German Technology

Master the Art of Sustainable Innovation
Engineering a better world.
German Technology
Master the Art of Sustainable Innovation
The ITMA slogan “Master the Art of Sustainable Innovation” reflects the central challenge which the textile industry and the equipment technology sector are facing actually: Sustainable development has become a competitive factor. On account of the volatile prices for commodities and energy as well as the increasing responsibility for work safety and workplace design the textile industry pays highest attention to all aspects of sustainability. For these reasons resource efficiency is one of the premium targets of technical development. As a key industry for forward-looking technologies, the textile machinery manufacturing companies affiliated with VDMA play a prominent role in developing and realising sustainable solutions.

For this reason in 2011 VDMA launched the sustainability initiative BLUECOMPETENCE. It aims to interconnect all of Germany’s mechanical engineering industry, to pool resources, know-how and strength of the VDMA member companies and to foster sustainable development. Furthermore the BLUECOMPETENCE initiative supports the requirements of the customer’s industries. So in March 2015 EURATEX, the European textile and apparel confederation, and VDMA Textile Machinery signed a Memorandum of Understanding to join efforts in the campaign “Energy Made to Measure”. It is focussed to strengthen synergy effects, in order to increase energy efficiency in small and medium enterprises of the textile and apparel industry.

On the occasion of ITMA 2015 VDMA member companies will speak about their technologies and concepts in order to add content to the sometimes loosely used watch word sustainability. Best practice examples in this publication deal with resource and energy saving, sustainable corporate culture and strategies, final textile products of increased sustainability, integration of functions, automation and further steps towards Industry 4.0.
Textiles contributing to a Sustainable World

**Braided expertise for oil rigs and keyhole surgery**

Dizzying heights, fathomless depths. The enormous tensile forces and load capacities that arise in mining or oil extraction on the high sea, and which previously only steel cables could sustain, have now been also become one of the challenges facing textile machinery. The article explains the advantages offered by braiding synthetic fibres for material substitution and saving energy on water, on land, and in the air. Page 7

**Biodegradable hygiene products: Nonwovens with better environmental friendliness**

The WC at home is often used to dispose of items other than toilet paper: fabric items and wipes for cosmetics, personal care and hygiene that really do not belong in there. These moist wipes are broken down very poorly in water, so they get into the drainage system, and from there to the wastewater treatment plants, where they form enormous clumps and have to be removed at great effort and expense. The hygiene product manufacturers which produce these wipes from nonwoven materials are therefore working with system builders to develop alternatives for improving the environmental tolerability of hygiene products. Page 10

**Wovens have exciting potential as inherently digital structures**

Weaving is one of the oldest manufacturing processes known to man, but in the age of technical textiles it is about to undergo exciting new transformations. 60 percent of all woven carbon and aramid fabrics, 50 percent of all glass fibre fabrics, two out of every three airbags and three out of four motor vehicle tyres worldwide are woven on machines built by the German technology leader besides Lake Constance. Page 12

Sustainable Corporate Culture & Strategies

**Technology and market leadership as consequences of a vivid sustainability strategy**

Sustainability is an integral part of corporate culture in long term strategies. In an interview, the managing director of a leading textile machinery manufacturer with some 3000 employees worldwide explains the many consequences of a reasonable sustainability strategy; technology and market leadership are only some of them. Page 15

**Multiple benefits based on sustainable culture of innovation**

For the leading supplier of manmade fiber plants, sustainability stands as a fundamental principle in all dealings with customers and its own employees. The interview discusses the many aspects of developing future-oriented products and applications in the company. Page 17
## Resource and Energy Saving

### Assistance systems for plant operators: 30 percent more performance

Machinery manufacturers for finishing of textile and film webs introduce assistance systems for plant operators onto the market. The tools — retrofits are partly possible — are expected to unlock energy savings and free up 30 percent of the reserve capacity. Page 19

### Combining cost cutting with environmental protection

With caustic recovery plants textile manufacturers can lower the quantity of caustic soda used in mercerising by an impressive 85 percent. In this way, not only do the plants help lower operating costs substantially, they reduce environmental pollution at the same time. Page 25

### Sustainability due to minimal application

Non-contact rotor systems are useful for precise, metered application of liquids and chemicals to fabrics. In an interview the product manager explains why global players in the paper, textile, tissue and foil industries have come to rely on the liquid application system and why it helps them to save enormous quantities of water, energy and chemicals. Page 21

### Needles lower end user CO₂ emissions

One of the largest textile machinery equipment suppliers in the world has demonstrated with new needles for circular knitting machines that product innovations are not driven solely by financial considerations. A latest innovation weighs just 0.6 gram and is capable of lowering the end user’s CO₂ emissions significantly. The contribution explains why the company devotes equal attention to efficiency and sustainability in all its new developments and research into such future technologies as textile-reinforced concrete. Page 27

### Coated spacesuits for Chinese astronauts

Manufacturers of stenter frames for textile finishing are expected to meet growing technological challenges in terms of nature and number. Of-the-peg technology will and must continue to exist, but special requirements are becoming noticeably more prevalent for garments and technical textiles as well. Remote service contributes to homogenize the production flow and to save cost. Page 23

### With energy savings and after sales heading towards sustainability

Faster than formula 1: During cabling — a mechanical yarn upgrading process in carpet making — the strand reaches top speeds of up to 420 km/h (261 mph). With a few innovative tweaks to the machine, a leading machinery manufacturer contributed significantly in the effort to reduce energy consumption and thereby also the CO₂ emissions associated with industrial carpet making. Why the solutions consume up to 40 percent less energy will be answered in the interview. Page 29
Functional Integration, Automation and steps towards Industry 4.0

