fibers and filaments

the experts' magazine

No. 37 | may 2022

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Top quality: Result of perfect interaction

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Dear Customers, dear Readers,

Quality lasts. Its endurance characterizes it like virtually no other feature. So, it is no coincidence that customers operate our machines and systems over decades – of course, 'with a little help from their friends', our colleagues in Service. And it is also no coincidence that an extraordinary company, one that has focused on quality from the very start, is as indestructible as its products.

Oerlikon Barmag celebrated its 100th anniversary on March 27, 2022. But the company does not look its age, because it has always been, and will continue to be, a pioneer of innovation and renewal. It has quite literally consistently reinvented itself, adapted to social and economic change and successfully transformed itself. This too is a sign of quality, which has consequently become a cornerstone of our commercial success.

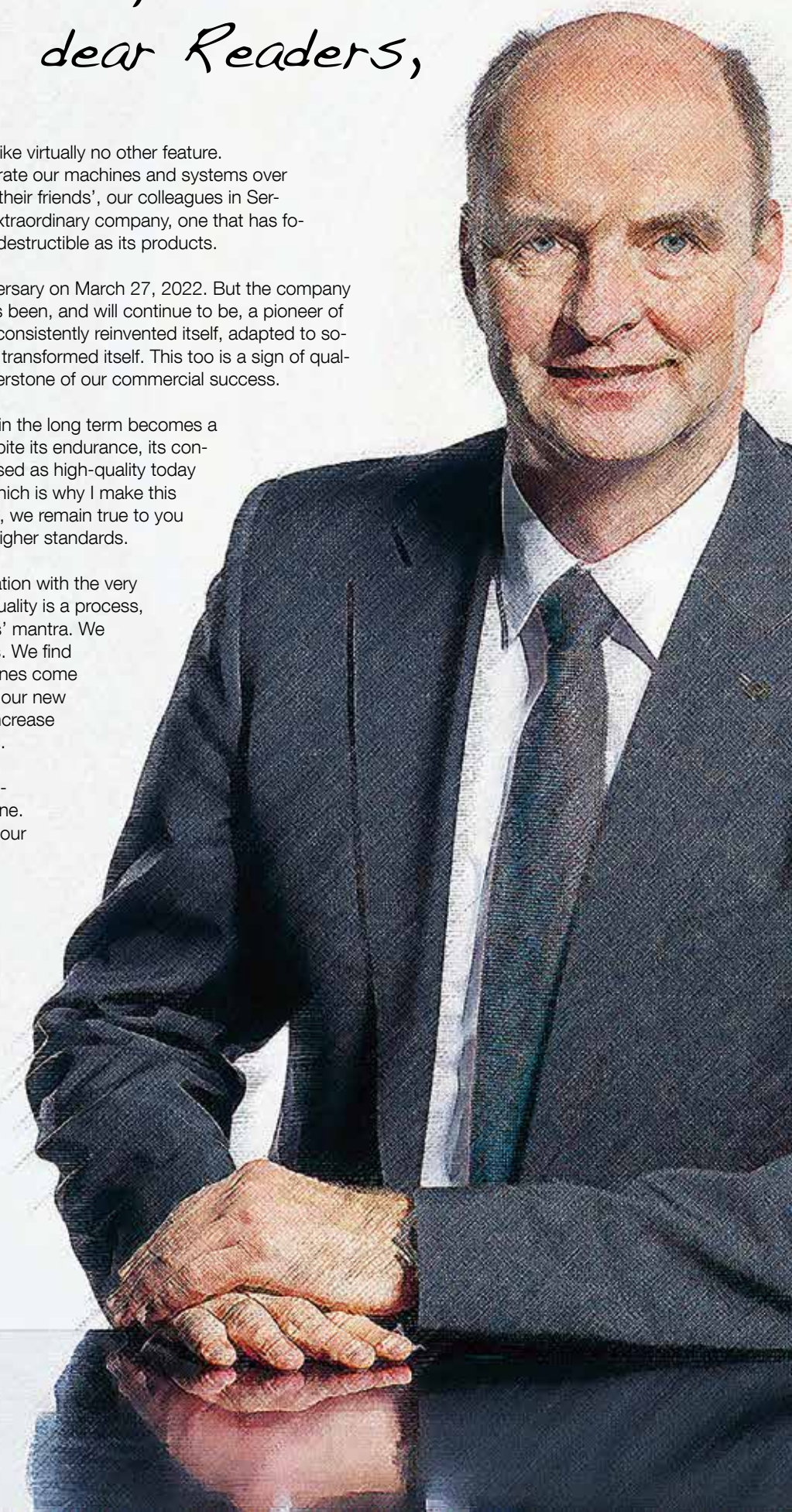
Without this ability for renewal, even quality in the long term becomes a flash in the pan, so to speak. Because, despite its endurance, its concrete value changes over time. What is classed as high-quality today may well not be good enough tomorrow. Which is why I make this promise to you: we never rest on our laurels, we remain true to you and ourselves and we always pursue ever-higher standards.

For this, we have aligned our entire organization with the very highest quality, very much in line with our 'quality is a process, which starts with people and not with things' mantra. We also instill this quality culture in our suppliers. We find solutions, even when the lifecycles of machines come to an end. We train their employees – using our new Digital Academy, for example – in order to increase the performance of their production facilities.

Read about this – and about much more besides – in this issue of our customer magazine. And rest assured: quality is the fulfillment of our performance promise. Always and forever.

With best regards,

Georg Stausberg
CEO Oerlikon Polymer Processing Solutions Division



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Second Sustainability Report published

Progressing towards a sustainable future

Since publishing its first sustainability report last year, Oerlikon has made good progress in advancing the company's sustainability efforts, both internally and externally.

"In our approach to sustainable innovation, collaboration remains a hallmark as we remain focused on extending tool life, reducing fuel consumption in cars and airplanes, improving textile machinery efficiency, increasing recycling of fibers and materials and pioneering technologies that will enable the future of mobility", says CSO Georg Stausberg. In this report, readers will find many case studies and examples of how Oerlikon is continuing to help customers in key markets to build their businesses by implementing cost-effective, climate-friendly solutions and services.

"We take great pride in our ability to attract and retain the exceptional professionals who convert the principles of sustainability to action on behalf of our customers, our partners, our suppliers, our investors and our planet. Only in engaging our workforce are we able to secure the link to sustainability as we work together toward profitable growth", resumes Georg Stausberg.

Oerlikon will continue to make progress and recognize the need to implement improvements on an ongoing basis. » (ed.)

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For further details refer to **www.oerlikon.com/sustainabilityreport-2021**

2021 Full-Year results

Strong growth and margin expansion in both divisions

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www.oerlikon.com/en/company/media/press-releases/2021-full-year-results/

"We grew the company and delivered strong margin expansion in 2021, and expect profitable growth to continue in 2022," said Roland Fischer, CEO Oerlikon Group, within the publication of the 2021 annual results.

Oerlikon delivered growth in orders and sales, supported by market recovery in Surface Solutions and strong demand in Polymer Processing Solutions. Group order intake increased by 25% to CHF 2,797 million. Group sales increased notably by 17% in 2021 to CHF 2,649 million.

"Operationally, we executed well, efficiently managed cost and successfully mitigated supply chain shortages, driving EBITDA above pre-COVID levels. Moreover, we successfully completed two accretive bolt-on acquisitions, further diversified our business and made excellent progress in our sustainability initiatives," added Roland Fischer.

Results division Polymer Processing Solutions

The division achieved record orders (order intake CHF 1,425 Mio.) and sales (CHF 1,366 Mio.) and significantly improved its operational EBITDA (CHF 213 Mio.), which was attributable also to the accretive acquisition of INglass. The increases in sales and order intake were noted across all regions, particularly driven by the higher demand for filament and texturing equipment, as well as by strong demand for non-filament solutions, such as plant engineering and carpet yarn solutions in the US.

New group leadership structure

After six years leading the company and ensuring its successful transformation, Roland Fischer, Oerlikon Group CEO, has announced his decision to step down for private reasons, effective June 30, 2022, in consultation and with the endorsement of the Board of Directors. As of 1 July, 2022, the Executive Committee will consist of the two division CEOs, Markus Tacke and Georg Stausberg, the Chief Financial Officer, Philipp Mueller; and the Chief Human Resources Officer, Anna Ryzhova, and will be led by the Executive Chair, Michael Süss. » (ed.)

FILTECH Cologne & IDEA Miami

Oerlikon Nonwoven – close to its customers

At this year's FILTECH, the Oerlikon Nonwoven team introduced hycuTEC, its new hydrocharging solution.

"We love building systems, machines and components that sustainably manufacture materials from which your successful products are made." This was the pledge made by Dr. Ingo Mählmann, Head of Sales at Oerlikon Nonwoven, to all visitors of the FILTECH trade fair in Cologne (March 8-10, 2022). Oerlikon Nonwoven exhibited at this long-established trade fair with its own trade fair stand for the very first time.

