

fibers^{and} f!laments

the experts' magazine

No. 35 | may 2021

**Fasten seatbelts
please!**

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**A look at
the heart of
a lifesaver**

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Dear Customers, dear Readers,

The coronavirus pandemic has been accompanying us all for more than a year now, severely impacting our lives and social interaction.

So, it is all the more pleasing that we have been able to help you – our customers and partners – with our technologies and solutions during this difficult time. Here, I would like to specifically highlight our nonwovens clients, who are contributing hugely to supplying the world with medical and FFP2 face masks and hence actively helping to save lives.

The human need for security and the lifesaving properties of textile fibers and fabrics are the primary focus of this issue. In conjunction with airbags, seatbelts, for example, reduce the number of traffic fatalities in the event of front-end collision by 61%. A textile success story! We are thrilled to be informing you about the corresponding systems concept.

In addition to the process technology, it is the individual core components that are important for the quality of all materials manufactured using Oerlikon equipment and hence for the safety of the users as well. In particular, these also include our gear metering pumps. They are the quality guarantee when it comes to flow control equipment used in both manmade fiber spinning systems and in the plastics industry. To further grow here as a company and to offer our clients comprehensive flow control solutions, we are planning to acquire the Italian hot runner system manufacturer INglass in the middle of this year – subject to the approval of the respective authorities.

In the age of digitalization, the topic of security has once again assumed special significance also in conjunction with data and information. Our digital solutions are securing your processes – but what is the situation with the data that have to be collated for this purpose? Well, I can put your mind at ease: we are very passionate about data security. We make no compromises in this regard!

And we take the health of your and our employees equally seriously. The topic of occupational safety is easily mastered in a regulated working environment. But many things are improvised on construction sites. It is therefore all the more important to also, and particularly, implement processes that ensure the safety of those who work there. In this respect, the coronavirus pandemic poses an additional challenge. We will undertake everything in our power to ensure we remain a reliable and safe partner to you and your team throughout this difficult time.

With this in mind: take care and be safe!



Georg Stausberg
CEO Oerlikon Polymer Processing Solutions Division



fibers^{and} filaments

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New maintenance service from Neumünster **Why meltblown die bodies should be regularly cleaned**

Meltblown systems produce non-wovens with the finest filaments in the micrometer range. Consequently, the spin packs are also fine. In order to achieve optimum melt distribution across the entire spinning width and hence homogeneous nonwovens, the surface over which the melt is distributed to the nozzles must be as level and smooth as possible. Over time, melt residue adheres to the interior of the die bodies and this can compromise the melt flow. In order to ensure superlative machine performance and nonwovens' quality, Customer Service in Neumünster offers regular inspection and cleaning of the die body, either by means of a service contract or simply as a service-on-demand.

“During service visits, we repeatedly encounter die bodies that are heavily contaminated or that have been scratched as a result of customers' cleaning attempts. It is for this reason that we offer die body cleaning as a qualified manufacturer service. We have the experience, the know-how and the technical capacities to carry out this work both professionally and swiftly”, explains Michael Schwarz, Technical Sales Manager for Modification Nonwoven, talking about the rationale behind this service product. Depending on the general manufacturing conditions, the die body should be cleaned every one to three years. Using special tools, the die bodies are unscrewed and the melt residue removed from the interiors. Among other things, a dry ice blasting machine is used for removing heavy contamination. Using dry ice ensures that the delicate surfaces are not damaged during cleaning. “They



Before – after; professional die body cleaning carried out by Oerlikon Neumag restores items virtually to their original state.

are restored virtually to their original state”, is how Kevin Loell, Specialist Technical Services, describes the results.

Reducing system downtimes

Die body maintenance can either be carried out at the customer site or at the Oerlikon Neumag assembly facilities in Neumünster. Depending on the general conditions, professional cleaning takes approx. one week. “We systematically ensure that system downtimes are kept to an absolute minimum and we are correspondingly constantly optimizing our processes and offerings. To this end, we recommend – for example – that customers acquire an additional die body, which they

are able to swiftly exchange themselves. The removed die body can then be sent to Neumünster for cleaning, which can be carried out without time constraints. This investment generally pays dividends over several years with customers with high quality demands and for whom on-site cleaning would – due to the distances involved – be too expensive or time-consuming”, explains Tilmann Seidel, Head of Customer Services Oerlikon Neumag, speaking about the responsibility as a service provider.

» (che)

Oerlikon signs agreement to acquire INglass

End of April Oerlikon signed an agreement to acquire Italy-headquartered INglass S.p.A. and its innovative hot runner systems technology operating under its market-leading HRSflow business.

The strategic acquisition is a significant step in expanding Oerlikon's current manmade fibers business into the larger polymer processing market. The acquisition accelerates and enhances existing organic initiatives to diversify and strengthen the company's core high-precision polymer flow control capabilities, products and services. The completion of the transaction is subject to customary regulatory approvals and is expected by the second quarter of 2021.

To reflect Oerlikon's expansion into a larger high-growth market, the Manmade Fibers Division will be renamed as Polymer Processing Solutions Division. This division will have two business units: Flow Control Solutions and Manmade Fibers Solutions. The business unit Flow Control Solutions will combine the expertise of Oerlikon Barmag's existing gear metering pumps business line and INglass' HRSflow operations. The business unit Manmade Fibers Solutions will continue to focus on growing the existing chemical fiber machinery and plant engineering business, offering plant solutions for the production of polyester, polypropylene and polyamide. "Our new Polymer Processing Solutions Division and the acquisition of INglass S.p.A. and its HRSflow business are critical components of Oerlikon Group's growth strategy. We are accelerating our efforts to drive sustainable organic and inorganic growth in all of our businesses. The acquisition enables new synergy opportunities between both

Oerlikon divisions in specific end markets such as automotive.

With INglass and its HRSflow operations, we

acquire leading suppliers in their markets with proven success of their technologies and services," said Dr. Roland Fischer, CEO Oerlikon Group.

New business unit offers great growth potential

The Oerlikon Barmag competence brand already offers high precision flow control related components, including a large selection of gear metering pumps for textile and non-textile markets. These highly efficient pumps are used in silicone casting, dynamic mixing and oil spraying for the chemical, paint, polymer processing and automotive industries. This double-digit million CHF business, which has grown in recent years, will be merged with INglass' HRSflow hot runner technologies under the new business unit Flow Control Solutions. HRSflow's excellent market access to many OEMs in and outside the automotive industry brings significant growth opportunities. » (aw)



First Sustainability Report published

Along with the 2020 Full Year Results, the Oerlikon Group published its first sustainability report. Sustainable innovation is an integral part of Oerlikon's strategy and built into everything the company does. Oerlikon is now making a public commitment and publishing its first Sustainability Report. It is joining the ranks of corporations, people and organizations that proactively engage in sustainability and inspire others to do the same. Based on the materiality analysis, Oerlikon has selected 8 out of the 17 United Nations Sustainable Development Goals (SDGs) where the company can make the most difference for its stakeholders. Environmental, social and governance targets for 2030 have been set by the Group in areas that align most closely with its operations, policies and capabilities. » (bey)

Scan me



For further details, refer to www.sustainability.oerlikon.com

Webinars instead of trade fairs

As trade fairs are still being cancelled in times of the pandemic, Oerlikon Manmade Fibers Solutions kicked off the new year with a series of webinars on the topic of home textiles. The four lectures on BCF S8 including the tricolor variant, Heavy Denier applications and spinning and texturing solutions for heavy-denier POY and DTY were well attended.



As an alternative to Domotex, Oerlikon Manmade Fibers Solutions arranged a webinar series on home textiles in March. Nis Lehmann-Matthaei spoke about the BCF S8.

A second webinar series focusing on industrial textiles and processes was scheduled in May. The Manmade Fibers experts from the Swiss Oerlikon Group provided their clients with information on manufacturing safety yarns and on state-of-the-art recycling technologies. All lectures have been recorded and are available on our website at www.oerlikon.com/manmade-fibers for those who missed the events. » (bey)

Dear customers, dear readers,

To provide our customers with up-to-date information we are working with a global CRM (Customer Relationship Management) system. The data protection of our customers

is particularly important to us! Thus we can only address you with news on events, products or company information if you expressly agree to this. To make it as comfortable as

possible for you, place your name card in the frame below, tick the information you would like to receive and send a photo of both to events.omf@oerlikon.com

Place your name card here



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Double-beam meltblown plant with ecuTEC+ put into operation at Wolf PVG

Oerlikon Nonwoven has successfully commissioned a double-beam meltblown plant with ecuTEC+ electro charging unit at Wolf PVG GmbH & Co. KG beginning of this year. With this plant, the East Westphalian company can now provide nonwovens for the production of surgical and FFP2 masks. In addition to this filter material, which is in great demand today, high-quality meltblown nonwovens can also be produced for medical and industrial filter applications. The plant has now been running for several months under stable production conditions with optimal nonwoven fabric quality of the highest standards.