**Knitting and spinning all in one**
Circular knitting machines that spin as well: A new technical approach makes it possible. The knitting machines still need prefabricated yarn to do their work – the end product from the spinning plant. But with Spirit Systems, a new generation of machines only require the intermediate yarn stage, so an entire process step can be omitted. Page 31

**Heavy bobbins move as if by magic**
Over 15 kilometres of cable and 2 kilometres of optical waveguides have been installed in India so that an enormous plant can be controlled through a single command centre. The site offers a tantalising glimpse of how Project Industry 4.0 – the fusion of information technology and machine building – will affect industrial production in the future. Page 37

**Right-first-time with task compression**
Integrated robotics replaces the simplest manual labour – high-tech equipment from Germany can reduce the human error rate in dyeing plants dramatically. It also helps to make working conditions more save. While transporting the dye to the preparation vessel in buckets by the operators is still standard practice in many factories in Asia, this is done by robots in state-of-the-art machine parks. A dying machine manufacturer strives consequently for compressing tasks over the entire production process. Page 33

**With system integration toward the Internet of things**
RFID readers in the dye house read the contents of radio tags, robotic dispensing systems supply the precisely constituted dye mix. If sensors report excessive shrinkage of the textile goods, the smart machine controller corrects the process parameters. If delivery deadlines are not met, downstream production processes are adjusted immediately. Specialists in automation are on course for Industry 4.0 for a long time. Digitising and automating the manufacturing processes for textile finishing is on track. Page 39

**Step by step to success through integration of functions**
Modular platforms and flexible machinery concepts support research facilities in the development of innovative filaments. In particular the MultiMode systems are well adapted to enable intelligent networking of the production steps for product development. Page 35

**Tradition Meets Digitalisation**
A long-established manufacturer of flat knitting machines follows the trend of digitalisation and networking of the entire value chain. An innovative software tool networks extensive machine parks with up to a thousand machines. The interview deals with digitalisation and technical textiles as challenges and opportunities for long-established machine manufacturers. Page 41
GERMAN TECHNOLOGY – MASTER THE ART OF SUSTAINABLE INNOVATION

Textiles Contributing to a Sustainable World

Braided expertise for oil rigs and keyhole surgery

Dizzying heights, fathomless depths. The enormous tensile forces and load capacities that arise in mining or oil extraction on the high sea, and which previously only steel cables could sustain, have now been also become one of the challenges facing textile machinery. The advantages offered by braiding synthetic fibres for material substitution and saving energy on water, on land, and in the air, are explained by Dr. Janpeter Horn, managing director of Herzog Maschinenfabrik GmbH & Co. KG, an Oldenburg-based company whose history began 154 years ago.

Technical textiles are replacing conventional materials and enabling innovation thrusts in industries not normally associated with textiles. What is the machinery industry’s share in these developments?

We are often the first provider to cooperate with customers in developing machine technology that is suitable for entirely new applications and thus also for new textile products. On the subject of water treatment engineering, for example, Herzog is the technology leader in machines for producing braided membrane carrier materials with substantial energy and space advantages. As a result, the water in wastewater treatment plants only needs to occupy a quarter of the surface area and uses only half the energy required for treatment in conventional plants.

The global trend toward lightweight construction with composite fibre materials has surely presented another major challenge for your developers?

We have indeed devoted a great deal of effort to these processes in recent years. Nowadays, automated braiding technology from Oldenburg is not only used by BMW. Wherever loadbearing structural components made from carbon fibres are fitted, in aircraft, cars or bicycles, our technology is in demand. This includes the radial braiding machines that have been on the market for well over ten years. In the beginning, our competitors made some attempts to replicate these complex machines, but now we are the only company that has succeeded in surmounting the underlying technical problems, and we sell these machines all over the world.
Recently, synthetic ropes have been causing great excitement with regard to energy recovery...

... these ropes consist of many fibre sets, which have to be bundled. That is why offshore extraction of petroleum and natural gas has become a second major challenge for us in the last few years. In work on the open sea, conventional steel cables are being replaced increasingly with lightweight, synthetic fibre ropes — made from UHMWPE (ultra-high-molecular-weight polyethylene) materials, for example — which float in the water. These braids are endowed with significantly better properties and can be used at much greater depths than steel, for lifting loads, lowering parts, or mooring rigs and ships. We provide the technology for this. The braided synthetic ropes that are produced in this way are self-supporting in the water. This enables great strength at much greater depth.

From offshore back to onshore energy recovery!

Our machine technology for lift and crane manufacturers is also ground-breaking, not to say unparalleled. Every kilogram of weight that can be saved with these much lighter textile ropes in the transportation process means that they can support correspondingly heavier loads — it would be particularly interesting to compare the performance of these materials in the deepest mines in the world, up to 3,000 metres underground.

„As to the question why our family-run business is still independent and has not been subsumed into some international conglomorate, there is only one answer: We enjoy the process of innovation, we are always at the forefront of technology, and we are also highly diversified.“

Dr. Janpeter Horn, Managing Director
As a machinery manufacturer, your ears have to be close to the ground. How does your company turn ideas into innovations?

We review new trends, such as replacing metal and wire with textile structures, and in consultation with our customers we offer technical options for them. This area of activities is gaining more and more momentum – and we were (again) involved right from the beginning. You can find examples of this in cars, where more and more components that were conventionally made of steel and aluminium are being replaced increasingly with composite fibre materials, which are just as rigid and stable, but significantly lighter. When the vehicle body is lighter, the engine size can also be reduced. Textile assemblies overlaid with radial carbon braids are a key field of the future, which will also continue to pose considerable challenges, particularly for technology providers. Ideas for new exploration projects also reach us through trade fairs or international workshops. I have just recently returned from an event hosted by an US-Irish company, one of the largest stent manufacturers in the world.

Speaking of stents: Since much is being made of textile implants as well now, Herzog offers a machine for making them that would have been considered practically impossible a few years ago.