At the event, word quickly spread that the Neumünster-based systems builder had launched a real game-changer in the form of its new hycuTEC system. The hycuTEC is a hydro-charging solution that seamlessly integrates into the production process. The hycuTEC allows the efficiency of filter nonwovens to be increased to more than 99.99% (see page 26 for more information on the hycuTEC). "Exhibiting at the FILTECH has most definitely been worthwhile. We returned home with numerous new, serious inquiries for further processing", summarized Ingo Mählmann.

And the Oerlikon Nonwoven Sales team was back in action just under three weeks later: namely at the IDEA in Miami (March 28-31, 2022). Here, it is well-known that the exhibition focuses on hygiene applications, which Oerlikon Nonwoven caters to perfectly with its Phantom, QSR and airlaid technology solutions. The Oerlikon Nonwoven Phantom coform technology from Italy proved to be hugely popular in particular. The Phantom platform is an alternative coform technology for manufacturing various wet wipes from pulp and polymer fibers. For the very first time, the FiltXPO took place in parallel to the IDEA at the same Convention Center, offering visitors the opportunity to attend both trade shows using a single ticket. This allowed the company to also present the new hycuTEC system to a broad audience on the North American continent.» (che)

imprint

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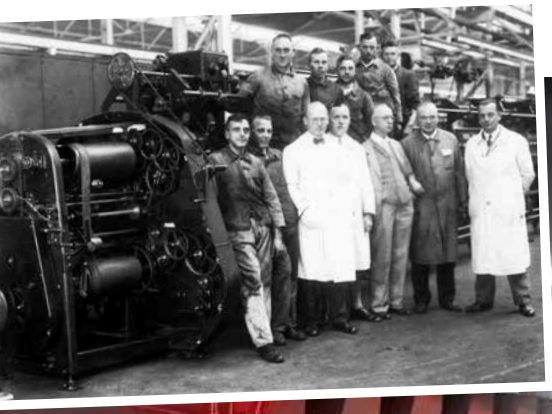
A pioneer of the industry turns 10

When the manmade fiber age began a century ago, a German company was responsible for the pioneering work involved. Barmag, established in 1922, was one of the world's first companies to construct machines for the large-scale production of synthetic staple fibers. To this day, the leading manufacturer of manmade fiber spinning systems and texturing machines in Remscheid – a brand under the aegis of the Oerlikon Group since 2007 – has shaped technological progress in this sector.

Barmer Maschinenfabrik Aktiengesellschaft (Barmag) is founded in Barmen, located in the Bergische Land region, on March 27, 1922. The German and Dutch founders enter unchartered technological territory, one created as the result of a groundbreaking invention: in 1884, French chemist Count Hilaire Bernigaud de Chardonnet used nitrocellulose to produce the first so-called artificial silk, later known as rayon. The following decades see rapid development focusing on the search for synthetic textile fibers and



manmade fiber
oo

their manufacturing technologies. As one of the first machine factories, Barmag battles its way through the eventful early years of the manmade fiber industry, through German inflation and the Great Depression in the 1920s and suffers the extensive destruction of its factories during World War Two. Rebuilding is successful. With the success of purely synthetic plastic fibers such as polyamide, the company flourishes from the 1950s through to the 1970s, establishing sites in all international, for the textile industry at the time important, industrial regions and garnering prestige across the globe in the process. In the ups and downs of expansion, global competition and crises, Barmag reaches the very pinnacle of the market and becomes the preferred technological development partner for the manmade fiber industries in China, India and Turkey. The company has been a high-impact brand under the umbrella of the Oerlikon Group since 2007.

Innovation as the guiding star

Today, Oerlikon Barmag is a leading supplier of manmade fiber filament spinning systems and part of the Manmade Fibers Solutions business unit of the Oerlikon Polymer Processing Solutions Division. With in excess of 3,000 employees, ten sales and service sites and seven manufacturing and R&D centers, the company is present at its headquarters in Germany and in its primary markets – China, India, Turkey and the US. And our aspirations have not diminished: “Striving towards innovation and technological leadership has been, and remains, our guiding star”, emphasized Georg Stausberg, CEO Oerlikon Polymer Processing Solutions, speaking to representatives from politics and business at the anniversary celebration at the Remscheid plant on March 28, 2022 (see info box).

In the past, this has been observable in such trailblazing innovations as the revolutionary WINGS generation of winders for POY in 2007 and for FDY in 2012. Currently, the focus of new and further developments is very much on digitalization and sustainability. Here, Oerlikon Barmag has – as one of the world’s first systems manufacturers – been implementing fully-networked smart factories for globally-leading polyester manufacturers since the end of the last decade. Artificial intelligence is being used in initial products and the corporate structure is increasingly being oriented on digital transformation and the requisite agility.

Environmental protection has been one of the declared strategic corporate goals since the 1980s. More recently, this sustainability commitment has not only been evident in the e-save label introduced for all products back in 2004. The parent corporation Oerlikon is endeavoring to make all its sites carbon-neutral by 2030 and acquire its energy exclusively from renewable sources. An ambitious target, for which Oerlikon Barmag draws on the very best prerequisite: the company has been reinventing itself for a century now. » (wa)

Ambassador for the ‘Made in Germany’ seal of approval

The Oerlikon Barmag management joined representatives from politics, business and society at the company HQ in Remscheid on March 28 for a small celebration of this momentous anniversary. Difficult times demand precisely what has made the company strong over the past 100 years: ‘the ability to constantly reinvent itself’, as CEO Georg Stausberg put it so succinctly in his speech. The fact that ‘the Barmag family’ has this potential, has stood together over the past century and is for this reason a formidable ambassador of the ‘Made in Germany’ seal of approval was repeatedly underlined in the tributes paid by guests and customers, with video messages also sent from China, India and other fiber markets.

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Enter the
Oerlikon Barmag Future Museum!
www.oerlikon.com/barmag100

“We **want** to live and breathe **quality every day”**

Quality is one of the foundations of the Oerlikon Manmade Fibers Solutions business unit’s commercial success. This is about far more than just yarn or adhering to technical dimensions. Speaking to Bernd Kachelmaier, Head of Quality Management, we discover what 100 percent quality means, what important role quality plays even during the development process and what customers say in the event of rare problems.

Mr. Kachelmaier, how does Oerlikon Manmade Fibers Solutions define quality?
We fundamentally define quality as the fulfillment of expectations. Primarily, it's about fulfilling our customers' expectations regarding the performance of our machines. We deliver 100 percent quality whenever we fulfill these expectations and achieve the corresponding level of expectation. And this is the pledge we make to our customers. Providing even greater fulfillment would be nice, but uneconomical. Which is why our quality philosophy is all about clear definitions and specifications – and adhering 100 percent to these. This relates to technology, but also to services, processes all the way through to meetings.

Do you not sometimes have to do more than just enough to achieve development progress?
Other criteria undoubtedly apply to innovations and new developments, where we can by all means overshoot the set target as well. In addition to quality, innovative power is a further strength of our company and a source of energy that drives us. To this end, we want to further develop the robustness of our systems and equipment in the future, among other things. Here, robustness means that a technology works well under the most diverse conditions, even if the surrounding influences are worse than specified.

Do quality requirements vary from country to country?
We can't generalize like that. It's more a case of there being differences between individual companies. However, we do have different machine designs depending on the requirements. It's really quite similar to automobiles. You can drive long distances in both compacts and luxury limousines. But the expectations in terms of comfort will be very different from the outset. With regards to the minimum safety requirements – in our case, machine safety – we make no compromises and we make no distinctions.

Quality based on four pillars

What is your quality management fundamentally based on?
Each business unit is organized and certified in accordance with an ISO 9001 quality management system. Here, our quality management is based on four pillars, with differing prioritization depending on the business unit. The first pillar is quality engineering, quality advance planning. This means that our quality employees work as a team with the construction and production staff from the product development stage all the way through to the start of production in order to identify and correct potential errors in these areas or to prevent them from occurring in the first place. The second pillar comprises our supplier qualification and development. We work with many suppliers due to our lower manufacturing depth. Regular audits are carried out with these suppliers and they have to comply with certain requirements. This is designed to ensure the parts they supply and their overall output and performance are of high quality. Over the past few years, the number of supplier audits has increased by between 300 and 400 percent. We regard many suppliers as strategic partners and support them in their further development.

Qwins
I live quality.

And the two other pillars?
We call the third pillar Q-Operations. This is all about quality management and internal checking of bought-in and internally-manufactured products, initial samples and complaints. And this also includes internal audits and registering and calibrating measurement devices. We use highly-sophisticated technology to ensure quality down to the very smallest dimensions – for example, adaptive measuring instruments for surface examination and devices that measure using light sensors – automated and accurate to the micrometer. And pillar number four is called Q-Administration. This is like looking in the rear-view mirror – at key figures, at ensuring processes are up-to-date, at completed audits and at the implementation of measures. It is designed to establish and further develop processes, procedures and our ISO 9001 quality management system and monitor prescribed targets.