With the meltblown plant from Oerlikon Nonwoven, Wolf PVG, a wholly-owned subsidiary of the Melitta Group, is further expanding its production capacities. The plant, with its two beams and the patented ecuTEC+ electro charging unit, is optimally designed for the production of face mask material. The plant is also ideal for the production of other filtration nonwovens.



The meltblown technology from Oerlikon Nonwoven is considered the most technically efficient process for the production of highly effective filter media from plastic fibers.

"A decisive point for investing in a plant from Oerlikon Nonwoven was the flexibility of the plant in relation to the possible product portfolio and the competence of the manufacturer," explains Markus Seele, COO of Wolf PVG, and Dr. Ingo Mählmann, Senior Vice President Sales & Marketing Oerlikon Nonwoven, adds: "Thanks to the numerous setting options for the electrostatic charge provided by the ecuTEC+, the optimum loading status can be set depending on the filter application." » (che)

imprint

'fibers and filaments' is the exclusive Oerlikon Manmade Fibers Solutions customer magazine. It is published two times per year in English, Chinese and Turkish by

Oerlikon Textile GmbH & Co. KG

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Total circulation

3,800 copies

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Make and Do, Hella Hölzer
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Print

Köllen Druck + Verlag, Bonn
www.koellen.de

Photography

Ralf Buchholz, Rickey Steele, archive, Autoliv, Innovatec, iStockphoto.com/ EXTREME-PHOTOGRAPHER, iStockphoto.com/Vadim Shechkov, iStockphoto.com/af_istocker, iStockphoto.com/Irwan_Nartadi170, iStockphoto.com/matsabe, iStockphoto.com/alexey_ds, iStockphoto.com/Turac Novruzova, iStockphoto.com/Mihailgrey, iStockphoto.com/DMaryashin, iStockphoto.com/benoitb, iStockphoto.com/leremy, iStockphoto.com/mara_lingstad, iStockphoto.com/greyj, iStockphoto.com/bananajazz, iStockphoto.com/ST.art, iStockphoto.com/appleuzr, iStockphoto.com/-VICTOR-, iStockphoto.com/InnaKalyuzhina, iStockphoto.com/RecycleMan

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Life-saving filament yarns

Fasten seatbelts please!



A close-up photograph of a seatbelt buckle and webbing. The buckle is black plastic with a silver metal latch. The webbing is white with a woven texture. The background is a soft, out-of-focus blue and white.

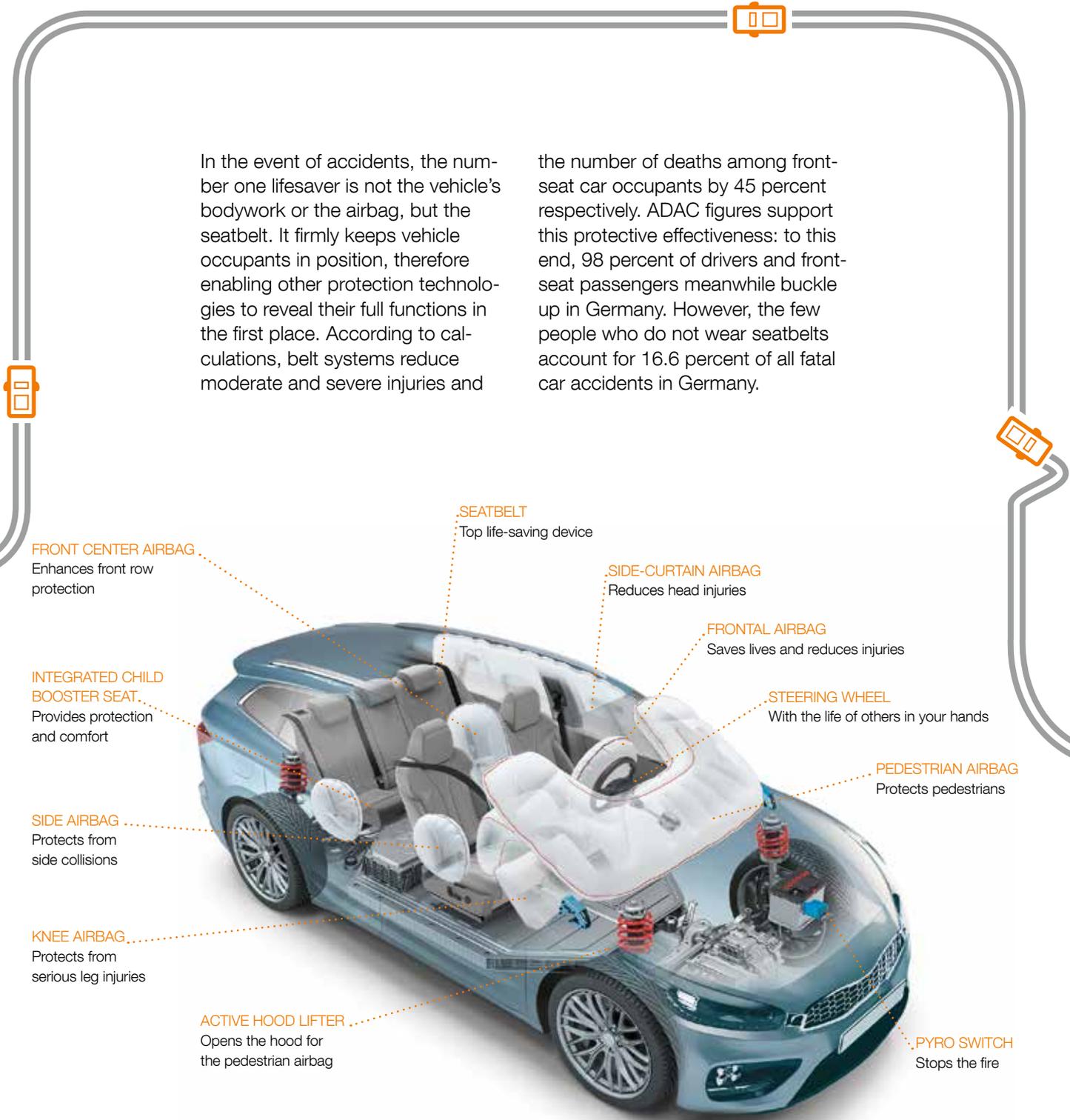
Safety belts play a decisive role in protecting vehicle occupants and reduce the risk of injury and death in the case of certain accidents by 45 percent. Seatbelt webbing has to handle tensile forces of more than three tons, while simultaneously stretching in a controlled manner in an emergency in order to reduce loads in the event of impact. Their manufacture from polyester yarn comprising up to 100 individual high-tenacity filaments is highly-complex – they are, after all, lifesavers.

Bang! The car drives straight into a wall. The driver is not wearing a seatbelt. His knees impact hard against the dashboard and his chest, chin and Adam's apple smash into the steering wheel. His forehead crashes through the windscreen and the driver is hurled back into his seat. If he were not a crash test dummy, he would have suffered severe injuries. This is the result of a 30-kph crash test conducted by the ADAC, Europe's largest automobile club. To give the scene some context: even in the case of a collision at 14 kph, the impact forces correspond to eight times the driver's body weight, according to the experts at Dekra, the German vehicle inspection organization.



In the event of accidents, the number one lifesaver is not the vehicle's bodywork or the airbag, but the seatbelt. It firmly keeps vehicle occupants in position, therefore enabling other protection technologies to reveal their full functions in the first place. According to calculations, belt systems reduce moderate and severe injuries and

the number of deaths among front-seat car occupants by 45 percent respectively. ADAC figures support this protective effectiveness: to this end, 98 percent of drivers and front-seat passengers meanwhile buckle up in Germany. However, the few people who do not wear seatbelts account for 16.6 percent of all fatal car accidents in Germany.



Safety has many facets

The diversity of the Autoliv products reveals that safety solutions make the automobile a fortress against many risks of accident and injury. And textile products are extensively responsible for this – the most diverse airbags provide protection ahead of, next to and between vehicle occupants and, externally, even for pedestrians in the event of collisions. In conjunction with these, seatbelts play the lead role in protecting occupants as the primary restraint system. Driver airbags and seatbelts together reduce the number of deaths in the case of head-on collisions by 61 percent. Autoliv has calculated that their products save at least 30,000 lives each year, and prevent ten times as many serious consequences of accidents. This figure is based on a calculation which takes into account the number of Autoliv products sold; product effectiveness; use rates; and the number of road traffic fatalities, vehicles in the fleet, and occupants in vehicles. Calculations are made for representative countries and regions and then summed up to world level.