You are referring to the radial braiding machine we developed together with the Institut für Textil- und Verfahrenstechnik (ITV) in Denkendorf to handle surgical yarns for minimally invasive procedures. The new application development enables the fine single threads needed for „keyhole surgeries“ to be manufactured with furcations or openings in an automated process. As a result, the material no longer has to be spliced manually under a microscope, which was previously standard practice.
Biodegradable hygiene products — Nonwovens with better environmental friendliness

The WC at home is often used to dispose of items other than toilet paper: fabric items and wipes for cosmetics, personal care and hygiene that really do not belong in there. These moist wipes are broken down very poorly in water, so they get into the drainage system, and from there to the wastewater treatment plants, where they form enormous clumps and have to be removed at great effort and expense. The hygiene product manufacturers which produce these wipes from nonwoven materials are therefore working with system builders like Andritz Küsters GmbH in Krefeld to develop alternatives. Managing director Andreas Lukas explains how specialising in processes and machine systems for paper finishing and nonwoven production is improving the environmental tolerability of hygiene products.

Why do these kinds of nonwoven products not break down more readily?

Most damp wipe cloths have synthetic fibres embedded in them, so they are very poorly soluble, if at all. It must also be remembered that hygiene products for the face and body are often impregnated with lotions, fragrances for example. Given the situation of collapsing wastewater systems and increasingly stringent standards for drinking water quality, we are no longer dealing with an exclusively financial question – purifying wastewater is immensely expensive —, but also an ecological problem which is becoming more urgent as the demand for moist wipes increases. Our engineers have been wrestling with the question of environmentally friendly nonwovens for some years now.

How is it progressing?

The starting situation was as follows: There are three properties in conventional wipes that render them unsuitable for flushing: The fact that they are made from synthetic fibres, the use of chemical binding agents, and thermal solidification. All three make the products less readily degradable. So we addressed each aspect individually and tested them for improvement options: Regarding materials, instead of synthetic fibres we now use wetlaid nonwovens made from degradable cellulose fibres, such as are used to make tea bags among other things. It is well known that these materials can be disposed of with organic waste. Instead of the usual binders and the thermal solidification they cause our systems work with chemical-free hydro entanglement, also called „wetlace“. At the end, we have nonwoven products like moist toilet paper and cosmetic wipes that dissolve in water quickly and completely.

„Our vision is market leadership in sustainable nonwoven technologies. So we have made it a part our mission to earn most of our sales from the areas of sustainability, the environment and resource conservation.“

Andreas Lukas, Managing Director, Andritz Küsters GmbH
One of your processes is conceived not only to create a sustainable end product, but also to do justice to the “machinery footprint”. What is meant by that in real terms?

This is the response to the question: How much water and energy do I have to supply to a system in order to make, say, a ton of nonwoven web? As we develop our systems, we also consider the aspects of energy, water and material optimisation. In real terms, that means: The water used in the wetlace process is collected, purified to drinkable standard, and reused elsewhere. Even some of the hot air used for drying the wetlaid nonwovens is recovered and returned for recirculating in the system to conserve energy. We have now advanced to the point where our systems use up to 20 percent less energy than their predecessor lines.

Does demand for the “flushable wipes” already exist on the market?

Regarding demand: An unequivocal yes. The big hygiene product manufacturers are very interested, and the first products from them are already on the shelves.
“Wovens have exciting potential as inherently digital structures”

Weaving is one of the oldest manufacturing processes known to man, but in the age of technical textiles it is about to undergo exciting new transformations, says Peter D. Dornier, chief executive officer and co-owner of Lindauer DORNIER GmbH. About 60 percent of all woven carbon and aramid fabrics, 50 percent of all glass fibre fabrics, two out of every three airbags and three out of four motor vehicle tyres worldwide are woven on machines built beside Lake Constance.

Please explain the role of sustainability in practical terms?

To name just a few of the latest milestones: Very recently, we created the label „DORNIER Composite Systems®“. This has enabled us to combine our expertise in constructing weaving machines and film stretching machines for a more efficient process for manufacturing high performance composites from film and fibres. Or our „The Green Machine“ concept, with the twin objectives of producing exceptionally high-performance woven products for protecting people and the environment while maximising resource conservation. This sustainability has been a part of the corporate DNA of Lindauer DORNIER GmbH ever since it was founded, and not just because our weaving machines have been the same colour green for the last 50 years. For example, I am thinking of a market like China, which accounts for a quarter of our sales at the moment. Among many other items, our machines are used there to produce filter fabrics for – desperately needed – pollution control in water and air. Incidentally, our „green“ machine concept is derived from the basic idea of the VDMA BLUECOMPETENCE initiative for optimising machines or processes, that is to say reducing energy and air consumption will improve performance. But with regard to sustainability, we go yet another step further, because our weaving machines and film stretching systems typically have service lives lasting 30 to 40 years. These are certainly not „disposable products“. And one of our strengths is that we provide support with spare parts and service for as long as this makes financial sense for our customers. This is also what „The Green Machine“ means to us.

A question about the innovation process:
Where do your ideas come from?

One of our great advantages is that we are active in more areas than all of the other weaving machine builders. Our customer base includes, for example, wire weavers, which manufacture ultra-fine filter fabrics for turbochargers, or metal printer cartridge fabrics, carbon fibre weavers, which make cables as thick as your finger on jacquard looms, Italian clothing manufacturers, which produce soft, lightweight suit material with our air jet weaving machines. Not a few new ideas are inspired by transfer that is to say from the markets or straight from our customers themselves. For example, when a known feature is applied to new application fields, truly surprising, positive solutions are created – as in the case of our low-mass back beam, which was developed especially for weaving aramid fibres for antiballistic applications; an Italian wool weaver wanted to know whether this innovation could also be used successfully with wool. It was because of precisely this question that this back
A woven fabric is always "intrinsically" digital anyway, the weft passes either over or under the warp. This means that in the weaving mill we have the only truly, purely digital manufacturing process – all other machines produce analogue structures, including those that are controlled digitally. We are currently standing on the threshold of a completely new departure, in which we can produce wovens that are structured not only in two but also in three dimensions and with reproducible "digital quality" as it were. Weaving as an intrinsically digital process has enormous potential, and we are only slowly beginning to realise what the future might bring – especially with regard to mass production.