All employees complete the Qwins workshop

Quality awareness runs through the entire company. Are the staff specially trained for this?
Quality awareness has always been good, but in 2017 we took awareness to the next level with the 'Qwins' quality initiative and a series of workshops. All employees – from machine operators through to the CEO – have attended these workshops. Acting consciously, following the rules, jointly succeeding – these are things practiced in the workshops, also with a concrete quality improvement measure for course participants. New members of staff learn the contents within the context of their induction using e-learning programs, among other things. Qwins means: living and breathing quality – here, the name is also our culture!

Bernd Kachelmaier bases quality on four pillars: quality engineering, supplier qualification and development, quality operations and quality administration.

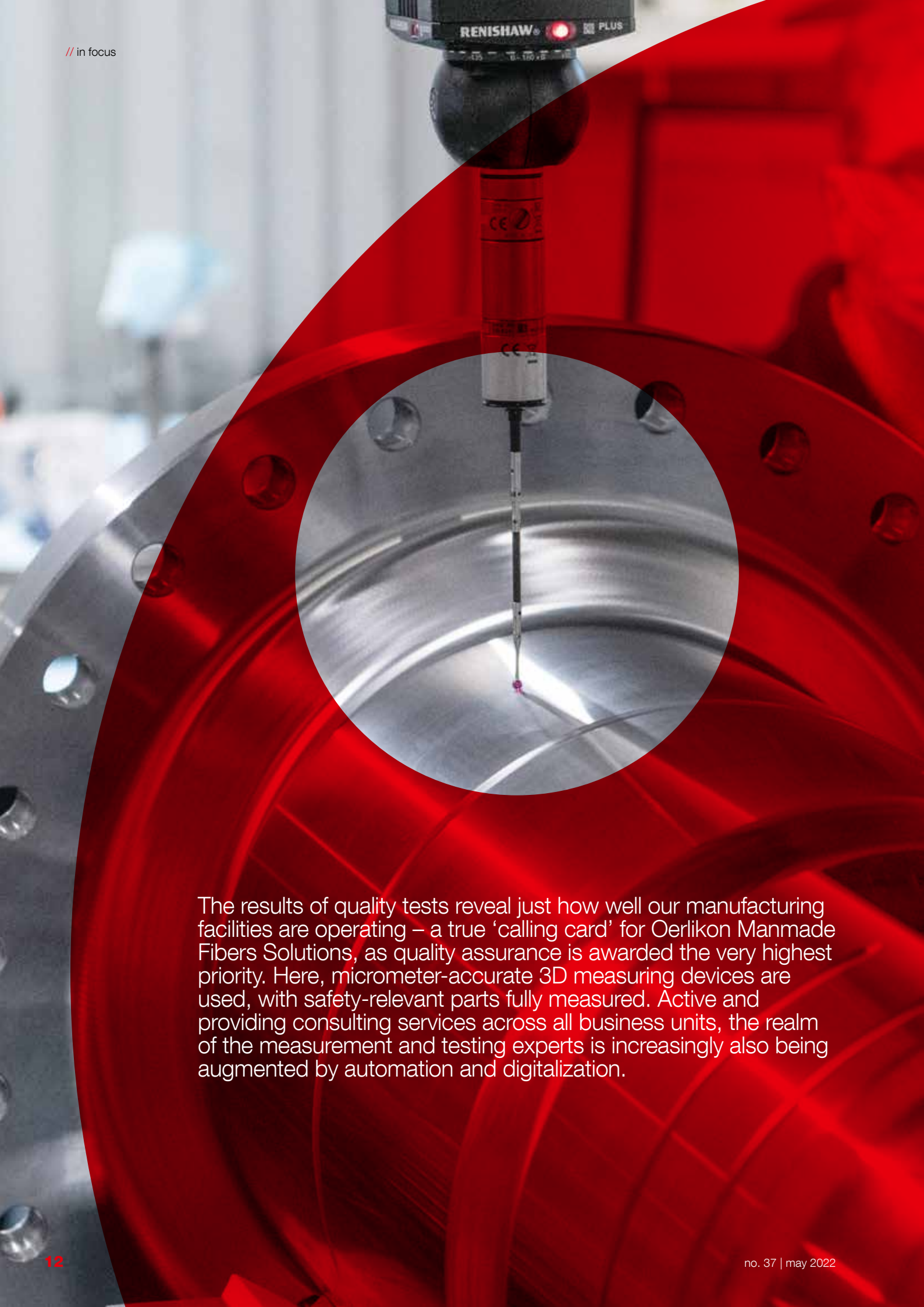
The close cooperation between quality engineering, R&D and construction as well as production ensures quality planning in advance.

How important is this quality awareness? Could you give us an example of this, please?
Up to 80 percent of issues later arising from finished parts have nothing to do with the manufacturing process itself or the assembly. They can generally be traced back to the administration and are the result of change, communication and development processes. Maybe the construction changes were not adequately communicated, meaning that the supplier manufacturing the part was not aware of the change and was therefore unable to implement it. Or errors occur during operation that are discussed, but not passed on. Here, clear rules and conscious actions, as defined by Qwins, help.

Customers: “This is why we buy from you”

What happens when a customer approaches Oerlikon Manmade Fibers Solutions with a machine-related quality issue?
In principle, complaints are first recorded through our Customer Services using a ticketing system. Internally, there are clear processes for handling errors and initiating measures. In the event of issues, a Customer Services and Quality Management team becomes active in order – as an initial step – to find solutions for our customers as quickly as possible. In the subsequent step, it is decisive to find the cause of the error and initiate measures that will prevent the error occurring in the future. This is about systematically and continually learning from mistakes and errors. Furthermore, we offer remote support and training – for systems operation, for example. The fact that we are successful at this is confirmed by our customers. Many of them say: “If there are issues, they are also addressed and solved. At the end of the day, we can be assured that your machines will run – with superior yarn and product quality than that of the competition. This is why we buy from you.” The fact that these statements are relevant is also underlined by our full order books.

What warranty do you give on your machines?
The fundamental warranty is twelve months following commissioning, but no longer than 18 months after delivery. That is standard within our sector. However, this can differ depending on the situation. In many cases, we do maintain long-standing customer relationships, something we will continue to do as well. For this, we live and breathe quality each and every day! »



The results of quality tests reveal just how well our manufacturing facilities are operating – a true ‘calling card’ for Oerlikon Manmade Fibers Solutions, as quality assurance is awarded the very highest priority. Here, micrometer-accurate 3D measuring devices are used, with safety-relevant parts fully measured. Active and providing consulting services across all business units, the realm of the measurement and testing experts is increasingly also being augmented by automation and digitalization.

Certified accuracy for manufactured parts and components

However, precision gears for Oerlikon Barmag Pump Construction are still being measured manually. Several thousand each week, requiring many testing hours in the process. But that is about to become a thing of the past: with the new automated gear height measurement procedure, the testing throughput will soon more than double – with the same number of staff. At the same time, this development promises superior measurement precision and error-free classification of gears, with the result that their operating reliability will also improve.

This example says a lot about the Oerlikon Manmade Fibers Solutions philosophy: quality at the very highest level justifies a high level of testing – the focus being on automation, which is checked and, if possible, implemented. The Pump Construction measurement center was upgraded in 2021, adding a further Zeiss 3D measuring device, expanding the facilities and employing an additional member of staff. Control measurements during serial manufacture are secured in this way, as is the simultaneous operation of two machines by a single employee.

In general, the testing and qualification steps follow standardized manufacturing processes that ultimately guarantee the quality of the components. And it is not just spare parts that are subjected to interim and final mechanical and electrical tests in order to ensure their function, so too do modules, units and even complete machines. The same is valid for external products and services, with the proven testing and measurement strategy also established at all our partners and suppliers.

“We are constantly investing in quality assurance, in the latest technology and in staff training and are hence fully committed to the continual improvement process. Our QMS is certified in accordance with DIN EN ISO 9001:2015 and can be audited at any time. And our demands with regards to delivery quality always exceed customer expectations”, explains Helmut Bittner, Head of Quality Management at Oerlikon Barmag, talking about the approach.

Comparable principles are also in place at our affiliate Oerlikon Neumag in Neumünster, where several new measuring devices and instruments have been acquired for the measurement room in the production facilities over the past few

years. Just like in Remscheid, this is where all aspects of quality assurance come together. The tasks of the twelve-person team: manufacturing control for in-house production parts and supplied parts, managing measuring instruments, testing initial samples, processing complaints relating to erroneous deliveries and solving problems. For this, there are several 3D measuring devices, among other things, the latest of which arrived in 2021 and is able to accommodate 3-meter-long and 2.5-ton components. Its measurement accuracy is twice that of its predecessor and it delivers measurements 20 percent faster.

1.5-micrometer measurement accuracy

This high-tech equipment enables the precision measurement of the most diverse dimensional and geometrical tolerances to an accuracy of 1.5 micrometers. 100 percent of function- and dimension-critical parts are measured, with others being randomly measured. Spin packs, flanged shafts, tight bearing fits and, above all, narrow-tolerance core components such as Rotac tangling unit elements are inspected, for example.