Seatbelt pretensioners holds, load limiter gives

By which means and how seatbelts protect are questions that the experts at Autoliv, world market leader for automobile safety systems, have the answers to: “The webbing restrains occupants and transfers the forces created by vehicle deceleration to the anchor points of the

webbing in the vehicle”, explains Kai-Stephan Müller, Technical Manager Seatbelt Webbing at Autoliv Europe. These anchoring points – generally, three in the case of three-point seatbelts – must each be capable of handling forces of more than 10 kilonewtons (kN). This corresponds to a weight force of approximately 1,000 kilograms. The actual forces are dependent on the geometry and the functionality of the overall seatbelt.

Safety is not provided by tear-resistant webbing alone, but also by the expedient, injury-reducing design



of the entire safety belt system. In the event of an emergency, pyrotechnical seatbelt pretensioners, for example, retract slack webbing that is not held close to the body within milliseconds, keep occupants more tightly in their seats and hence additionally reduce forward movement. However, this restraining force has to be controlled in order to limit the risk of injury through the webbing itself. In the case of some seatbelts, this is ensured by seatbelt load limiters, which release the webbing in a controlled manner and can be integrated into the seatbelt retractor mechanism. Webbing is not an off-the-peg product, it is a specialist fabric. The fabric construction is capable of withstanding loads of up

to 30 kN (3,000 kilograms), stretches in a defined manner, but also continues to fully function following a minor collision.

Webbing made from 400 warp threads

Autoliv produces this kind of seatbelt webbing at its own plants using narrow band looms. The basis for these are filament yarns, manufactured from up to 100 or more individual filaments. Generally, these are manufactured from PET in order to ensure a high resistance to aging and are produced as high-tenacity quality products using special processes – also on Oerlikon Barmag machines (see article on Page 20). Depending on the yarn type, achiev-





ing webbing forces of more than 30 kN requires up to 400 individual warp threads being woven together to create the webbing. Subsequently, these are thermoset, whereby the seatbelt webbing is heated in a controlled manner under tension and then cooled again.

This process also sets the stretch and flexibility of the webbing. After this, the webbing is dyed using an immersion process and depending on the target design of the vehicle interior.

The manufacture is completed with automated visual quality control and cutting of the webbing before it is used for the seatbelt system – together with mechanical parts such as buckles, fittings, pillar loops, height adjusters and seatbelt retractors.

Prior to use, seatbelt webbing must be subjected to intensive testing in accordance with stringent legal and automobile industry requirements

to ensure that it also does what it is supposed to. These include fracture resistance tests, along with aging and exposure to light testing to ensure that the seatbelt webbing maintains the requisite tenacity throughout its entire life.

“The webbing restrains occupants and transfers the forces created by vehicle deceleration to the anchor points of the webbing in the vehicle”

This ensures greater safety for the around 67 million new vehicles worldwide each year, on the basis of the figures for 2019 provided by the German statistics database Statista.

Add to this webbing for trucks, buses and special vehicles. What this means for the sector is put into figures by Birgit Degler, Head of Marketing at Autoliv Europe: “With around 15 meters of webbing per car, the annual output of seatbelt webbing lies at more than one million kilometers”. This is almost three times the distance between the Earth and the Moon. » (tho)

400 warp threads made from filament yarns with up to 100 single filaments each are the core of the seatbelt.



A look at the heart of a lifesaver

In the age of the pandemic, respiratory masks protect our health and, in some cases, our lives against viruses and germs. Today, the heart of this omnipresent companion is meltblown nonwoven. Its sophisticated manufacturing technology is the key to highly-effective particle filtration, to the least-possible breathing resistance and to the highest level of comfort – all provided at a low weight.

With the ecuTEC+ electro-charging unit meltblown materials can be electrostatically-charged in order to attract and reliably separate even the smallest particles.

Alexander Lopez (name changed) enters a world that is a threat to him whenever he leaves the house. He could infect himself through germs whenever he goes shopping, visits the doctor, practically on any street corner – infections that could cost him his life. The 31-year-old has incurable pulmonary fibrosis, with his lung function progressively deteriorating and breathing become more difficult. Although he recently had a lung transplant, he has to take medication that impacts his immune system to ensure his body does not reject the new lung. In other words: he has had to give up on his body's own defenses, which – during the coronavirus pandemic – would have helped him ward off and survive infections. For this reason, the respiratory masks that he carefully puts on before leaving home is all the more important. Quite literally a lifesaver for Alexander Lopez.

This undoubtedly applies to many risk patients. But they are not alone in requiring protection. Due to the fact that wearing a mask in public is mandatory, billions of these face masks are currently being manufactured across the globe. So, how do these masks offer safety and protect against viruses and germs? This is probably best explained by somebody who manufactures the most important basic material: “We have been manufacturing meltblown nonwovens for masks for



more than ten years now”, states Daniel Krumme, Managing Director of Innovatec Microfibre Technology. “Today, we are producing much more than we used to, with current output at 1,500 tons for in excess of 1.5 billion protective masks.” With this, the German, Troisdorf-based company regards itself as by far Europe’s largest manufacturer of mask nonwovens, exporting across the globe.

Meltblown nonwoven fabrics form the very core of protective masks, embedded between two layers of spunbond material. It is above all the so-called respiratory or FFP masks (FFP = filtering face piece) that offer protection against inhaling the smallest airborne particles, drops and aerosols. In general, they feature between two and three meltblown nonwoven layers, while medical face masks (surgical masks) have only one layer. Depending on the mask structure, the running meter weights of these nonwovens range from around 20 to 80 grams per square meter. Its light weight indicates that it must – in addition to protecting against particles – fulfill another function, namely ensuring the least breathing resistance possible.

Finest filaments in a turbo-charged air stream

The fact that meltblown nonwoven fabric is superbly lightweight, is easy to breathe through and simultaneously filters extremely well are its

trump cards. And it is these benefits that Innovatec guarantees thanks to its special manufacturing technology and comprehensive knowledge of the complex production process. Meltblown nonwovens are not woven like other textiles. This is demonstrated at the production facilities in Troisdorf: the systems installed there are first used to melt polypropylene (PP), then force it through hundreds of tiny spin packs and draw it into viscous endless filaments. The subsequent quenching and drawing into ultra-fine filaments are masterpieces of engineering. To get the filaments down to diameters of up to less than one micrometer, about 70 times finer than a human hair, the hot air is accelerated to a speed of around 500 kph. “Here, the trick is to ensure the filaments do not break in this turbo-charged air stream”, emphasizes Daniel Krumme. A sophisticated air deflection system swirls the hot, sticky filaments, forming a random, but close-knit, web of up to 200 layers when laid.

This creates a very large surface to which foreign particles adhere easily. The size of the pores in these nonwovens lies between 15 and 20 micrometers. These are considerably larger than the diameters of coronavirus viruses, which range from between 120 and 160 nanometers. However, these pathogens are usually contained in larger-



Attracting viruses: the EcuTEC+

Nonwovens are specially treated to allow them to capture nano-sized particles and germs. For this, Oerlikon Nonwoven uses the ecuTEC+ electro-charging unit with its systems. Meltblown materials can also be electrostatically-charged in this way using a patented process. To this end, even the smallest particles are still attracted and reliably separated by a relatively open-pored nonwoven. Here, nonwovens manufacturers can set the optimum charging method and intensity for their respective filter application. As a result, the concept distinguishes itself from other processes available on the market.



diameter aerosols or drops. Besides, nonwoven pores are virtually never positioned behind each other and hence do not form a continuous 'tunnel', as the filaments form a barrier made up of many randomly-positioned layers. And, finally, the engineers also invented a process with which they are able to 'capture' virus and germs: electrostatic filtration. Here, the nonwoven fabric is electrostatically-charged and attracts conductive particles – like one of the dust-grabbing microfiber cloths used for cleaning floors.

“The trick is to ensure the filaments do not break in this turbo-charged air stream.”

Daniel Krumme



Christian Klöber (left) and Daniel Krumme rely on meltblown technology from Oerlikon Nonwoven.

With these combined methods, high-quality meltblown nonwovens achieve a high level of filtering efficiency – which is precisely what they need to do. Valid standards require FFP masks to filter 80 (FFP-1)

to 99 percent (FFP-3) of particles up to 0.6 micrometers in size. Not all FFP products comply with this: “We have tested imported product from various sources, with the majority being non-compliant”, comments Christian Klöber, owner of Innovatec. For him, this is undoubtedly a sign that ‘Made in Germany’ quality products can be successful within this market, particularly in view of the rapid rise in demand due to coronavirus. To this end, Innovatec was the first German business to receive support from the German government as part of the mission to create an entirely domestic infrastructure for manufacturing protective masks. For this, the leading producer increased its meltblown capacities to include three new systems in 2020 alone, with Oerlikon Nonwoven delivering two double-beam meltblown systems. “With this, we can manufacture twice as much product as we would have with a single-beam system. Furthermore, it offers tremendous benefits for manufacturing mask nonwovens, as two spinning beams can produce two layers and hence considerably more homogeneous, superior nonwovens for this purpose”, explains Daniel Krumme.