"We are currently standing at the door step of a completely new era, in which wovens can be produced not only two-dimensionally but also in three dimensions and with reproducible "digital quality""

Peter D. Dornier, Chief Executive Officer of Lindauer DORNIER GmbH
What are the implications for sustainable industrial production?

In future, we will undoubtedly be able to replace even more metals with plastics than ever before, or enhance the performance of metals or ceramics with textile reinforcement. If we want to become more mobile, but still be more lightweight, efficient and economical in terms of CO₂, composites with carbon, glass or aramid fibres will be the only way ahead. And thermoplastics like PA, PP and HT polyester will become very important – particularly regarding sheer quantity. For instance, the possible benefits of fibre-reinforced plastics in terms of safety are vast, and so far we have not even scratched the surface of the applications and implications of this for mass-produced motor vehicles. The age of metal in the aerospace industry is already on the decline, and in hindsight will be nothing more than an intermezzo, also because of the issues surrounding CO₂. Today, textile composite materials account for half the weight of modern aircraft, for the Airbus A350 it is over 50 percent, and for the Eurofighter 82 percent. However, in most cases unidirectional (UD) textiles are currently used.

What I mean to say is this: It is precisely woven materials for which demand will increase in industrial applications. A woven mass production part is digital, and can be manufactured with total reproducibility in a well-established production process. Just a quick glance at other textile technologies for comparison purposes: For weaving car airbags, that is to say in the field of safety-critical components, a single technician oversees 40 DORNIER weaving machines. In a large fabric facility operated by a car maker to produce structural components from carbon, these figures are practically reversed. This example shows what the weaving process has to offer in terms of globally distributable, industrial efficiency. The world’s leading airbag or tyre manufacturers already benefit from this every day, while large sections of the metal industry are still barely aware of what is coming. This just goes to show, textiles are making a comeback, but in an entirely different form, in aircraft, in cars, in wind turbines or even as the coating material on the boots of professional football players. Woven textiles, the standards and qualities of which can be reproduced almost identically anywhere in the world, are becoming more and more indispensable.
Sustainable Corporate Culture & Strategies

Technology and market leadership as consequences of a vivid sustainability strategy

For the Mönchengladbach-based Trützschler GmbH & Co. KG, sustainability is an integral part of its corporate strategy and culture. The firm employs a staff of about 3,000 and is ranked among the foremost textile machinery manufacturers in the world. In an interview, managing director Dr. Dirk Burger (CEO) attests to the success of his firm’s approach: A policy of sustainability has many consequences; technology and market leadership are only some of them.

Dr. Burger, Trützschler is a medium-size enterprise with a history as a family-owned company dating back 127 years. What does sustainable operations mean to you in the present?

For us, sustainable operations mean that giving equal consideration to customer benefits in our dealings with customers and to our responsibilities towards our employees, business partners and the environment is a fundamental tenet of our approach. As a result of this way of thinking and operating, Trützschler quickly earned its position as a technology and market leader in its areas of operation. The innovations we intend to present at the ITMA will bear this out.

Is the appreciation for an employee greater in a family-run medium-size company than in a large corporation with tens of thousands of workers?

Yes. Employees enjoy considerably more appreciation in a family-run company than in a large public company. The employees, the owners and the executive managers know each other personally, the company’s success has been achieved by joint efforts and is celebrated together—as we experienced on the occasion of our 125th anniversary.

Prudent action as was required during the crisis of 2008/2009 builds trust among the employees and leads to outstanding loyalty, commitment and long service with the organisation. It is no coincidence that our workforce includes people whose fathers and grandfathers worked for Trützschler, thus demonstrating a third generation of loyalty to the company. Each employee understands that our success depends on the longterm satisfaction of our customers, which means we don’t step out of the picture until any and all questions have been resolved, we support the customer throughout the service life of the system, and we develop machines that enable the customer to work profitably in the long term. Through our manufacturing facilities in China, India, the USA and Brazil, we have a physical presence close to our customers in the major textile markets and can still offer them localised products that still reflect the global Trützschler quality standard. And: Our good reputation as an employer helps us to continue recruiting employees with outstanding technical skills all over the world.
Are your customers aware of your endeavours with regard to sustainability and are these efforts recognised?

On the subject of sustainability, we make a distinction between resource optimisation and environmental protection. Regarding resource optimisation, we address matters such as lower energy consumption, optimised use of raw materials, low maintenance costs and investment protection with high service quality and long service life. All of these points combine to optimise „total cost of ownership” for the customer, which makes them extremely important selling points. Examples of Trützschler functions in this context include energy measuring devices that display energy consumption, and sensors for minimising waste in our machines. Nowadays, energy efficiency is a key topic of global concern, since energy costs are very relevant, even in the Asian markets. Customer awareness of this subject has become very much more sophisticated.

And we have been actively committed to environmental protection objectives for a long time. For example, our noise emission profile is significantly below all worldwide standards. We began addressing dust emissions very early. In this case, the requirements of the western world were raised to match the global Trützschler standard. This is now respected and duly recognised in Asia as well.

How do you assess development on the Chinese market?