100 percent of the texturing jets for manufacturing BCF carpet yarn are measured using a 3D measuring device, undergoing random function testing using a BCF laboratory system. The testing process measures the yarn tension at each nozzle opening, hence providing a reliable picture of the yarn quality. “This differentiated quality testing improves the chances of our customers achieving superior yarn quality and greater process stability. This cannot be achieved by suppliers of replicas – and that is what distinguishes us from our competitors”, emphasizes Arne Haake, Head of Quality Control.

It is not just the measurements that are constantly documented, so too are the materials used in production. Documentation is a growing area, as previous measurement and material data play an important role for future projects. Steadily superior precision will be necessary moving forward, as the requirements in terms of components increase whenever greater throughout and speed in production are demanded. This necessitates that all work – including quality control – is consistently carried out to high, state-of-the-art standards.

For this reason, the quality experts are constantly attracting attention with news – as recently with the above-mentioned Pump Construction division. Its quality department has expanded its statistical methods and software in order to continually monitor and improve the machine and process capabilities during production. Here, we can now use statistics software to assess the collated data in a targeted manner, to derive measures regarding machine maintenance and process management and to develop test plans. This helps us to respond appropriately in the event of deviations in the manufacturing process.

All this means that the quality specialists always collaborate closely with the most diverse departments. “We are fully networked across the entire operation – whether we are focusing on developing new products, maintaining current products, construction or scheduling”, states Arne Haake. And the fact that Oerlikon Manmade Fibers Solutions is willing to spend considerable amounts on quality is also acknowledged by customers, adds the measurement room manager, grinning: “They are always really impressed when we show them the 3D machines in our measurement room.” » (tho)

Top performance **with top partners**

Top quality can only succeed with the right suppliers. And this maxim applies particularly to Oerlikon Manmade Fibers Solutions: the business unit only manufactures special core components and precision parts itself. The lion's share of materials, modules and services are provided by around 1,600 suppliers across the globe. These must qualify from the very start, and subsequently regularly, in accordance with defined standards. A challenging, but highly-rewarding process for both sides.

Some supplier relationships are as constant as a longstanding marriage. Coatings specialist Oerlikon Metco, for example, has been collaborating with Oerlikon Barmag since the late 1970s, long before the supplier became part of the Oerlikon family in 2014. What began with the contract coating of godets and thread guide elements has meanwhile expanded to the commissioning of complete components, whereby Oerlikon Metco is responsible for the entire supply chain. And this is not the only proof of performance: Oerlikon Metco has also extensively automated the finishing process for yarn guides in order to ensure consistent quality and make it reproducible. On the one hand, this process innovation increases production efficiency and capacity compared to the formerly manual procedures. Furthermore, it also guarantees consistent component surface quality, which has a direct impact on the final yarn quality. With an annual output of in excess of 100.000 thread guides, this is an equally high-ranking quality topic, as is for coated godets, which are also stressed by abrasive additives in the spinfinish in respect to corrosion and wear requirements.

Unlike matrimonial relationships, such 'long-term life partners' have to be continuously subjected to audits. "We have long bonded with our customer. But we have also signed a quality assurance agreement, conduct regular supplier audits and receive score-card-based quality assessments", states Dr. Stefan Andres, Head of Operations at Oerlikon Surface Solutions in Switzerland and Liechtenstein and also responsible for Metco's coating service.

Crucial element: qualified suppliers

Conducting quality assurance among qualified suppliers is ensured through globally-harmonized processes and is hence also a cornerstone of quality management at Oerlikon Manmade Fibers Solutions. The corresponding measures comprise audits for releasing new and checking existing suppliers, the qualification, support and further development of suppliers, the handling of supplier problems and the final inspection of products and tools on the supplier site prior to being delivered to the final customer.

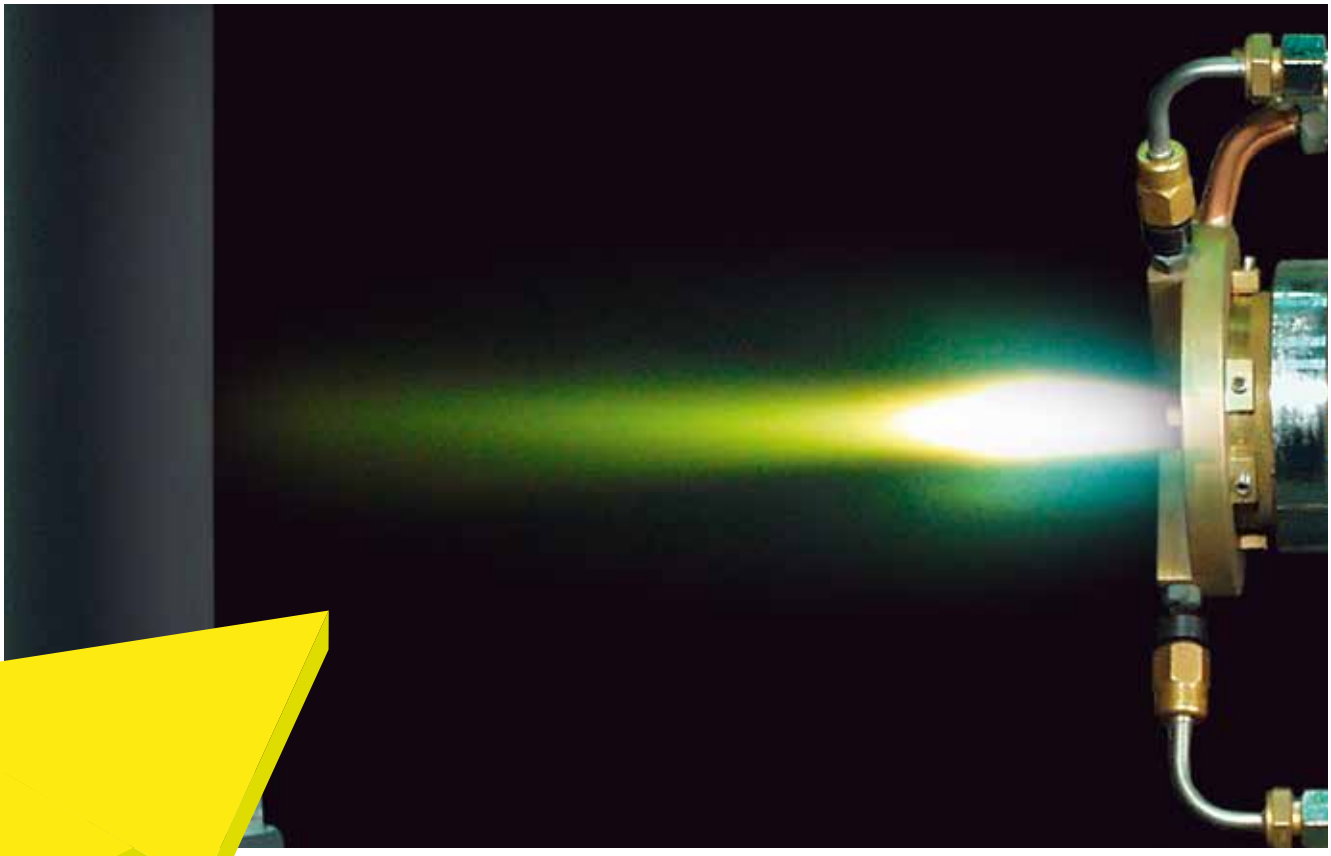
This begins as early as the search and selection of suppliers: “Our purchasers look at potential suppliers including their machine parks and references for manufactured parts very carefully and carry out a commercial review, which includes financial rating”, explains Timo Lüdorff, Chief Operating Officer at Oerlikon Manmade Fibers Solutions. The administrative processes such as supplier onboarding and document management with the suppliers will soon be automated with the introduction of a supplier relationship management system.

If a supplier is deemed suitable, they first need to sign fundamental agreements prior to any document exchange. These also include the Oerlikon Code of Conduct for Suppliers. Here, for example, a partner agrees to adhere to certain laws, regulations and internationally-recognized standards and to not breach any stipulations regarding material specifications and minerals from conflict regions, fair working conditions relating to human rights, child labor or health, safety and environmental management issues.

> “Our purchasers look at potential suppliers including their machine parks and references for manufactured parts very carefully and carry out a commercial review, which includes financial rating”
>
> Timo Lüdorff, Chief Operating Officer at Oerlikon Manmade Fibers Solutions

And a supplier self-information must also be submitted. This relates to product and public liability insurance, certification issues and dealing with hazardous substances regulations such as REACH, for instance. This is followed by the exchange of documents relating to the concrete delivery and a quotation and sampling phase with an initial on-site audit, during which central issues such as production, processes, maintenance, supply chain, sustainability, quality assurance and business management are once again examined.