Efficient and in demand: meltblown technology from Neumünster

The meltblown technology from Neumünster is considered by the market to be one of the technically most efficient methods for producing highly-separating filter media made from plastic fibers. The systems can be used to manufacture nonwovens not just for all mask protection classes, these products can also be used for high-performance filters deployed in air purification systems. These are undoubtedly decisive reasons why – since the outbreak of the coro-



navirus pandemic – the worldwide demand for protective masks and other medical protective equipment has resulted in a record number of new orders in the high double-digit millions of euros at Oerlikon Nonwoven.

“In view of this demand, we have initiated measures at our Neumünster-based production site that enable even faster delivery of meltblown systems”, comments Rainer Straub, Head of Oerlikon Nonwoven. Current orders come

from Germany, China, Turkey, the United Kingdom, South Korea, Italy, France, North America and, for the very first time, also Australia – taking us well into 2021. With this, the capacities for respiratory masks available in Europe to date are, according to company information, predominantly produced using Oerlikon Nonwoven equipment. And who knows – maybe Alexander Lopez has already worn a mask made using a meltblown nonwoven manufactured on a system from Neumünster? » (tho)



At the Oerlikon Nonwoven meltblown laboratory in Neumünster, production processes for innovative, high-performance filter materials for liquid and air filtration applications are developed.

Textile fibers and fabrics make a huge contribution towards greater safety in numerous lifesaving applications

There is more to them than you might think

In Germany, three-point seatbelts have been mandatory for the front seats of newly-registered cars since **January 1, 1974**; seatbelts have been mandatory for rear seats since **May 1, 1979**.



According to Wikipedia, the European Union alone has five different respiratory filter classes with a total of 21 sub-categories.

While **airbags** were initially only installed into the steering wheel, new vehicles today generally have **7 airbags**.



A safety belt comprises approximately **300 threads** whose individual filaments are spun from around **100 polyester fibers**. According to ECE regulations, a three-point seatbelt must have a breaking load of at least 1,470 dekanewtons (daN).



Myth:

wounds should be left to heal in the open air.



Preferable is treating wounds using **plasters**, as these protect against bacteria, germs and dirt.

The patent for the airbag was granted as far back as

1951. It was invented by Munich-based engineer Walter Linderer. However, it was to be many years before it had been sufficiently refined to install into motor vehicles.

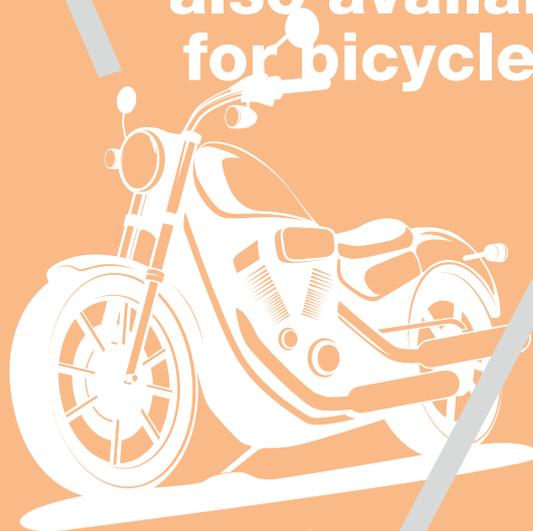


In Germany, standard fire-proof clothing must offer 40kW/m² heat protection.

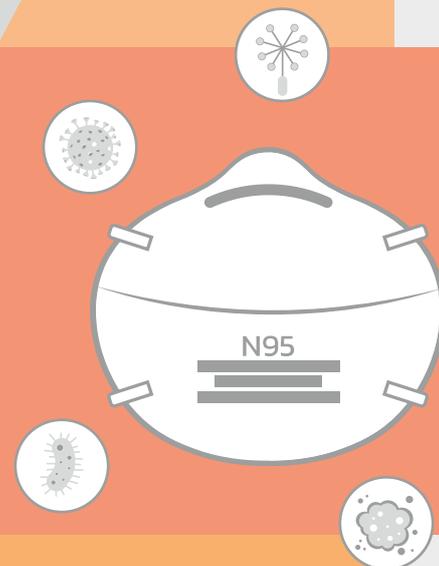
The first **airbag for motorcycles** was

launched by Honda back in 2006, with airbags meanwhile

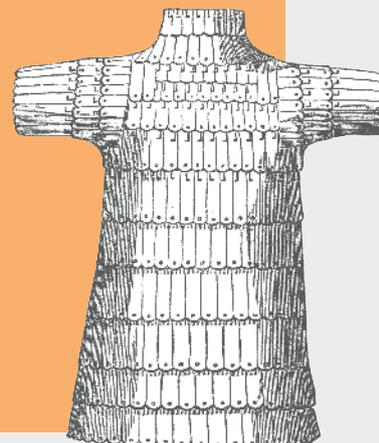
also available for bicycles.



According to the Federal Health Ministry, PSA Class **FFP2** masks should filter at least **94%** of all aerosols in the air, while **FFP3** masks should filter **99%**.



Simple protective apparel – such as leather helmets, for example – existed as long ago as 3,000 B.C. and the first leather armor reinforced with metal plates was used in approx. 1,500 B.C.



Gentle touch for a tough product

No safety belt without quality industrial yarn. Fulfilling the high demands of the automobile industry requires the manufacture of high-tenacity (HT) yarns using a process that is both sophisticated and gentle. For its systems concept, Oerlikon Barmag has developed unique, patented technology. And its name dictates the program: single filament layer.

Seatbelt yarn is, so to speak, the benchmark among industrial yarns. The titer of a single filament lies between 11 and 24 dpf (decitex per filament) – in contrast to standard yarns, which range from 3 to 7 dpf. With a diameter of 34 micrometers for 11.5 dpf (or 49 µm in the case of 24 dpf), such HT PET filaments are still considerably finer than a blond human hair, which measures around 100 micrometers. This does not sound groundbreaking, but nevertheless showcases the stability of these fibers. “Fundamentally, even finer filaments would suffice for the high tenacities required for safety belts. This high titer is necessary, above all, to counter so-called pilling”, explains Stefan Becker, Senior Expert Application Technology for Industrial Yarns at Oerlikon Barmag. Pilling refers to yarn’s tendency to form little knots if subjected to friction. This friction occurs predominantly when the safety belt is pulled out of, or snaps back into, its retractor.

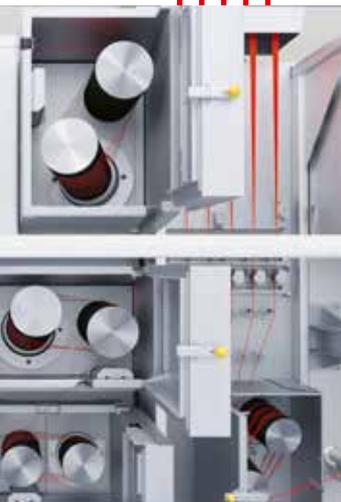
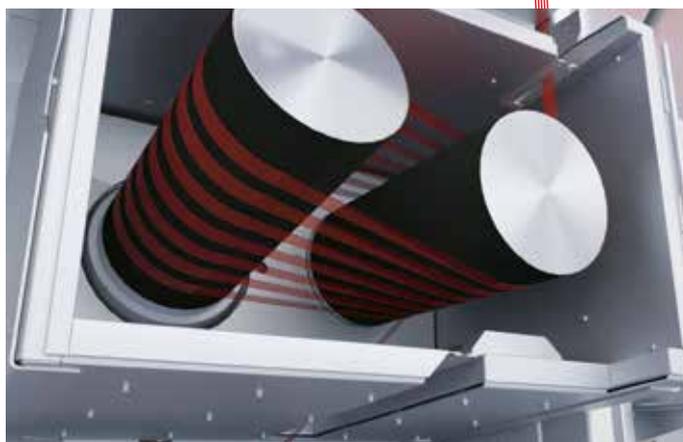
This already demonstrates just how challenging and detailed the requirements of the automobile industry are (see also Focus article, Page 8). High, even tenacity, flawless appearance without filament breaks and no lint formation – these demanded

properties can be optimized during yarn production – but also compromised. Because these tough textile products require gentle handling even during manufacture – as their quality could subsequently otherwise suffer. For this, Oerlikon Barmag has created an innovative systems concept with patented technology.

Single filament layer: side-by-side rather than on top of each other

“The objective is, on the one hand, to heat each filament equally well, as this results in the very highest, even tenacities. On the other hand, it is about feeding the filaments through the process with as little contact as possible in order to prevent filament breaks”, comments Stefan Becker, getting to the heart of this technology. And this requires a special filament guiding system. To this end, the individual filaments that form a thread are laid onto a godet in between three and five layers in the case of conventional processes. As indicated by the name, the Oerlikon Barmag single filament layer (SFL) technology reduces this to a single layer. Consequently, each filament lies directly on the heated godet and there are no filaments that lie on top of each other and are therefore less well heated.