In general, there is a marked trend in China towards sharply rising wages, growing scarcity of qualified personnel in the textile industry, a stronger currency and more stringent regulations governing environmental protection and occupational safety. As a consequence, Chinese customers are expressing strong interest in the use of high-tech machines with low operating costs (personnel, raw materials consumption and energy) for manufacturing textiles. This trend runs in our favour, and has led to a pronounced increase in our share of the Chinese market over the last five years. New, innovative technologies will undoubtedly help us to make further steps in this direction in future.

What do you associated with the VDMA’s BLUecoMPETENCE sustainability initiative?

We consider our participation in this initiative to be an obligation for the purpose of sustainable business activities in the widest possible sense. It means developing technologies and building products that have the lowest possible impact on the environment, are energy-efficient and economical in their use of resources. At the same time, all of our technical innovations are made with a view to improving the limit conditions on the manufacturer and user side — that is to say for our customers and our employees. That we have been successful in this is demonstrated in the increased productivity and lower energy consumption of our systems. To this extent, the BLUEcoMPETENCE initiative by the VDMA represents welcome support for Trützschler’s sustainability programme.

„We are literally fighting for each fiber, to ensure that the causes of added value and sustainability are advanced continuously."

Dr. Dirk Burger, Managing Director, Trützschler GmbH & Co. KG
What advantages do your own employees derive from a corporate self-image in which sustainability plays such a vital role?

Regarding production we have implemented process improvements at all our production sites. In Remscheid, the recently developed one-piece flow concept was used both for the new WINGS POY 1800 assembly line, and for the production of the change bars, which resulted in an increase of 15 percent in production capacity and ergonomic benefits for the assembly personnel. At the same time, energy consumption was reduced. We also use these experiences at our other sites in Germany and abroad, in China, India and the US. We are also very active with regard to health management. Age-appropriate workplace optimisation, redesigning break rooms and even ensuring healthy eating options are just some of the ways in which our employees benefit from the approach.

Multiple benefits based on sustainable culture of innovation

In the Oerlikon Manmade Fibers segment, sustainability stands as a fundamental principle in all dealings with customers and its own employees. Oerlikon is a German-based group with its headquarters in Remscheid. André Wissenberg, Vice President Marketing, Corporate Communications and Public Affairs, discusses the many aspects of developing future-oriented products and applications in the Oerlikon Manmade Fibers segment.

Mr Wissenberg, how important is the question of sustainability in the corporate culture of the Oerlikon Manmade Fibers segment?

Sustainability has always been a very important consideration in the Oerlikon Manmade Fibers segment. Not only the development of new products and customer solutions, but also the production, manufacture, assembly, sales and service activities of all our 2,500 employees worldwide are informed by the requirement to protect and deal responsibly with resources and colleagues. For precisely this purpose, for example, we launched our „e-save“ programme in 2004, which has since been expanded systematically with further initiatives in the „Health, Safety and Environment“ sphere.
Are your customers happy to pay for sustainable technologies and improved energy efficiency?

Yes, because our solutions increase our customers’ competitiveness and enable a faster return on investment than with other solutions, some of which are supposedly less expensive at first glance. In the medium to long term, therefore, customers who use our technology solutions are substantially more successful, with regard to both profitability and quality.

Is it possible to quantify the magnitude of the energy savings that are realised in textile production by using the latest machines from your segment?

The contribution of our product solutions to sustainable, economical production is substantial, particularly for chemical fibre spinning. Here are two examples for you: Our latest WINGS technology (Winder Integrated Godet Solution) reduced average energy consumption by 40 percent per ton of the POY yarn type (Pre-oriented Yarn). For the FDY yarn type (Fully-drawn Yarn), this reduction is as high as 55 percent compared with the systems produced in the mid-90s. As you can see, our most recent solutions are exceptionally energy efficient.

How are you able to minimise the negative influences of industrial production?

Industrial production inevitably affects the environment. By systematically minimising these effects, we acknowledge our responsibility to ensure a liveable future. Our German sites, in Remscheid, Neumünster and Chemnitz, are all certified to DIN ISO 50000-1. We have imposed strict energy management regulations, which must ensure that energy consumption is reduced by 1.5 percent per year. The recovery of drilled oils from machined metal by centrifuging or reconditioning lubricants, waste recycling and energy recovery with heat exchangers are other examples of how we handle resources for sustainable results.

Are there consequences for the textile manufacturing?

These aspects are just as important to us on the customer side. The manufacture of textile products and the components, machines and systems used for this are traditionally associated with many unfortunate environmental consequences. By applying the latest in scientific and technical expertise, we help to reduce these negative effects to a minimum. Some of the ways our products do this include using all raw materials involved in the production process as efficiently and effectively as possible, significantly reducing emissions, optimising energy footprints, and in some cases considerably reducing space requirements.

What persuaded the Oerlikon Manmade Fibers Segment to join the VDMA’s BLUecoMPETENCE sustainability initiative?

As a pioneer in matters of sustainability in our industry, it seemed quite logical to combine the message of our „e-save“ programme with the wider BLUecoMPETENCE campaign launched by the VDMA in 2011. This yields synergies for both sides, and we are able to market the VDMA initiative globally at the same time and thus also provide strength to our German location.

„The products and technologies we develop create the conditions in which our customers can ensure their sustained success in the market.“

André Wissenberg, Vice President Marketing, Corporate Communications and Public Affairs
Resource and Energy Saving

Assistance systems for plant operators: 30 percent more output

A company that specialises in manufacturing machines for finishing textile and film webs, BRÜCKNER Trockentechnik GmbH & Co. KG intends to introduce assistance systems for plant operators onto the market. BRÜCKNER expects the tools to unlock energy savings and free up 30 percent of the reserve capacity in German-manufactured systems. In some cases, retrofits are also possible. Axel Pieper, Technical Director of the company, talks about the potential.