These audits are repeated at two- to three-year intervals. To ensure continuous improvement, early identification of potential risks and maintenance of the own ISO9001 certification, a monthly supplier evaluation takes place. Here, the quality and delivery performance of the previous six months is assessed on a rolling basis and communicated in accordance with various criteria such as on-time delivery, quantity and order confirmation reliability as well as complaint rates



Oerlikon Metco, a specialist in surface coatings, has been a strong partner of Oerlikon Manmade Fibers Solutions for decades. Quality is crucial here: the yarn-guiding components, such as the godet pictured above, have a direct influence on the yarn quality.

and costs. Based on the submitted results, suppliers are split into performance groups A, B and C, which can lead to individual follow-up actions. The purchasing department uses the assessment results as the decision-making basis for countermeasures in the event of deviations and the awarding of new orders.

If the supplier performance needs to be improved, a further management feature comes into play: supplier development. In this case a written statement from the supplier, and if needed, an additional 5D report is required, development objectives are jointly defined and a development plan is agreed. “We offer support in the event that the supplier is not able to manage the initiated actions on its own. The supplier development process serves, on the one hand, to continuously improve the suppliers´ operational performance and, on the other hand, to sustainably maintain a partnership with us”, explains Martin Sendrowski, Head of Category Sourcing at Oerlikon Barmag.

Both sides benefit

Managing and maintaining partnerships like this have proven to be extremely productive. And suppliers also make a decisive contribution towards increasing quality and performance. To this end, Oerlikon Barmag has further developed the rotor bearing in collaboration with a long-term supplier, allowing it – as a result of its greater durability and increased rigidity – to be operated in faster-running machines. As a result, a highly-critical part that had reached its technical limits was further developed: rotor bearings control the pace of the chuck units on which the yarn winding bobbins are running. Their manufacture is all about the tightest manufacturing tolerances and the highest level of precision. “This was a superlative example of target-oriented exchange of know-how”, comments Martin Sendrowski. And further proof that customer and supplier need an equal understanding of quality and development to generate innovative solutions. » (tho)

Creating first-class products with team work

Prevention instead

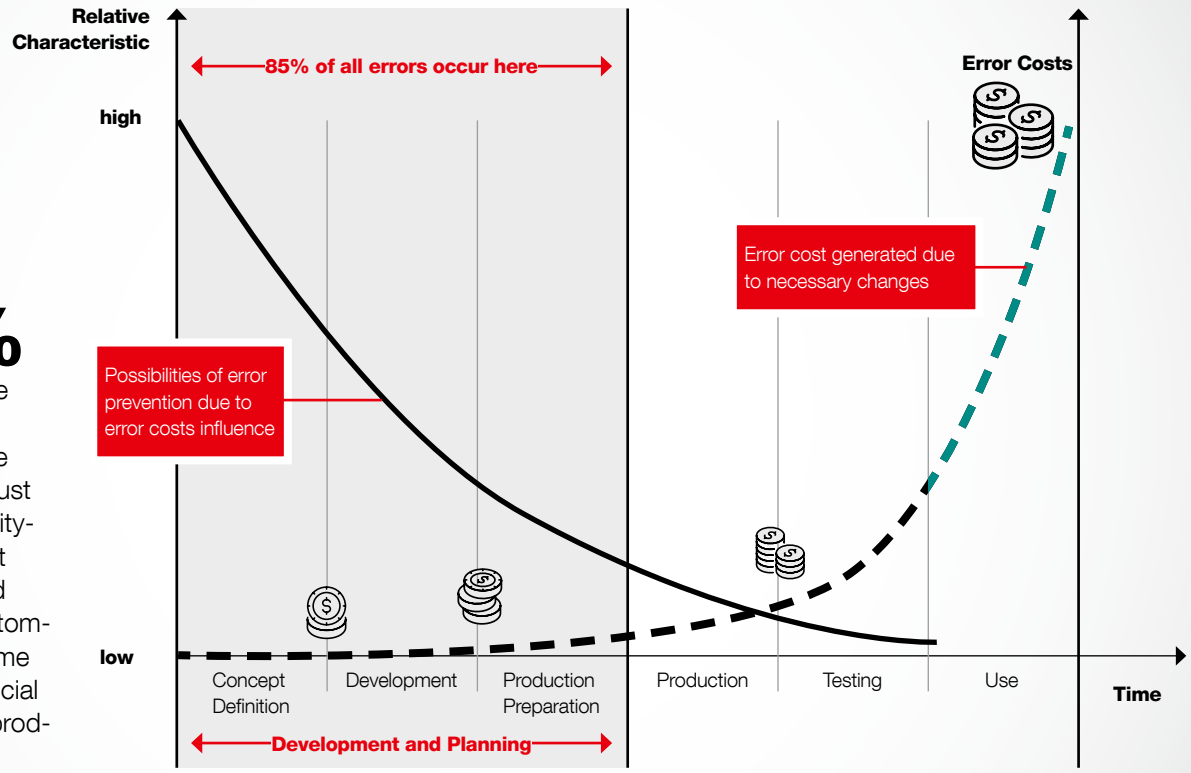
Quality starts as early as the development phase for new products. This is not a groundbreaking insight – Oerlikon Manmade Fibers Solutions has known this for quite some time now. And it is for this reason that it established quality engineering many years ago, using tried-and-tested tools in systematic processes to ensure that the products developed fulfill the promises they make.

Qua|li|ty En|gi|nee|ring

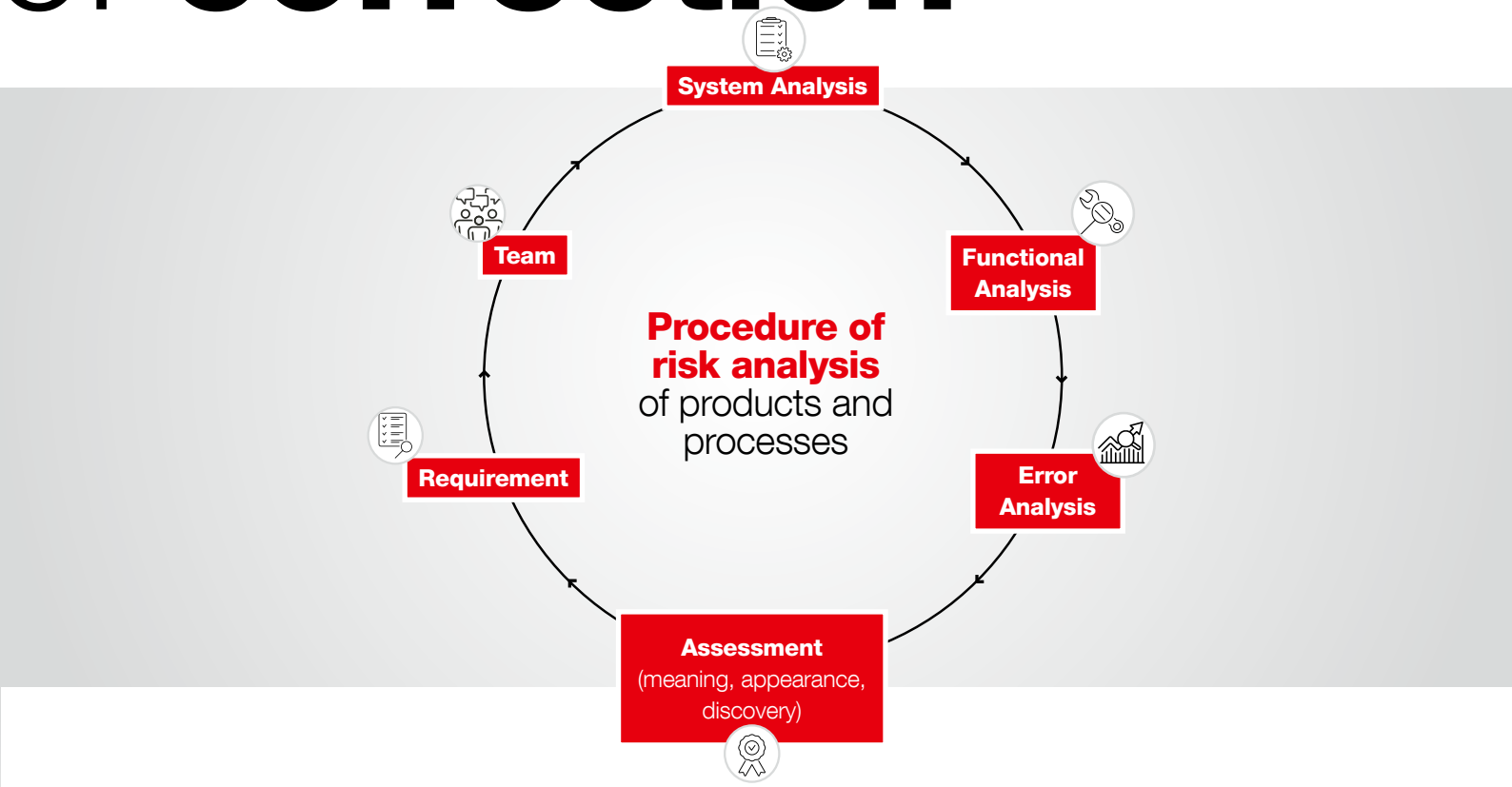
Quality engineering supports the development process from the start. Involving the affected departments – including technology, manufacturing, quality, process development, material planning, customer service and purchasing – as early as possible is essential for successful product development. Quality engineering conducts risk analyses to identify potential errors in advance and eliminate them before the newly-developed product goes into serial production. Here, a cooperative team work with R&D is particularly important in this early phase of development.