The yarn path is decisive for the special properties and the different end applications of the industrial yarn.

How is this achieved with the least possible mechanical contact? In conventional processes, the filaments exit the spin pack, are positioned by means of yarn-guiding elements and travel across several godets, with multiple wraps each time. In the case of each multiple wrap, the filaments converge and are finally so close together that there is a risk of contact between them – with the associated tangles or breaks. Yarn guides are designed to prevent this, but create additional contact points in the process.

With the SFL concept, a particularly geometric positioning of the kiss rolls over which all filaments run after exiting the spin pack creates the possibility of influencing the distance between the filaments in a targeted manner. A large distance between the filaments is chosen from the start, ensuring that the filaments ultimately do not touch. Furthermore, this procedure also dispenses with further yarn guides between the godet systems – hence guaranteeing decreased contact, breaks, lint formation and loops.

Powerful technologies for industrial yarn

“With our up to 6-end technology, we can produce seatbelt yarns of the very highest quality using high-tenacity, lint-free PET yarn with total titers of up to 1,500 denier”, emphasizes Stefan Becker. Here, further technical finesse plays an important role in guaranteeing quality. To this end, the filaments

pass over the godets with alternate directions of rotation. As a result, the filaments are – like a pancake being tossed – extremely evenly heated from one side and then from the other. Furthermore, the release angle of the godets is increased in certain phases, which means the filament maintains contact for longer and acquires greater retaining force for reliable drawing. Finally, the Oerlikon Barmag reversing winder ensures low-friction yarn displacement during the winding process, a precise and even package build and an even take-off performance in the downstream processes.

Correspondingly-equipped machines are already operating at the sites of well-known manufacturers in India and China, for example. Just about to commence production is Fujian Billion, the largest polyester yarn manufacturer in southern China. With the purchase of the Oerlikon Barmag system, the company is now planning to also produce industrial yarns, including seatbelt yarn. With 124 positions and a capacity of around 250,000 tons per annum, Fujian Billion is one of the top Chinese industrial yarn producers and is planning to use the system to manufacture HT and LS (low-shrinkage) yarns for the automobile, geotextiles and safety sectors, among others.

Oerlikon Barmag offers powerful technological solutions for the most demanding requirements for all these applications – including up to 12-end concepts for airbag yarns (PA 6/PET) with between 550 and 1,100 dtex overall titers, 4-end systems with high process speeds (7000 m/min) for HMLS tire cord yarns and also technologies for high-titer/low-shrinkage yarns with up to 6,600 dtex for geotextiles. » (rdo)



Metering safety from the heart of the process

There is a famous old saying - 'if you can't do it safely, then don't do it at all' - so what does the gear metering pump contribute to safety and safety products ?

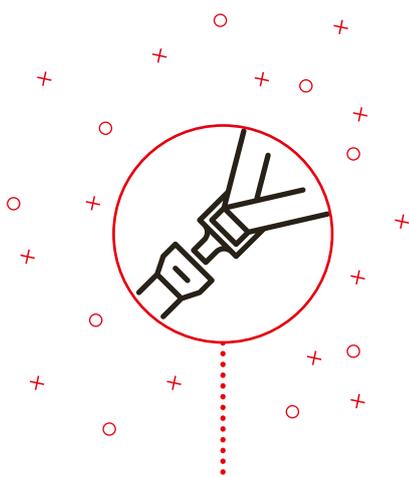
One of the most obvious is possibly safety belts produced from PA66 filaments, manufactured by a melt process accurately delivered by the gear metering pump. Although the priority of these products is safety which means they have to be exceptionally strong, they also need to be comfortable, unobtrusive, convenient to wear and long lived. Their use in automotive and leisure applications dictates that aesthetically they must also be of a high perceived quality, whilst in industrial applications they must be suitable to wear without severely restricting an operator's role. A high-quality finished product is needed which can only be achieved by accurate denier control guaranteed by the gear metering pump.

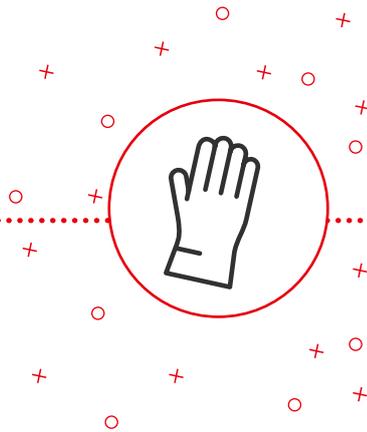
Hidden and unrecognised - safety in our everyday life

Whilst the seatbelt is the visible statement of vehicle safety, the air bag is equally important, hidden away only required in an emergency. Vehicle air bags became a consumer expectation only in the last twenty years or so, but modern

vehicles do not only offer protection from the steering wheel but also from the doors, dashboard and vehicle side frames. These air bags are manufactured from an industrial PA66 fiber (ABY). A high technology gear metering pump is required in the melt process to deliver exceptional quality yarn with zero failure risk. PA66 fibers are not straightforward to produce and extra attention is needed to the internal design and manufacture of the gear metering pump so that maximum process uptime is achieved resulting in the most competitive products.

Around us, manmade fibers are working away hidden to the eye in applications contributing to safety. Where manmade fibers are present, usually a gear metering pump has been used in the manufacturing process. Vehicle tyres are an excellent example constructed with a strong carcass below the visible rubber, this carcass is made of PA or PET melt spun industrial fiber (IDY) known as tyre cord. Nylon tyre cords are usually used in commercial applications (trucks, tractors, construction machines) and poly-





ester tyre cords are used in lighter duty applications such as cars. Development of tyre cords has significantly increased the performance and safety of vehicle tyres allowing heavier loading and higher speeds not possible using older forms of tyre reinforcement. Similar industrial fibers are also used for belts and conveyers safely transporting bulk materials and cargo in workplaces and travel hubs.

Sophisticated and special – safety in exceptional situations

Special fibers produced using aggressive solvent chemical processes and gear metering pumps manufactured of exotic metal and ceramic materials and coatings continue to find new applications where traditional materials are too heavy, less environmentally friendly or simply outperformed.

Meta aramids woven as fabrics are widely used for protective wear for front line responders and emergency service personnel providing a flame and heat retardant. Industrial and automotive applications include fire and abrasion protection in mot-

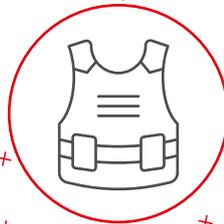
orsport racewear, protective overalls and machinery heat shields. When produced as a sheet material meta aramids can also be used as electrical insulation, safely isolating phases of copper windings in electrical machines such as motors, generators and transformers.

Para aramids are often considered the higher performing variant and are also produced in very demanding solvent spinning processes. Booster and spinning pumps required to control flow and denier are manufactured from super duplex stainless steels, cobalt alloys and ceramics with corrosion and wear resistant coatings applied. Engineering gear metering pumps for such challenging applications requires a deep knowledge of the process and the properties and limitations of suitable materials in both operation and manufacture.

Para aramids exhibit high tensile strength providing many possibilities as replacements for traditional solutions, wire, cable and hose reinforcement being typical. When pulped, para aramids can be used in automotive brake pads increasing braking

performance by shortening stopping distances and delivering environmental advantages over asbestos.

Stab vests frequently used by Police and first responders contain para amid fibers due to their low weight and high strength capabilities similarly, military uses include vests, helmets and combat vehicle armour for ballistic protection. In industry, para aramids are commonly used in protective gloves and garments where there are risks of cuts, friction burns or serious limb damage.



In conclusion, fibers used in safety products are high end and high value that are usually not easy to manufacture. Surpassing such challenges with the highest quality core components, Oerlikon Barmag's high technology gear metering pumps provide end users with unrivalled technical and commercial solutions. » (reh)

Phase and earth electrical insulation



BCF polyester carpet yarn continues to gain ground worldwide

Did you know that polyester is by far the polymer most frequently-used for carpet yarns? Today, polyester carpet yarns have a global market share of approx. 70 percent. And the majority of these polyester yarns are produced in the US, where Oerlikon Neumag has a market share of approx. 90 percent. The company sold the first BCF polyester system to the US back in 1999, with demand growing year-on-year ever since. Oerlikon Neumag installed polyester capacities totaling approx. 1,800 tons per day for manufacturing BCF since 2012 alone. This corresponds to an installed base of more than 800 positions for manufacturing polyester carpet yarn in the US with various Oerlikon Neumag systems technologies.