In order to optimise energy consumptions, you are „dabbling“ with influencing factors that are not necessarily of primary concern for most manufacturers ...

Exactly – and that is the human factor, or more precisely, the machine operators. With regard to the productivity of machinery systems, there are three influencing factors, all of them more or less equally important: the efficiency of the machine, servicing and cleaning the machines, and the process expertise of the machine operators. Most manufacturers, including us, have already optimised the first two, but the human factor is still very often disregarded. „If the operating personnel do not have adequate understanding of the process, it’s like driving a Ferrari only in second gear.“ It follows that the machine operators must be given the tools that enable them to drive the machinery properly, and to maintain it.

Where do you start this process for dry finishing?

Brand new and the prototype is ready for ITMA: We provide the operators with intuitive assistant systems, optionally in the form of an actual tool, which is supported by the databases that hold the sum of our own process knowledge. Then, the machine operator only has to enter the key information for the goods, such as weave type (e.g., wovens), fibre mixture (e.g., 100 percent polyester), weight of goods (e.g., 150 g/m²), then the moisture content at start (e.g., 60 percent) and the process (e.g., setting wet fabrics). With the new simulation tool, in the next step the entire cycle can be simulated. When it is finished, the system offers works out as series of suggested measures according to two optimisation criteria: large volumes in the shortest possible time or energy-optimised production.

That’s the theory, how does the software work in practice then?

The optimum profile can be calculated either on an office PC by the job preparation department, or right at the machine by the operator himself. Alternatively, existing profiles can also be checked by the assistance system with regard to the criteria of maximum productivity and/or minimum energy consumption. In this case, the machine will be „run as it always has been“ and the operator simply enters the fabric data (see above) in the machine controller. The assistant system works in the background and shows the operator where there is potential for further optimisation in a traffic light format. In practice, this could be, for example: „Run the dryer faster, because otherwise you are drying too much“, or „Reduce the fan power in the heat setting zones“, and so on. In a large-scale process, this has the potential to substantially increase productivity and/or save energy. But all of that taken together is only really half of the possibilities.
If the operating personnel do not have adequate understanding of the process, it’s like driving a Ferrari only in second gear."

Axel Pieper, CEO BRÜCKNER Trockentechnik GmbH & Co. KG

... and the other half?

Comes from the internal comparison between system operators or entire shifts, and whether the textile finishing according to the productivity guidelines was really carried out in line with optimum energy criteria at all times as well. For example, was the night shift as productive and economical with resources as the day shift? In the next step on the road to 360 degree energy management, the maintenance condition of the machines can be monitored with special sensors. Then it would be possible to document the first signs of dirt accumulation or wear over the timeline as well as the time until the next scheduled cleaning or part replacement. So the customer can prove that he always kept the machine well maintained, and consequently production was as energy efficient as possible.

An existential energy question: What effects would these assistance systems have?

In dry finishing with our equipment, the effects could be huge. Because when we consider our systems – of which there are now over 5,000 in service all over the world – it is highly likely that many of them are only being run at half of their technically possible capacities. The reasons for this are to be found in maintenance and operator expertise. Looked at another way: When a customer wants to find ways to double his production capacity, he does not necessarily have to invest in a new machine to do it. Our new assistance systems have proven capable of getting about 30 percent more output from existing machinery. It is planned to offer this tool as a retrofit as well, depending on the machine generation.
Please explain the advantages of this economising approach with an example ...

... woven fabrics. For these products, padding is the traditional method for the finishing. In padding, the textile to be treated is transported through a liquid or auxiliary bath as a web. As a result, it is much more than just the essential quantity of liquid applied, but it also penetrates practically the entire textile, so it has to be squeezed out afterwards using nip rollers and then dried to remove the excess liquid. As an illustration: Before coating, the absolute moisture content of a conventional textile is in the order of 8-10 percent; this means that 1 kg of material contains 80-100 grams of water. After padding, the moisture content in the material is about 60-70 percent. Drying processes that consume a great deal of energy have to be applied to lower the moisture content to a normal level again. On the other hand, with the Weko liquid application system the woven fabrics only have an absolute moisture content of about 20-30 percent after coating, and much less energy is needed to reduce this to the required 8-10 percent – this corresponds to about 40 percent less drying power than is needed in the padding process.

Sustainability due to minimal application

In the southwestern corner of Germany, in Baden-Württemberg, stands in a region known affectionately by locals as the „Ländle“ – „the little country“ – Weitmann & Konrad (Weko), the inventor of a non-contact rotor system for precise, metered application of liquids and chemicals to fabrics. In an interview, Weko Product Manager Thomas Laißle explains why global players in the paper, textile, tissue and foil industries have come to rely on the liquid application system of the owner-managed company with a workforce of 140, and why it helps them to save enormous quantities of water, energy and chemicals.

The non-contact rotor system for coating surfaces can be integrated in existing systems. How does that work?

Surface coating is part of the standard procedure in the paper, textile, printing or foil industries, for example. It is a way to endow the base material, produced in webs, with certain functional properties that are not intrinsic to the base material alone, such as flame retardant properties, softness, antimicrobial/antibacterial, hydrophilic/hydrophobic or oleophilic/oleophobic additives. With our rotor, which works like a rapidly rotating disc, the corresponding liquids can be applied without contact and continuously according to a precise quantity specification. Unlike the conventional technology, the contactless application means that the surface to be coated is not subjected to any mechanical load. In addition, the distribution of the liquid is improved considerably, because it is applied as a homogeneous stream of fine micro droplets.

„We think of ourselves as following the Baden-Württemberg tradition of ‘tinkerers and thinkers’, paying particular attention to the theme of ‘sustainability’, under which we actively advance the optimisation and further development of our systems.“

Dipl.-Ing (FH) Thomas Laißle, Product Manager at Weko
That sounds as if a great deal was invested in research and development beforehand?