Errors and their effect within the development process

Around **85%** of all errors take place before serial production begins. This once again demonstrates just how important a quality-oriented development process is – also, and above all, for our customers. Taking enough time in development is crucial to bringing a robust product to market.



of **correction**



Established quality techniques for high-end products

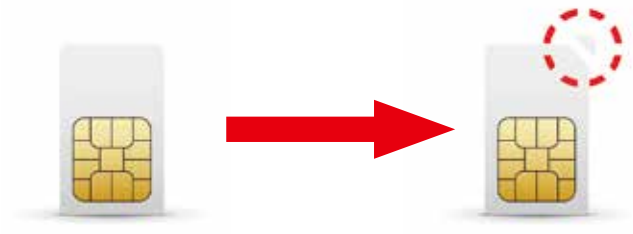
Failure Mode and Effects Analysis (FMEA) is a preventative method for qualitative assessment and the avoidance of errors. It is used above all in development and production and identifies potential weaknesses whose causes and effects are assessed in a very structure way. The result of this analysis flows either into design changes (design poka yoke), change of production process (process poka yoke) or into control plan, which monitors the production process from supplier to customer.

Six Sigma (6σ) is aimed at improving processes and helps statistically evaluate ability and the correlation of the effects, etc. Key elements of this method are the description, measurement, analysis, improvement and monitoring processes using statistical means.

The **5-Why method** is used to determine the cause of a defect or a problem. Here, questions are asked until the process step causing the error is clearly identified. The Ishikawa method creates diagrams that show the causes that result in, or decisively influence, a specific event, whereby all problem causes are to be identified and their dependencies revealed.

Poka-yoke is a Japanese term meaning 'inadvertent error prevention'. Simple mechanical methods are used to prevent incorrect product operation and incorrect manufacturing process actions.

Poka yoke in daily life



In the case of a complaint, the **8D method** results in a systematic procedure and the consistent documentation of the individual solution steps. The fact-oriented approach ensures that product defects are traced back to their causes and these are permanently eliminated. The findings from the complaints flow into the **lessons learned process** to allow the insights gained to be incorporated into new products.

Top quality: Result of perfect interaction

Sighing, Martin Müller hangs up the phone. An unpleasant conversation. And an expensive one as well: once again, he is dealing with a complaint that will cost his company tens of thousands of euros. In hindsight, he knows: quality does have its price – in every respect.

In addition to the financial repercussions due to large numbers of errors and complaints, customer trust in the manufacturer also suffers in the long term. Markus Reichwein, Head of Product Management at Oerlikon Manmade Fibers Solutions, states: “For us, system efficiency not only means manufacturing quickly and as inexpensively as possible, but also that our customers produce more efficiently. Because how well the product can be further processed is decisive for the value added that our customers can offer their clients – along the entire process chain.”

The stronger, more even and stretchable the filaments and fibers are, the better their performance in the downstream processes: better dyeing evenness from end to end and also over time is one advantage. Further, lower break rates mean fewer interruptions, enable higher speeds and superior material yield right up to the last windings of a package.

So, the quality of the end product has a direct impact on the yarn prices achieved. A sample calculation: if a manufacturer is able – due to the superior quality of its product — demand 2 eurocents more per kilogram of fiber, this would equate to a plus of 20,000 euros for a daily output of 1,000 tons.

The three famous 'Ms': Man – Machine – Material

Three factors influence fiber quality: the starting Material, the Machine that processes the material and the Man operating the machine. Markus calls them ‘the three famous Ms’. Although Oerlikon has little or no influence over the quality of the raw materials PTA and MEG, it does, as a systems manufacturer, see its core competence in optimizing the ‘Machine’ – from the melt through to the finished yarn and for precisely 100 years now.

With only a few exceptions, machine construction development is more a case of evolution than revolution and there is very little scope particularly in the technically very sophisticated manmade fiber manufacturing sector. The focus of new developments is therefore above all on manufacturing even more efficiently and, in the case of quality improvements, on concentrating on the yarn-guiding elements. The more perfect their interaction, the greater the quality of the end product. Here, an almost endless number of parameters play a decisive role: for instance, the temperature evenness within the melt systems, the godet temperatures, the pressures, the moisture, the temperature and air speed during quenching and the pump and drive speeds. And, last but not least, this also includes the machine design: surfaces designed so they cannot damage the yarn, but also ensuring that surfaces, air jets and ceramic elements are resistant to wear.

High-end components and solutions – from melt to end product

Superlative quality is only possible with consistency along the entire production process. All developments are therefore designed to optimize individual process stages. Highlighting just a few:

- top-quality yarn can only be produced using absolutely homogeneous melt. Manufacturers can directly influence the polymer quality using an efficient and high-end continual polycondensation (PC) system from Oerlikon Barmag Huitong Engineering (OBHE).
- Downstream to the melt process, the yarn or fiber quality is determined in the spinning unit. Here, Oerlikon Manmade Fibers Solutions offers a whole range of high-performance components – all designed to manufacture premium yarns. Thanks to its even air distribution and temperature, the EvoQuench radial quenching unit, for example, ensures excellent yarn evenness in POY and FDY production.
- With its particularly gentle yarn path, the WINGS winder guarantees that the yarn maintains the high quality it had upon exiting the spinning system. Its minimized angle of deflection has a positive impact on the yarn evenness, the yarn tension, the CV% values and consequently the dyeability. A perfect package build and hence optimum take-off performance guarantee excellent further processing properties in such downstream processes as texturing, for example.

Automation supports the ‘Man’ quality factor

And the third ‘M’ – Man – also has a major impact on product quality. On the one hand, highly-developed, robotized automation solutions simplify Man’s work and, on the other hand, eliminate human error sources with wiping robots, take-off systems for spinning and texturing machines as well as packaging, transport and warehousing systems, for example – and all combined with a state-of-the-art communication platform.

Today, the motivation for investing in automation solutions is no longer primarily to be independent of manual labor, but more about the desire to consistently further optimize the highly-complex processes in modern manmade fiber production: “Ever-faster systems with ever-greater capacities of up to

1,000 tons per day make the quality management of individual packages virtually impossible without automation and the risk of handling and package data monitoring errors increases enormously", explains Volker Schmid from Oerlikon Barmag Automation.

Digitalization: continually optimizing the complex production process

The broad field of digitalization offers tremendous potential with regards to yarn quality as well. The digital factory is already a reality for Oerlikon. Ever-more Industrie 4.0 developments are aimed at the complete networking of information, and not just internally, but also externally – with the customer, for example. The vast volumes of data produced by a modern manmade fiber factory are collated in the Datacenter in a Box – the basis for a high-performance, flexible and above all secure IT infrastructure. But it is only when this production data is combined with data relating to the quality of the end product that even greater quality be achieved even more efficiently. The production control system therefore optimizes production processes within a manufacturing stage and along the entire production chain.

Artificial Intelligent Manufacturing (AIM) is the next stage of the digital manmade fiber factory. The digital AIM^{4}DTY system, for example, 'learns' the probable causes of drops in quality using artificial intelligence – a kind of 'digital customer service', so to speak, aimed at continually optimizing the production process.

Thanks to secure IT architecture, real-time data, historical data evaluation and artificial intelligence (AI), the tremendously complex production process can be increasingly better visualized and controlled in its entirety. This also minimizes error sources and continually optimizes production. The – no longer all too distant – future encompasses the complete networking of the entire production, which consequently becomes fully

"Our solutions are targeted at enabling our customers to produce ever-superior quality more efficiently and ultimately at lower costs. To ensure they are able to offer their clients unique value added that makes their business more profitable"

Markus Reichwein, Head of Product Management at Oerlikon Manmade Fibers Solutions

transparent and understandable in its correlations and enables automatic adjustments and improvements at every point of the process.

Unique know-how for comprehensive solutions from a single source

As the leading supplier of manmade fiber systems and an engineering solutions service provider, Oerlikon Manmade Fibers Solutions is not just familiar with the requirements of the entire textile value chain. Positioned both broadly and deeply, Oerlikon also has unique know-how that flows into the development of new solutions – for machines, systems, plants, software and services. For this reason, customers are able to rely on a perfectly harmonized overall package from a single source, including automation and digitalization solutions and seamless interfaces.

"Our solutions are targeted at enabling our customers to produce ever-superior quality more efficiently and ultimately at lower costs. To ensure they are able to offer their clients unique value added that makes their business more profitable", concludes Markus Reichwein. » (aze)

Superior yarn quality depends on many factors. Perfect interaction of all relevant components is crucial here.

Oerlikon Nonwoven convinces at the FILTECH with a new hydro-

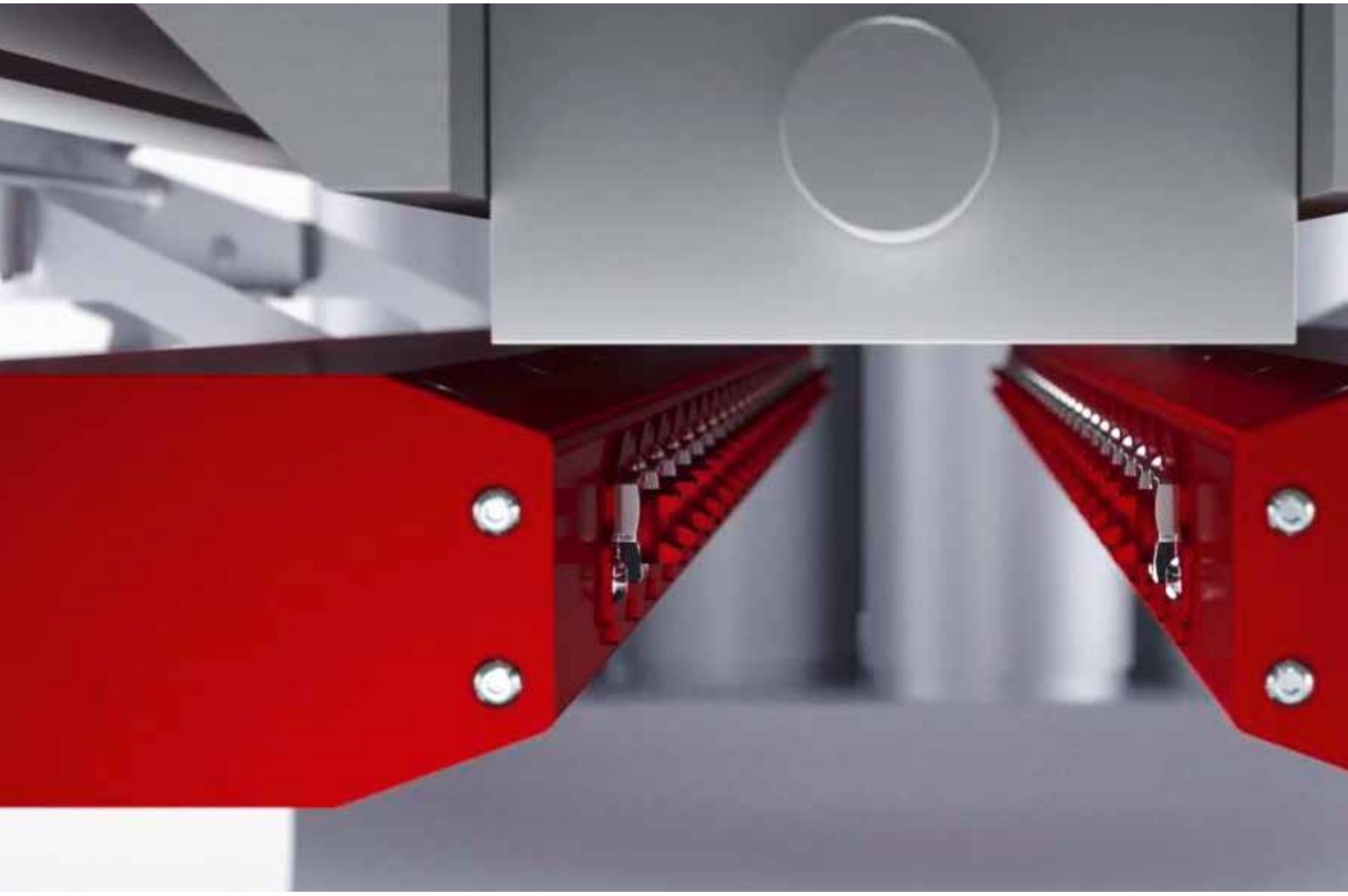
hycuTEC sets new standards in

The Neumünster-based systems builder Oerlikon Nonwoven premiered its new hycuTEC hydro-charging solution at this year's FILTECH in Cologne. This new technology for charging von nonwovens enables the filter efficiency to be increased to more than 99.99%. As a result, it offers meltblown producers considerable material savings with simultaneously improved filtration.

The hycuTEC is the market's first industrially-manufactured hydro-charging solution that can also be seamlessly integrated into the production process. And the innovative technology is also easily retrofitted to existing systems as a plug & produce component – a first within the market.

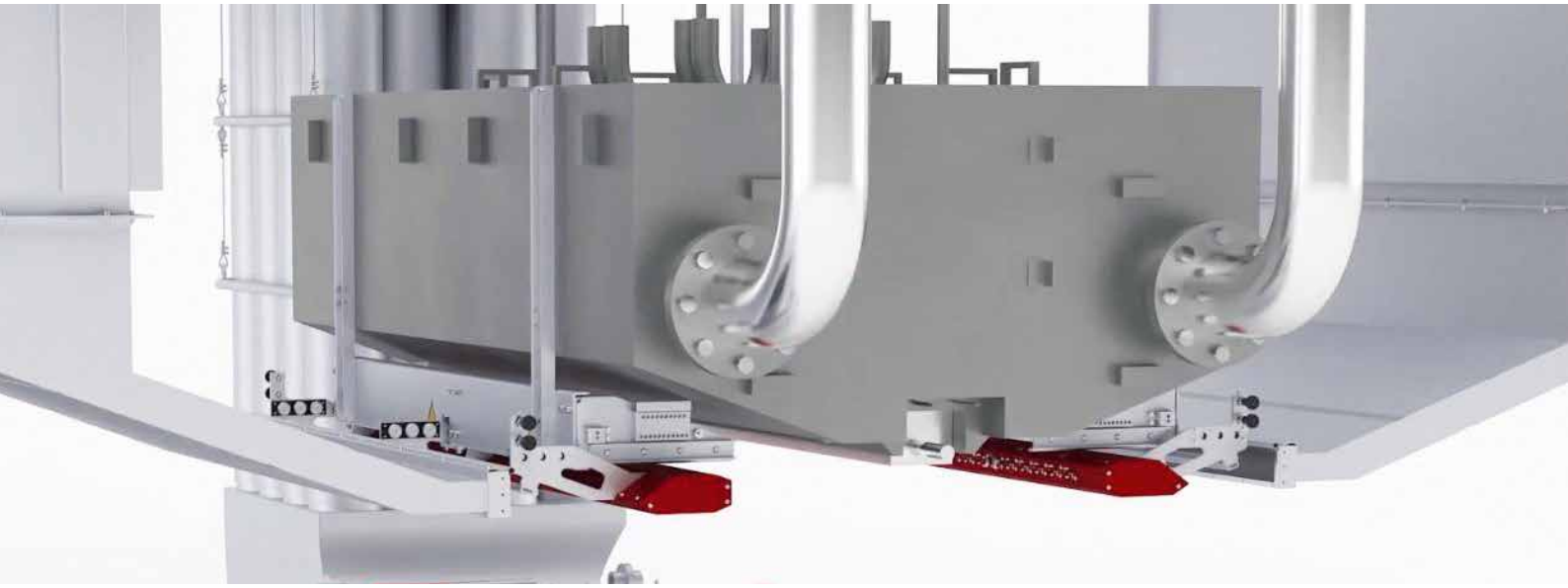
Filter media with a whole new level of quality

hycuTEC hydro-charging can reduce the pressure loss in typical FFP2 filter media to less than a quarter. Even filtration efficiencies of more than 99.99% are easily achieved in typical filter media of 35 g/m² at 35 Pa. Tests at pilot customers manufacturing FFP2 face masks have confirmed quality increases due to the improved filtration with a simultaneous reduction in material usage of 30%. For end users, the consequence is noticeably improved comfort resulting from significantly reduced breathing resistance.



-charging solution

terms of quality and efficiency



The hycuTEC process easily achieves filtration efficiencies in excess of 99.99% in the case of typical filter media.

In addition to this, the hydro-charging unit also stands out in terms of sustainability: “The hycuTEC process excels as a future-proof technology due to its considerably lower water and energy consumption compared to other hydro-charging concepts. This unit allows an additional drying process to be dispensed with in many applications, which has a huge impact on energy consumption”, comments Dr. Ingo Mählmann, Head of Sales & Marketing at Oerlikon Nonwoven. Incidentally, the hycuTEC unit can be easily and quickly installed and is simple to operate, set and service, while also being extremely user-friendly.

Technological quantum leap

Whereas classical hydro-charging processes charge the finished nonwoven material, the hycuTEC concept is based on the allround charging of each filament. Through controlled atomization, charge is evenly transferred to the fibers from the water spray. And a special additive is used to permanently bond the charge to the surface of each fiber. The result: filter media with a uniformly stable charge over the entire cross-section and an effective fiber surface area about 10 times greater than that of surface-charged media. Integrating the new unit into a state-of-the-art Oerlikon Nonwoven meltblown system helps achieve a uniformly high product quality across the whole production process. » (bey)

The hycuTEC process easily achieves filtration efficiencies in excess of 99.99% in the case of typical filter media.

Lifecycle management also cracks tough nuts

When progress closes the

Oerlikon Manmade Fibers Solutions has always firmly subscribed to the philosophy of standing by its customers throughout a system's entire lifecycle. But what if progress closes the door and purchased components for spare parts will soon no longer be available on the market?

In this situation, Oerlikon Barmag has for the very first time had to announce an 'end of life' for old winding machines, including the CW generation from 2024 onwards. The fact that a proactive, customer-appropriate service solution is offered even in such difficult cases is highlighted by a further, current example of lifecycle management for texturing machine inverters. For Sascha Klemm, who is today Head of Service Sales for Oerlikon Barmag's Southeast Asia region, this is a completely new experience in his 30 years of working for the company: "We have informed some customers that they should switch to a new generation in the medium term." This primarily affects the winders of the legendary CW-technology, which provided customers with a tremendous increase in efficiency 30 years ago, when Sascha Klemm was new to the company, at the time securing the business with orders of, in part, more than 500 winding positions at a single site.

"To be on the safe side, both we and our customers have built up inventories of spare parts that will cover the demand for these older generation of inverters for the next few years. At the same time, we have proactively ensured that the inverters are downward compatible"

Sascha Klemm, Head of Service Sales Southeast Asia at Oerlikon Barmag

Despite further progress made by the subsequent ACW and WINGS concepts, the old CW generation remains in use at customer sites and is therefore also relevant with regards to the supply of spare parts, for instance. As the components, however, are no longer state-of-the-art, procuring the raw materials and individual modules required for producing them has become increasingly difficult over the past few years. Current global delivery bottlenecks have exacerbated the problem. "To this end, we have had to announce that some spare part components and services will no longer be available", explains Sascha Klemm. Ultimately, we have now decided to inform, in good time, affected customers of the 'end of life' of their systems from 2024 onwards. Spare parts available after this date will undoubtedly still be supplied, but services such as the reengineering of replacement components for obsolete parts or software updates will end at the lat-

e door or speeds away

est in 2024. “We are very aware that missing spare parts jeopardize reliable utilization and production capacity planning. This is highly-critical for our customers. Which is why we wanted to create a window to help our customers reorient themselves”, comments Sascha Klemm.

Meanwhile our product development and design colleagues have come up with some creative modification solutions for replacing entire spinning systems and partial functions; for example, winders with current, innovative Barmag technology – and also in existing buildings, hence ensuring that no new infrastructure is required. Initial customers have deemed gradual generation change as prudent and have already implemented corresponding conversion projects. “Investments are acceptable if only part of the overall installation is initially replaced. Then customers can enjoy increases in efficiency with the newly-installed lines at least for part of their production capacity and the uninstalled equipment can be used as a source of spare parts for the remaining old systems”, emphasizes Sascha Klemm.

Super-fast development: inverters for texturing machines

The fact that progress sometimes speeds away for all parties involved and does not always make their business easier is shown by another current example of lifecycle management, this time relating to the control units for texturing machines. Here, inverter technology is experiencing ever-faster further development, meaning that generation changes for these components occur in shorter cycles. This is undoubtedly a good thing, particularly for new machines, as progress makes the control even more reliable and accurate. However, it also jeopardizes the supply of spare parts for older generations of inverters – the only difference being that it does not affect 30-year-old machines, but texturing machines that have only been operating for a few years.

“To be on the safe side, both we and our customers have built up inventories of spare parts that will cover the demand for these older generation of inverters for the next few years. At the same time, we have proactively ensured that the inverters are downward compatible”, promises Sascha Klemm. This allows current technology to also be installed in older texturing machines together with machine software updates. With this, customers acquire sufficient time to plan and implement the upgrading of the existing machines with the new inverters technology at the appropriate time.

“Our customers rightly expect to utilize the performance of our machines and systems over a long period of time. This also applies when innovation becomes faster – something we ourselves also encourage. And we want to promote the concept of service in the same way. Through active lifecycle management and customer-oriented solutions. We remain at our customers’ side, even when old systems are at risk of being left behind by progress”, summarizes Sascha Klemm. » (tho)

Maintenance is an essential guarantor for the trouble-free operation of plants and components.

For the first time in the company's history, Oerlikon Barmag has to announce the end of life of old winders. There will also be no more reengineering for obsolete spare parts for the legendary CW winder from 2024.

Training seminars and support for operating staff through to performance improvements

Three-level ‘gym’

Quality not only depends on the machine, but also to a great extent on the operating staff. Well-trained employees decisively help keep system performance and manufacturing quality high and reduce downtimes, waste and costs. And the demand for such qualified staff is growing.

For this reason, Oerlikon Manmade Fibers Solutions is expanding its service offering to include training seminars and know-how transfer and – with its Digital Academy – is increasingly also introducing online tutorials. The best machine is useless if the operating conditions are not right. Here, it is above global skills shortages that are resulting in poorer performance. Trained operating and service personnel leave or are unavailable – leading to performance deterioration or more machine downtimes, because the know-how required for correct or performance-enhancing system operation is no longer present. “Over the past few years, we have increasingly noticed that our customers are suffering as a result of these circumstances”, states Dr. Wolfgang Ernst, Head of Customer Services at Oerlikon Manmade Fibers Solutions. Here, for example, a not inconsiderable number of machines are not operating at some plants operated by our customers despite full order books – all because of a lack of skilled staff. And an absence of experience operating staff is increasingly a problem being reported in most regions across the globe.

> “Over the past few years, we have increasingly noticed that our customers are suffering as a result of these circumstances”
>
> Dr. Wolfgang Ernst, Head of Customer Services at Oerlikon Manmade Fibers Solutions

In view of this ongoing development, Oerlikon Manmade Fibers Solutions is now focusing more on sustainable solutions and support offerings. “In most cases, it makes little sense for us to repeatedly visit customers to provide operating staff with tuition only to discover that the employees are no longer there when we return”, summarizes Dr. Ernst, hitting the nail on the head. Which is why his service unit has split its training seminar and support offerings into three categories, with online training seminars designed to minimize access barriers as much as possible and maximize success.

Training - on-site as well as digital - is a key success factor.

On-site training: the tailored classic

Classic training seminars for technicians and operating staff at the customer site will continue to be part of the repertoire. Here, training programs are tailored to the needs of the customers and their systems. Topics include, for example, standard training prior to system commissioning, induction into machine configuration and processes, fast, autonomous execution of scheduled maintenance work and training seminars and support for all issues relating to operational and process optimization. And Manmade Fibers Solutions business unit training seminars in Germany can also be useful. To this end, a major customer in Turkey is currently combining its on-site winder maintenance and service training with a training seminar in Germany.

> "This enables us to continually provide customers with know-how and hence help somewhat mitigate the issue of skilled staff shortages and fluctuations"
>
> Tilmann Seidel, Head of Customer Service at Oerlikon Neumag

Expertise-based services: know-how for superior performance

In addition to learning contents targeted for example at monitoring regular maintenance intervals, there is also invaluable operational know-how that directly benefits the systems and the manufacturing performance. This starts with the little things: for instance, cardboard tubes for the packages should be stored under defined conditions. If incorrectly stored, the result can be a poor fit, potentially leading to catch and transfer errors – which have nothing to do with the machine itself. This kind of specialist know-how is provided by customer service experts with, in part, many years of experience as production heads and who are consequently familiar, and able to offer help, with customers' difficult operational challenges. Here, support ranges all the way through to performance checks, which – on request – also provide deep insight into the operational performance and important recommendations on the targeted optimization of processes, quality and efficiency. Such special training seminars are enjoying increasing popularity, are being tailored to requirements and offered in modules – from 'simple' machine audits through to comprehensive, company-wide check-ups.

Digital Academy: tackling skills shortages

New to the training 'gym' is the Digital Academy, which will soon be offering customer training seminars and online video tutorials on special topics via a Web platform (myOerlikon.com). A pilot project is currently underway in the US, where an expert on the operation of BCF machines is explaining operating tricks via video. "This enables us to continually provide customers with know-how and hence help somewhat mitigate the issue of skilled staff shortages and fluctuations", comments Tilmann Seidel, Head of Customer Service at Oerlikon Neumag. Like Dr. Ernst, he is very passionate about the Digital Academy; he and his team are currently focusing on the structure and the contents of the Digital Training Units for BCF machines. This will in future give trained employees the opportunity to receive a certificate for their respective qualification. The technical basis for the Digital Academy, which will later also focus on topics such as POY/FDY and DTY staple fibers as well as nonwovens, will be in place by fall 2022. "With this approach, we are underlining our 'Partnering for Performance' strategy", comment Dr. Wolfgang Ernst and Tilmann Seidel in agreement. » (tho)