But polyester is increasingly gaining carpet yarn market shares outside the US as well. In addition to the Asia/Pacific region, a strong trend towards polyester is noticeable particularly in Turkey. Turkey and the USA are the largest manufacturers of carpets in the world. While only 3.5 percent of the BCF systems installed in 2012 in Turkey by Oerlikon Neumag were designed for polyester, this figure had already increased to 65 percent of all systems sold in 2020. The majority of all polyester BCF yarns worldwide are produced using Oerlikon Neumag systems.

Trend towards polyester for ecological, economical and technical reasons

Oerlikon Neumag offers its customers a choice between 'PET-ready' systems and 'PET-prepared' sys-

tems. The latter offers the benefit that customers can inexpensively switch to producing polyester at short notice without having to invest in polyester equipment from the outset. Against the backdrop of a constantly-changing market, many producers are tapping into this increased flexibility.

The trend towards polyester has various reasons. One reason is the constantly-rising world market price for the polymer polypropylene, which has been most widely used outside the US to date. To this end, the raw material price for polypropylene is meanwhile consistently higher than that of polyester. A further reason is the growing importance of sustainability. Although technical progress has been made in recycling polypropylene and nylon waste over the past few years, polyester recycling is still the most

developed of these processes. To this end, many polyester carpets already contain some recycled plastics. For this, flakes are spun directly or regranulated chips are added, for example, to manufacture BCF yarn. This can make polyester an 'ecological' option, as – in addition to consumers demanding 'green' products – this trend is being promoted by legislators. Globally, more than 500 tons of recycled BCF yarn are being produced every day using Oerlikon Neumag systems.

In addition to the above-mentioned ecological and economic factors, polyester also has technical benefits for carpets. Polyester is known for its luxurious appearance, its handle and its choice of bright, strong colors and styles. Many so-called 'super-soft' carpets are made using polyester yarns. These yarns are ideal for carpets that are subject to

constant use, such as bedrooms, offices and television rooms, among others. Due to their moisture-repellent structure, polyester carpets are also ideal for bathrooms and outdoor areas. Furthermore, polyester yarn can be both spun-dyed and piece-dyed, which is additionally resulting in constant market growth for printed polyester carpets. In conjunction with economical raw material prices, the outstanding technical properties make polyester the mostly-widely used polymer in BCF carpet yarn manufacturing.

BCF S8 as a uniform platform for all polymers

The BCF S8 is Oerlikon Neumag's response to the strong trend towards polyester production. After the S+ proved that polyester carpet yarn could be manufactured economically with the right technology, the BCF S8 is once again creating a new benchmark with regards to productivity and product quality. The BCF S8 can be used to manufacture polyester yarns at process speeds of up to 3,700 m/min on the winder, with a guaranteed system efficiency of more than 99 percent. Furthermore, extremely-fine yarns with up to 2.4 dpf and 700 filaments can be produced. With the CPC-T, the BCF S8 Tricolor has innovative technology at its disposal that permits the manufacture of up to 200,000 different shades using the same three base colors. The new CPC-T is capable of producing polyester, polypropylene and nylon yarns.

In addition to various innovations that have improved the process and enable the manufacture of new products, Oerlikon Neumag systematically focused on modularity when developing the BCF S8. While the take-up unit in the case of the S+ still distinguished according to

The absolutely straight yarn path from the infeed to the cooling drum improves the production process.

polymer, a more uniform platform was created with the BCF S8. To this end, the BCF S8 now features a uniform godet configuration and a uniform cooling drum for all polymers. And it was the polymer process in particular that was further optimized in the development of the BCF S8. As a result, a new yarn path no longer requires heated entry godets, which generates additional energy savings. Furthermore, the dwell time of polyester yarns on the BCF S8's cooling drum has almost doubled compared to the S+. In conjunction with the new yarn path, the increased dwell time ensures unprecedented process speeds with consistently-excellent crimp results when producing polyester yarns using the BCF S8. Of the 192 BCF S8 positions sold since the market launch, 94 percent have been designed or prepared for polyester yarn production. This confirms both the trend towards polyester and the benefits the BCF S8 offers for the production of polyester carpet yarns. » (nlm)

BCF S8 Tricolor with CPC-T for up to 200,000 different shades in the case of tricolor yarns

Recycled polyester

VacuFil & VarioFil use produce rPET fiber

The VacuFil process enables inline spinning of post-consumer and post-production polyester (PET) waste into POY or FDY using the VarioFil system or direct spinning systems.

Manufacturing polyester fibers for demanding textile applications from recycled PET materials – particularly using the inline spinning process – is an extremely challenging task. It requires recycling know-how and spinning plant expertise. The starting material has to be continually processed into an homogeneous, spinnable melt. All processing steps must ensure the required melt properties and keep these stable throughout the entire process runtime. For numerous textile applications, parameters such as viscosity and homogeneity are decisive and must be subject to the only minimal fluctuations. In other words: using recycled polyester within the textile segment requires suitable pretreatment processes in conjunction with precise process management.

BB Engineering, a subsidiary of Oerlikon Textile, has developed a Liquid-State Polycondensation

re-cycling system for further processing post-production spinning waste and post-consumer bottle flakes on the basis of the VacuFil PET recycling system launched back in 2019. The system, for which patents have been applied for worldwide, is optimally tailored to the textile further processing of the recycled materials in the spinning plant. The core component of this process is the vacuum filter, with which the viscosity can be separately controlled and monitored. To this end, the required melt properties can be achieved inline in a reliable and reproducible manner and controlled during operation. In various spinning trials, the rPET granulates manufactured at the Oerlikon Textile R&D Center using the VacuFil produced convincing results.

The results of the various spinning trials demonstrate that the new VacuFil technology is so effective that the rPET produced is of outstanding quality and comparable to

Documentation of various spinning trials with rPET produced in VacuFil in comparison with Virgin PET

	Virgin PET reference	Bottle flakes Indian customer	Bottle flakes European origin	Fiber waste POY
Input IV	0.66 dl/g	0.81 dl/g	0.80 dl/g	0.624 dl/g
Output IV VacuFil		0.646 dl/g	0.66 dl/g (±0.06)	0.643 dl/g (±0.05)
Quality No.	22.1	22.8	21.8	20.9
Frays / 10.000m	0.65	0	0.75	0.41
Yarn breaks / 1t	0	0	0	0
Dyeing uniformity (1: best – 6: worst)	1-2	1-2 >4.5 (gray scale) AA	1-2	

ed to directly



that of virgin material. Eco Spindles – our Sri Lanka-based customer – has been so convinced by the VarioFil R+ spinning system with VacuFil extrusion that it is investing in a further rPET VarioFil system. Dr. Anush Amarasinghe, Managing Director of Eco Spindles, produces POY from bottle flake material and explains: “Our clients are increasingly asking for recycled fibers and we of course wish to fulfill their requirements and demands. For this reason, expanding our portfolio to cater to this has been an important step for us. Bottle recycling is still a niche market in Sri Lanka and we have been determined to maintain our high quality standards. We have special requirements and

needed a cutting-edge partner for this project. A few years ago, we opted to purchase a BBE VarioFil R+ compact spinning system to allow us to manufacture POY from bottle flakes. We wanted to first test the set-up – also due to the fact that the bottles collected from beaches are in part problematic starting materials. However, the extremely good customer feedback and the fact that our product is profitable have prompted us to invest further. We have decided to acquire a further VarioFil R+ line with VacuFil recycling system. What is particularly great is the fact that the entire process is completely coherent. We are able to produce extremely homogeneous, viscosity-stable rPET melt and spin it directly into high-end fibers.”

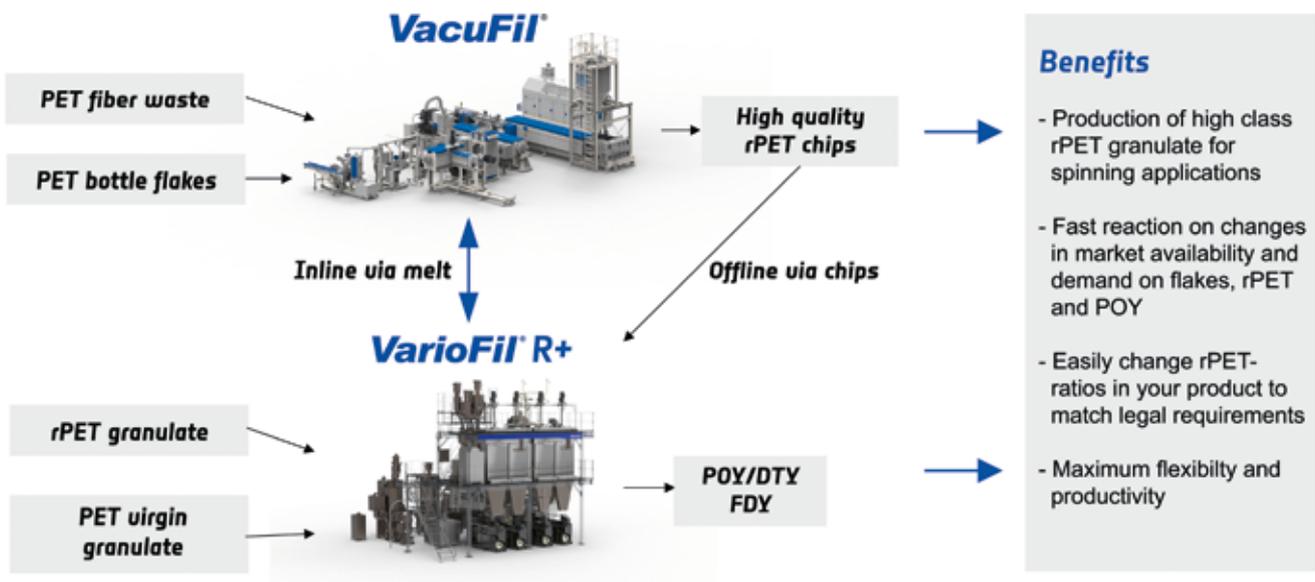
In the case of Eco Spindles, this is a flexible VarioFil R+ compact spinning system with upstream VacuFil inline recycling unit with a direct feed. It