Certainly. Weko is based in Baden-Württemberg, known as the state that of tinkerers and thinkers. Of our 140 employees, about 30 are engaged full-time in R&D processes. One of their main concerns is always to optimise the flow and control equipment, and also electronic and software development. The more intensively we work on these questions, the more our systems contribute to sustainability, because they are continuously improving the precision, metered application and energy economy involved in applying the chemicals, so that only the quantities really needed to provide the required function are used. As recently as 2015, a well-known Indonesian knitwear manufacturer decided to install our metered dispensing systems for quality reasons, in order to lower chemical consumption sustainably, by reducing chemical waste and improving the metered dispensing of the chemicals.

With our approach, only the quantity of liquid that is actually needed is applied onto the surface. This reduces the consumption not only of electricity, oil or gas – depending on the method used – because the drying process is less extensive, but also of chemicals and water, depending on the coating requirement. Incidentally, with metered, non-contact application, hardly any chemical residue is left over. And finally, a great deal of time is lost when the materials have to undergo extensive drying processes. As a result, the manufacturing process is made unnecessarily slower, and more expensive.
Coated spacesuits for Chinese astronauts

The nature and number of the technological challenges which manufacturers of stenter frames for textile finishing are expected to meet are growing constantly. The Mönchengladbach-based company A. Monforts Textilmaschinen GmbH & Co. KG, a member of the Fong’s Industries Group (Hong Kong) since 2013, intends to print the way forward at the ITMA. Senior Manager Klaus A. Heinrichs answered our questions:

Of-the-peg technology will and must continue to exist, but special requirements are becoming noticeably more prevalent ...

... absolutely. This applies not only for a constant stream of new coating „recipes“ for clothing, but also for the high standards expected of the equipment for technical textiles. Two examples: The largest manufacturer of denim (jeans fabrics) in the world, a Turkish company, has bought five extremely complex special systems from us. And a Chinese firm that supplies the high-tech shells for the spacesuits worn by Chinese astronauts, uses our machines to coat the materials.

What can we expect at the ITMA, the global showcase for textile machinery, from leading manufacturers of stenter frames and loop dryers?

Monforts will present several new solutions for coating technical textiles. Since air pollution control is a very important issue in many Asian countries, for example, Monforts will be exhibiting modular equipment for cleaning exhaust air and preventing odour emissions from textile machinery. And since Monforts has very extensive expertise in the field of denim equipment, in Milan we are also going to unveil a combination system for stretching and drying fabrics of this kind.

Let us have a closer look on the energy-intensive drying of denim ...

The denim industry for jeans material in particular recognised the potential of this, and has already invested in the technology. We are capable of saving up to 60 percent of the heating energy in the drying process during single- or doublesided coating of textiles. The most important point for the success of this device is that the initial moisture must be reduced before drying. Logically, if the goods contain less moisture, less heat energy is required to evaporate the water. This is where the sustainability concept is implemented. This unit applies a minimum quantity of liquor to the product. The substrate is not immersed in a liquid as is usually the case. Instead, the finishing liquid is deposited in just one thin, resource-conserving layer by steel rollers. In this way, the required application quantity can be calculated precisely beforehand, so less liquor residues are left and the waste water total is improved.
You employ a number of engineers to watch over the equipment worldwide as part of a teleservice arrangement. What benefits does this bring?

For the customer it is a direct monetary benefit if it means that machines are installed and run sooner, and – in the event of breakdowns during production – downtimes are minimised. The consequences of a stenter frame system malfunctioning in coating are considerably more serious than if one of 60 looms is out of service. For this reason, up to four experts in Mönchengladbach are in contact with our customers all over the world from 7 o’clock in the morning until 7 o’clock in the evening. And when our workday is over, a Monforts employee in Asia takes over the shift.

What else do customers expect from remote service?

preventative maintenance, and we can also tell if the drive units are overloaded or if malfunctions have occurred, for example. We then make the system operator aware of the fault via webcam. In terms of teleservice depth, we have, shall we say, the edge over our competitors. We can also download software updates to a given system via the teleservice facility. This means that in most cases the customer service technician is spared a trip to the site, which is tedious and expensive for the customer. Wearing and spare parts for the given system as stored in the teleservice software and the customer can identify them easily and order them simply and securely.

What is the innovation behind it?

It is based on intelligent automation and a completely new design on the market. Our unit is an integral component of the stenter frame. The remarkable thing about it is its two-part construction with a permanently installed lower section and a modular upper section, which can be replaced very quickly according to the intended application. Another bonus for effectiveness comes from the fact that the time-consuming cleaning of modules can be performed outside of the stenter frame.

The operational advantages are impressive, but does the customer not perhaps have to change his customary ordering methods?

Previously, the user had to decide on a quite specific coating system when making the investment decision. Application Y could be bought for price X. But that is history now. With our solution, he only needs to decide on a stenter frame, and with this he buys the option to choose from the modules that are required in each case. Moreover, the system is constantly being developed further. Subsequent upgrading with special modules can be arranged without difficulty.

“With the outstanding teleservice facility our customers are saving in most of the cases time and money for expensive traveling of technicians.”
Klaus A. Heinrichs, Vice President Monforts Textilmaschinen GmbH & Co. KG
**Combining cost cutting with environmental protection**

With the caustic recovery plants produced by Körting Hannover AG, textile manufacturers can lower the quantity of caustic soda used in mercerising by impressive 85 percent. In this way, the plants do not only decrease operating costs substantially, but they also reduce environmental pollution at the same time. The senior sales engineer Karl Hesse is responsible for the caustic recovery plants at Körting. In an interview, he explains how his company meets the changing demands of textile manufacturers for sustainable production.

**You are talking about closed circuits for lye and water, what does that mean?**

Our system cleans the recovered lye, so that it can be reused in the process without any loss of quality. When it is used together with another Körting product, the swirl droplet separator, the resulting vapour condensate is of excellent quality. Due to its low pH value, it can be used in other processes, e.g. for washing in the mercerisation machine and for bleaching. This means that we offer a closed circuit for lye and water, called „zero drain“. Körting is highly diversified in these fields, so the customer can also benefit from our experience in exhaust gas treatment.

**How do you support textile companies that are beginning to pay attention to sustainability in their production process without increasing the operating costs?**

Especially the caustic recovery plants help Körting not only to make production processes in the textile industry more sustainable, but also to decrease the operating costs significantly. The caustic recovery plants complement the existing production machines, the mercerising machines. Their only purpose is to recover the caustic soda used for mercerising at the end of the process. This recovered lye can then be returned to the process and no costly disposal is necessary, which helps to reduce environmental impact significantly. In addition, as these plants use the hot water generated by the process itself, they are extremely energy-efficient.

**Feedback from the customer is highly appreciated, and continuously improves our processes with regard to operational availability of the plant, user friendliness and many other criteria.**

Karl Hesse, Senior sales engineer, Körting Hannover AG
Is it possible to estimate the financial savings due to caustic soda recovery?

Since we offer customised solutions, we are able to point out the financial savings at an early stage of the process. The most important factor is to reduce the plant operator’s lye consumption by 85 percent. As a consequence, hardly any waste water is generated any more, which reduces operating costs substantially. At all events, payback time is less than a year. After that, the operating costs for mercerisation remain permanently low. Annual savings of one million euros are realistic. The larger the plant the greater the saving potential.

Do you appreciate the VDMA sustainability campaign BLUECOMPETENCE?

The additional costs of developing and manufacturing this kind of technology are much higher in Germany than abroad. So, we always take into account the „total cost of ownership“ in order to explain the fact that investment, operating and disposal costs must always be seen in an overall context. For example, our customers in India are always aware of the high quality of our plants. Therefore, they are willing to invest more money in engineering “Made in Germany”. With the BLUECOMPETENCE campaign, the VDMA supports German machine manufacturers in their efforts to convince their customers of this principle.
Can you give a few examples?

For example, at the ITMA we will present new modules in our expanded warp knitting range. When they are used together with a Groz-Beckert knitting machine needle, perfectly coordinated tools are guaranteed. This in turn means that processes run smoothly in every sense, and are not interrupted by errors, thus ensuring maximum productivity while conserving resources. Another example is the service concept Sewing5, which encompasses the sectors Supply, Solutions, Service, Superiority and Sustainability. As a partner, Groz-Beckert assists its customers throughout the entire sewing process. In this way, we create the best possible conditions, not only for making the right product choice, but also for perfect needle handling, and thus also profitable production. Another example is the EcoStar needle used to make nonwovens. When used, it reduces energy consumption by as much as 7 percent, and it has a considerably longer service life.

Needles lower end user CO₂ emissions

One of the largest textile machinery equipment suppliers in the world, Groz-Beckert has demonstrated with new needles for circular knitting machines that product innovations are not driven solely by financial considerations. A latest innovation weighs just 0.6 gram and is capable of lowering the end user’s CO₂ emissions significantly. Eric Schöller, a member of the management board explains the reasons for the family-owned company with 7,700 employees worldwide to pay equal attention to efficiency and sustainability in all its new developments and research into such future technologies as textile-reinforced concrete.

“Sustainability meets profit“ how do you support this concept?

At Groz-Beckert, the guiding principle of sustainability is formed by acceptance of our ecological, economic and social accountability as well as profitable growth. For this reason, we are also committed participants in the VDMA’s BLueCOmpETENCE sustainability initiative, which has become a powerful network of 400 partners in a concerted effort to make sustainable products with sustainable production. Accordingly, topics like process capacity utilisation, resource conservation and energy reduction determine our products and innovations.

If all the circular knitting machines in the world were equipped with these significantly lighter Litespeed needles, carbon dioxide emissions could be reduced by 475,000 tons year after year.

Eric Schöller, Managing Director, Groz-Beckert KG
Sustainability as sales argument.
What orders of magnitude are we talking about?

When „Litespeed Plus“ needles are used, it has proven possible to lower the machine temperature and energy consumption by up to 20 percent. With a single needle set consisting of 3,000 needles, knitting mills in China have recorded a CO₂ reduction of 1.4 tons per year, in India this figure was found to be over 2.4 tons. For the sake of comparison: In order to create an equivalent quantity of nitrogen emissions, you would have to fly 3,800 or 6,400 kilometres respectively.

Does Groz-Beckert also work with textile research institutes?

Cooperations with textile research institutes offer the chance to jointly develop discoveries that have been made in basic research – Groz-Beckert most certainly takes advantage of these chances. We have good, long-standing relationships with a number of textile research institutes, including for example the ITV in Denkendorf, the ITM in Dresden or the ITA in Aachen. The nature of these scientific cooperations is also highly diversified. For example, the ITA in Aachen was our research partner in developing a textile-reinforced concrete bridge. The bridge has stood in Albstadt since 2010 and is still the longest of its kind in the world.
With energy savings and after sales heading towards sustainability

Faster than formula 1: During cabling – a mechanical yarn upgrading process in carpet making – the strand in the „CarpetCabler“, manufactured by Saurer Volkmann in Krefeld, reaches top speeds of up to 420 km/h (261 mph). With a few innovative tweaks to the machine, the Saurer Group, with seven locations in Germany, is making a significant contribution in the effort to reduce energy consumption and therewith also the CO₂ emissions associated with industrial carpet making. Why do their solutions consume up to 40 percent less energy and how are Saurer customers always kept up-to-date? