for bicomponent fibers in 1995. Through the composition of two or more polymers in one fiber, the door to an unlimited horizon of fiber applications is opened.



Diverse cross-sections ensure diverse yarn properties

Bicomponent overview													
	1	2	3	За	4	5	6	7	8	9	10	11	12
Туре	core-sheath	core-sheath eccentric	side-by-side full	side-by-side full	side-by-side hollow	side-by-side hollow eccentric	orange-type with centre 16 segments	orange-type w/o centre 16 segments	striped fibers	conductive fibers	island-in-the-sea	profile bico	mixed fibers
	0				0	O		*	()	C		1	
Materials	R-PET/PET PET/CoPET PET/PE PP/PP	R-PET/PET PP/PE PP/PP PET/CoPET	PET/PET PP/PE PP/PP PET/CoPET R-PET/R-PET PET/PE	PET/PET PP/PE PP/PP PET/CoPET R-PET/R-PET PET/PE	PET/PET PP/PE PP/PP PET/PE	PET/PET PP/PE PP/PP PE/PE	PET/PA6 PET/PA6.6 PET/CoPET	PET/PA6 PET/PA6.6 PET/CoPET	PET/PA6	PA6/MB	PA6/CoPET PET/CoPET	PP/PA6 PA6/PA6 PET/R-PET PTT/PET	PET/PET PP/PP PA6/PA6 PA 6.6/PA 6.6 PET/CoPET
Final titer [dtex]	1.7-20	1.7-20	2-20	2-20	2-20	2-20	0.1-0.2	0.1-0.2	0.1-0.2	25-30 undrawn	< 0.05	15-20	
Ratio [%/%]	30/70 70/30 90/10	30/70 70/30	50/50	50/50	50/50 70/30	30/70 70/30	50/50 65/35	50/50 65/35 80/20	50/50 70/30	50/50 70/30	80/20 50/50 70/30	50/50 30/70	

Inline systems with 1-step process for special applications

Our compact 1-step staple fiber spinning lines have an excellent flexibility with regard to the processable raw materials and titer range. These plants enable highly economical production of fibers for a wide range of downstream processes.

Cost-efficient plant configuration

The one-step technology includes the spinning operation and the subsequent drawing in one process step. This compact construction permits the production of staple fiber capacities of up to 80 tons per day.

Your benefits:

- Single-storey operation, compact design -> Less staff requirements
- Spinning and drawing in one line -> no buffer between spinning section and drawing line
- Long spin pack running time

High flexibility

The applications are as diverse as they are specific: from fibers for geotextiles, filtration applications and hygiene applications to reinforcement fibers through to fibers for automotive applications.

Because of the extruder spinning, the inline process is ideally suited to processing recycled polyester. Whether as regranulated chips or directly as R-PET flakes (bottle flakes), even recycled polyester that does not 100% satisfy the qualities of virgin polyester can be processed.

Your benefits:

- Highest flexibility in raw material input: PET, R-PET, PP, PA6
- Titer range: 1.7 90 dtex
- Quick colour change due to side extrusion





Technical data

Raw material/polymers	PET R-PET PP PA 6
Raw material shape	chips, flakes or if required both with a ratio 0 - 100 % each
Extrusion	single and twin screw extruder
Heating	dowtherm condensation heating
Production speed [m/min]	50 - 200
Capacity [tons/day]	4 - 70
Titer range [dtex]	PET: 1.7 - 35 PP: 1.0 - 90 PA 6: 1.7 - 44
Tenacity [cN/dtex]	2.5 - 8.0
Elongation [%]	25 - 300
Crimp	2-dimensional and 3-dimensional, flat
Fiber cross-section	i.e. round/hollow, round, trilobal
Cutting length [mm]	2 - 300
Main application	Geotextile, filtration, hygiene, medical

Crimper and cutter – key components in staple fiber production

Crimping is one of the most important and challenging process steps in the manufacture of staple fibers. It provides the tow with a textile structure, which ensures the required adherence in yarn and textile manufacturing and enables the desired surface and volume properties in the end products.

An even and stable crimp is decisive for optimum further processing results. Oerlikon Neumag crimp technology guarantees optimum crimping as a result of:

- Guided tow package through inlet guide/chute
- Adjustable crimper roll temperature
- Constant stuffer box pressure due to pneumatic cylinders
- Constant pressure on thrust pads due to the use of worldwide patented hydraulic pressure device
- Worldwide patented decoupled two-rocker-arm design crimper
- Constant tow tension by the means of a dancer roll and alternatively by means of a tension measuring roll
- Uniform tow package and tow laying
- Uniform tow temperature and humidity
- Stuffer box made of high-end steel and non-ferrous metals High staple accuracy with extremely-low wear-and-tear

But a stable crimp is not the only factor decisive for further processing, so too are precise lengths and clean cutting edges in the case of fibers. Oerlikon Neumag offers two different cutting types: horizontal cutting and vertical cutting.

While the blades are positioned parallel to the direction of cutting during horizontal cutting, they are positioned perpendicular to the direction of cutting in the case of vertical cutting.

Your benefits:

- High guality cut with
 - Clean cut edges
 - No fused fibers
 - No long fibers
 - No double cuts
- No bending stress on the blades; therefore, lower blade breakage risk
- Flexible cutting head design all staple fiber lengths achievable with the same cutting head
- Very good fiber opening during carding due to low compacting of the fibers
- Parallel distance of the blades enables shortest staple lengths down to 1.5 mm
- Discharge of fibers by means of gravity
- No production stop required during head change



Solutions for manufacturing polymers

Homogenous melt is the very basis for high-quality fibers. Producing this is the job of our efficient and high-end polycondensation systems for fiber-grade and bottle-grade polyester melt and granulate.

The engineering services for the complex systems – built in collaboration with well-known partners – are provided by highly-qualified specialists from all divisions of the global Oerlikon Manmade Fibers network.

This allows you to secure all process steps – from the unloading of the purified terephthalic acid, polycondensation and spinning plant all the way through to drawing, crimping and cutting – all from one hand. This means optimum tuning of the individual production steps and system components,

hence guaranteeing the very best product quality and a high degree of production efficiency from the melt through to the fiber itself.

The benefits of an in-house polycondensation system for you as a yarn producer are clear to see: in addition to independence from external granulate manufacturers, short-term price fluctuations within the raw materials market and direct influence on polymer quality, it is – above all – the additional value added that promises further profits.





Engineering competences

Our present engineering competence is based on more than 65 years of experience in machine and plant construction. The information and experience gained during this time have been directly and systematically transferred into the engineering language.

Our engineering covers all areas of setting up a plant, the continuous operation as well as contractual guarantees for product quality and production performance.

Our turnkey project management includes, among other things the following engineering services:

- Mechanical engineering
- Process engineering
- Piping and air conditioning
- Measurement and control engineering
- Electrical and instrumentation engineering

Efficient Workflows

Most up-to-date resources are used by experienced project engineers for the preparation of the necessary documentation. As a consequence out of the combination of machine and plant construction and engineering, the strong character of engineering results through the exact tailoring to the requirements of the project. Direct access to the necessary data as well as the possibility of also creating manufacturing documents enables us to prepare the required documents with utmost efficiency. This offers the user the early availability of secured information and reduces revision services to a minimum. Last but not least, properly prepared engineering documentation shortens erection and commissioning times.

Comprehensive and transparent documentation

Documents prepared within the context of our engineering give our customers maximum transparency with regard to the scope of delivery, the quality of our plants and the project progression.

Preparing comprehensive specifications for direct purchases by the customer are part of performance spectrum, as are estimated calculations for the consumption of auxiliary production materials. Auxiliary aggregates – regardless of whether these are delivered by us or supplied by the customer – are part of the engineering and are included in the general project specifications.



Partnering for Performance

Our Customer Services department of Oerlikon Manmade Fibers segment has one allembracing mission: we want to make your production increasingly efficient and productive, and your business increasingly competitive and profitable. To do this, we offer you a close working relationship - Partnering for Performance.

Our services for your success

Textile technologies are becoming ever more efficient and flexible, opening up great opportunities to enhance your competitiveness. At the same time, this progress accelerates the race in the market. To be able to keep up and react swiftly to a changing market situation, it is important to maintain and expand your technical capabilities and to utilize them properly.

To achieve these, we place emphasis on a close, trusting service partnership with you to ensure reliable production and gain a technological edge, to secure your investment and to guarantee success in the future. Together, let us exploit the strengths of our technologies for your business.

Our goal: your operational efficiency

Through our partnership, we want to increase your operational efficiency to the best effect. With this in mind, we focus on optimizing your operating and manufacturing processes, your system and logistics management and the acquisition of further skills by your staff. Your success grows with the interplay of all the factors involved.

For this, we offer you the performance of a technology leader with a unique global service network, along with highly-qualified service and engineering experts. We will advise and support you in all phases of your business along the entire value creation chain of fiber production:

- With start-up services for the installation or relocation of your systems,
- With technical support around the clock,
- With modern services for maintenance and repair. performance enhancement and staff training,
- With longterm maintenance contracts for a continuously troublefree systems performance,
- With individual performance checks for an optimized plant operation, and
- With modernization and upgrades from the manmade fiber specialist.

Whatever you need, you can select services tailored to those requirements from a service portfolio that is unique in the industry.

Further information on our comprehensive **Customer Service can be found here**



Or contact us: customer-services.neumag@oerlikon.com





HP Compag LE1711







With our Oerlikon Barmag and Oerlikon Neumag competence brands, we are the world market leader for manmade fiber filament spinning systems, texturing machines, BCF systems, staple fiber systems and artificial turf systems. As a service provider for engineering and aftersales services, we offer total solutions for the entire textile value added chain. We attach great importance to energy efficiency and sustainable technologies in all our developments.

To what extent do you profit from this? Our market position guarantees you the benefits and quality of leading technologies, our sustainable products save you money and our comprehensive services save you time and hence increase your profit.

More on Oerlikon Neumag staple fiber solutions



Or contact us: sales.neumag@oerlikon.com

Oerlikon Neumag

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