has been designed to manufacture using recycled bottle flakes, recycled chips and virgin chips. On the one hand, this is possible as a result of the drying system that is suitable for both flakes and chips. On the other hand, the vacuum extruder can be operated with or

Leading textile-processing businesses and corporations – be these fashion brands, sports apparel and furniture manufacturers or those operating within the automobile industry – are increasingly focusing on sustainable products and products made from recycled materials.

without vacuum and is therefore able to melt recycled and virgin starting materials. The experience acquired from 20,000 sold units has influenced the extruder design. As a result of the gentle melting, BBE extruders form the basis for

The synergy of VacuFil and VarioFil



absolutely-homogeneous melt, as required by the spinning plant. The single-screw technology ensures the robustness necessary in recycling. Last but not least, the special metering system for several components also provides producers with flexibility: either two additives can be fed into the melt simultaneously or the metering unit can be used for fast dye switches. With 6 positions, this VarioFil configuration achieves product throughputs of up to 150kg/h and offers a broad end product range with final titers of between 50 and 150 den (DTY) with a DPF range of between 0.7 and 4.0 dpf. In other set-ups, the VarioFil R+ covers a range of 20-600 den POY or 30-500 den FDY with recycled PET.*

With this, the VarioFil is not only a versatile spinning machine for the most diverse applications, it also caters to the constantly-rising



demand for rPET fibers. Leading textile-processing businesses and corporations – be these fashion brands, sports apparel and furniture manufacturers or those operating within the automobile industry – are increasingly focusing on sustainable products and products made from recycled materials. Today, they are already telling suppliers of filaments, fibers and nonwovens that they will be switching from exclusively virgin polyester to recycled polyester – in some cases up to 100 percent – for the manufacture of their textile products in the near future. » (kue, msc)

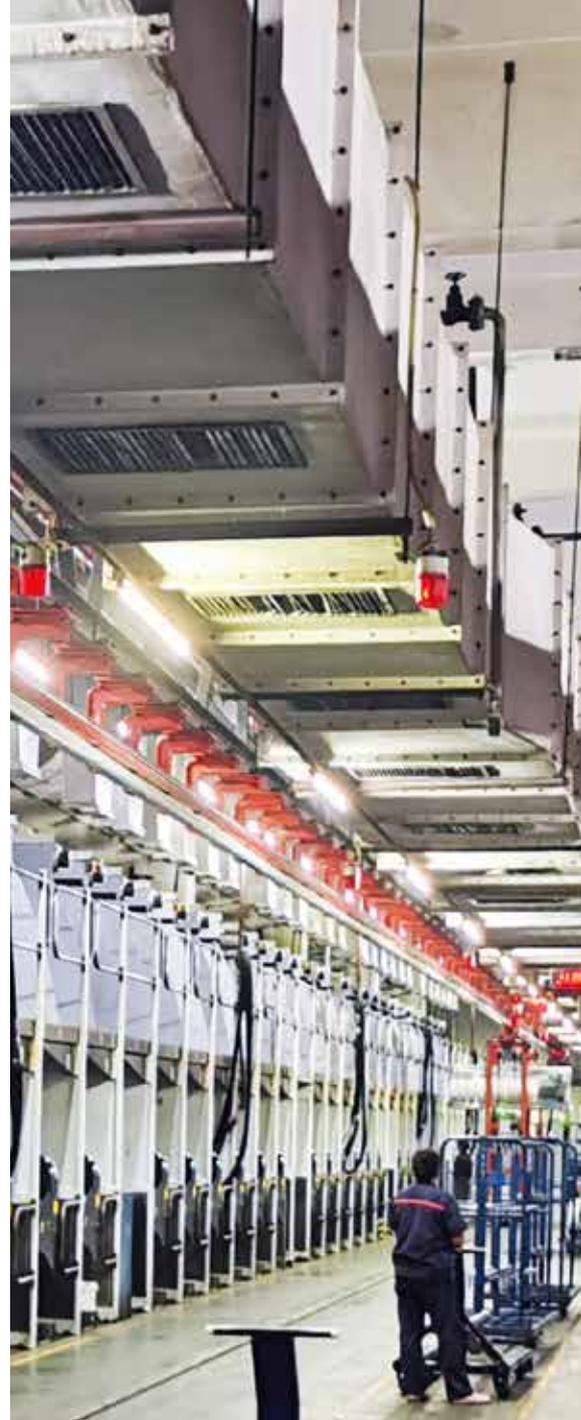
*In general, the VarioFil can process PET, rPET, PA6, PA6.6, PP, PLA, PBT, PTT and bi-component polymers. In addition to manufacturing FDY and POY, the system can also produce IDY.



Smart maintenance workshop technology

Fit for the future

Systems and machines are precious assets for manmade fiber manufacturers and are the essential foundations for the success of these businesses. For this reason, ever more Oerlikon Manmade Fibers customers are relying specifically on the expertise of the company when it comes to maintaining and future-proofing their machine technology. One of Oerlikon Barmag's customers is the Chinese company Zhongchi Chemical Fiber & Co., Ltd in Tongxiang, a subsidiary of the leading Chinese POY and FDY polyester filament yarn producer Xin Feng Ming. Mr. Wu Bin, Assistant to the General Manager of Zhongchi, spoke to 'Fibers and Filaments' about the advantages of the 'smart maintenance' workshop.



Mr. Wu: Since the summer of 2019, the Oerlikon Barmag on-site workshop has been using the Oerlikon 'smart maintenance workshop technology'. What makes this new service concept so interesting for your production process?

Mr. Wu: The most interesting thing is that we are able to monitor the production line in real time. As soon as a position stops, we are informed and can immediately react accordingly. It's just like the nursing system in a hospital I once went to. The nurse always had the 'real time' overview of the current status of each patient by the bed. Now we are able to take even better care of our winders. And with a better result, of course, which is very satisfying.



Shift manager Shen Huimin is well aware of the advantages of the smart system.



Wu Bin (left), Assistant to the General Manager of Zhongchi, appreciates the real time monitoring of the production.

Have you seen any impact of the Oerlikon smart maintenance technology on your processes?

Mr. Wu: It is obvious that we have increased our maintenance and repair success ratio in the last two years. By carrying out maintenance work in a planned and structured manner, we only have to interrupt the winding process in exceptional cases before the full bobbin has been wound. This, of course, has a positive effect on our productivity and also reduces our production waste.

In concrete terms: what functions are the most important to you and why?

Mr. Wu: The 'work order' function enables us to track each winder's history conveniently and quickly. We know at all times what the status of the respective winder is. Until then, we had always worked with maintenance cards that were placed behind the winders, but they were easily lost. Now this data is very easy to find and store safely over a long period of time.

And finally, a look into the future: what are your objectives, your ideas for the next three to five years?

Mr. Wu: With the development of IOT technology, the factory is becoming increasingly smart. We also want to monitor not only the winder, but also parts of the winder, in real time. In the future, I would like to check the situation of each part in the running winder. Then the operator will no longer have to check the performance of each part on the production line every day.

Furthermore, this concept should also exist for other Oerlikon technologies, for example DTY machines. Because we also have to track the machine, the components and the inventory here.

Mr. Shen Huimin is one of the shift managers at Zhongchi. He is well aware of the advantages of the smart system.

Mr. Shen: You have been working with the Oerlikon smart maintenance workshop technology since the summer of 2019. What does this mean for your daily work? What has changed for you?

Mr. Shen: With this technology, it is more convenient for us to check the maintenance and repair history. For example, we can now precisely align the maintenance cycles of the winders with the wiping cycles of the spin packs during ongoing production. This makes our work even more efficient.

Which feature is the most important for you and your work and why?

Mr. Shen: Most important is the 'maintenance and repair history' function. We can trace the maintenance and repair information for each winder, even over a long period of time. This helps us detect and thus eliminate faults that can occur repeatedly.

Thank you very much for talking to us and the interesting insights. » (wa)

There is no such as too much safe

The most important consideration on construction sites is the health of employees and local assembly staff. Therefore, the topic of safety is the top priority. On the one hand, because there are many potential risks and the people's health is at stake. On the other hand, because it is accidents – which so often occur when people are under time pressure – that can result in expensive delays. For this reason, Oerlikon Manmade Fibers Solutions accompanies the assembly of a system with a huge arsenal of targeted safety measures.

Hendrik Bartels has seen many construction sites in various countries over the years. He has been a member of the Customer Services department at Oerlikon Barmag in Remscheid since 1993 and looks after the assembly of systems at customer sites and the assembly staff who are commissioned with this work. Together with a colleague, he schedules staff and also looks after the company-run service stations in India and Indonesia. "I am very close to the action", he comments.

Therefore, Hendrik Bartels is superbly equipped to identify typical risk potentials: "Construction sites would not exist if everything there were finished. Although the buildings or the shell structures

into which the systems are to be installed are predominantly present, they usually still have openings in the walls to allow parts to be passed through. In part, the roof is missing or grab rails have not been installed, often shafts and ceiling openings have not been covered or there are building materials on the floor. It is for these reasons that we plan extensive accident-prevention safety measures for these challenging working environments", he continues.

These begin with the drafting of site regulations that must be completed prior to work commencement and agreed with all parties involved in the project. All employees are informed of these site regulations: What emergency procedures and facilities are there on site?

n thing ety



Where are the assembly points and the First-Aid boxes located? For Oerlikon it goes without saying that each employee is provided with personal protective equipment, including safety footwear, work clothing and personal ear protection. Annual HSE training is provided. Furthermore, construction sites are supplied with a so-called Safety Box with additional protective equipment for staff, including helmets, protective goggles and various types of gloves. This also comprises a First-Aid box and working equipment such as belts and straps, shackles and cordoning tapes. Among other things, the 'Readiness for Installation' checklist includes the customer's HSE contact partners. The 'Obstruction Notice' checklist is designed to officially inform customers of safety deficiencies.

And the Top Management is also involved

Oerlikon also responds to safety issues immediately. "We can describe problems and classify them in several stages in our reporting system, including HSE and – as the highest stage – machine safety, insofar as it puts people at risk. If this is the case, our Safety Committee will convene – with all the relevant main department heads, including our CEO, Georg Stausberg – in order to agree further steps. So, we fundamentally award great importance to safety", emphasizes Hendrik Bartels.

Regular meetings and daily and/or weekly inspection tours on construction sites help ensure high safety standards. Customers are responsible for implementing the measures, which is why it is important to inform them of deficiencies in good time, if there are any. The safety standards are, of course, not the same everywhere. "The very highest standards apply in the US, where, for example, it is – from a certain height – mandatory for people to tether themselves to ladders. And goggles and helmets are also having to be increasingly worn", explains Hendrik Bartels.

Apart from such country-specific differences, it is today naturally about implementing coronavirus-related safety rules. "We frequently have to remind people that protective masks have to be worn in the correct manner. We have comprehensively adapted our operations to the pandemic", states Hendrik Bartels. Particularly considering commercial flights are currently not operating in, and all visas have been suspended for, the region for which he is responsible, India. Nevertheless, spinning systems are being assembled at several major customers in the country at the moment. These projects are being executed by staff from the local service station, with remote support from Hendrik Bartels and his colleagues. To this end, a member of staff in Remscheid monitors the venture online, using

modern remote/video software for this. Even commissioning is frequently taking place online in these challenging times.

But safety considerations do not end once the project has been completed: "Using the instruction manuals, we explain the residual risks to the customers to ensure they are able to operate the system safely", comments Bartels. This is also designed to help prevent accidents and machine downtimes. And it is proving to be successful, at least according to in-house feedback: "Due to the measures described and the cautiousness of the employees, our own staff have to date experienced no serious accidents", says Hendrik Bartels, who himself can barely recollect any accident reports. And this despite the fact that the company has been present on numerous construction sites over the past years, each involving assembly over periods of several months as well as many service assignments. » (tho)

Safe and sound – data security in smart factories

Digitalization has a very good chance of becoming the word of the year. Digital solutions are enjoying a boom – particularly in the age of mobile working, travel restrictions and limited personal contact. Here, we transmit a considerable amount of data through the web that we need to know is absolutely secure.

And IT experts within Oerlikon's business unit Manmade Fibers Solutions are also busy ensuring the data of its customers are secure. Digital solutions such as Remote Service, AIM⁴DTY, Smart Maintenance Workshops, Plant Operation Center and the fully-networked 'smart' factory necessitate a secure infrastructure. How this can be achieved is explained by Sebastian Helmer, responsible for Information Security at Oerlikon Manmade Fibers Solutions: 'Secure by Design' is currently standard practice for establishing the necessary IT security in the product from the outset. With our textile market expertise, intensive interaction with customers and our company-internal international experience, we have developed a picture of our customers' requirements, which we are constantly expanding. We also deploy common standards in the development of solutions – including ISO27001 and IEC62443, among others. Building on this, we develop our own smart factory security solutions, all the way through to customized solutions. We test new solutions by means of so-called pen tests (here, tests are carried out to hack the system in order to close potential security gaps in a targeted manner) in order to further improve them and check our environments with security architecture reviews."

The smart factory

Ceasing to be a mere vision long ago: the smart factory. Of critical importance here is the close relationship between IT and innovation. "With the smart factory concept, we have developed from an operator into a consultant. On the one hand, IT enables innovation. At the same time, innovation is, however, also taking place in IT – culminating in new-generation digital products. Hence, both cross-fertilize each other", explains Chief Technology Officer Jochen Adler, talking about the interaction between the two disciplines. Operating a yarn manufacturing system requires various components and solutions: everything is present – from the control level, the Human Machine Interface (HMI), the

automation systems, the Plant Operation Center all the way through to cloud solutions. All this requires smart infrastructure, which – in addition to a reliable network – includes a high-performance edge computing solution that, coupled with a modern software platform (CSP) and a correspondingly high security level, safeguards the security and the quality of the end product. By nature, data security is also decisive for all downstream processes within the textile value chain that build on the collated data or for merchandise management systems that are directly connected to the smart factory.

Secure data exchange

Services such as Remote Support and tools including the AIM⁴DTY training center necessitate data exchange.

"Here, we draw on high standards for the purpose of encryption, customer separation and also minimizing data", states Sebastian Helmer. "We basically distinguish between three categories of threat scenario: firstly, we have the unconscious actions of employees who unintentionally load malware onto a system without realizing this themselves. Then there are the attacks that have no concrete objective; here, perpetrators attempt to attack a company by means of SPAM or phishing. And, finally, there are attacks that focus concretely on a specific company. Here, perpetrators try to plant malware using targeted methods. This can extend all the way through to social engineering in order to exert influence over the relevant persons."

"Our digital products work with a safety net and a false bottom – hence ensuring secure and reliable operation at the customer site"

Jochen Adler

Oerlikon Manmade Fibers Solutions is superbly equipped for the task with its smart factory concepts: "We have been supplying our customers with secure, certified hardware for decades now. And we also apply these standards to our software solutions: our digital products work with a safety net and a false bottom – hence ensuring secure and reliable operation at the customer site", promises Jochen Adler. » (bey)

How digitalization is making processes more reliable

Transparently and rigorously tracking and tracing, steering and even simulating processes – digitalization is providing modern manufacturing with powerful tools, enabling more reliable production and hence increasing quality and manufacturing success.

Digitalization solutions translate technical reality into a uniform, virtual data language.

In this way, sensors can capture and forward machine statuses and actuators can autonomously initiate the necessary responses whenever prescribed target values such as level, flow volume, temperature and pressure are not correct. We talk about the smart factories when all processes within the production chain have been digitalized, networked and extensively automated across the primary and auxiliary systems.

Such intelligent manufacturing makes the processes considerably more reliable in manmade fiber production. Yarn manufacturers can now identify deviations and adjust the production process faster than ever before. Because, in each yarn production phase, the most varied information automatically flows

Yarn manufacturers can now identify deviations and adjust the production process faster than ever before.

into the control system – regardless of whether it relates to the polymer manufacture, the direct spinning system, the texturing unit, the automation or other auxiliary systems, such as the air-conditioning and compressed air supply units. All while the product being manufactured is continually assessed. To this end, yarn manufac-

turers always have a complete overview of the production process, quality and costs. There is 100% tracking and tracing covering the entire process chain – from the polymer processing stage, the POY spinning plant

all the way through to the finished, checked DTY package.» (bey)

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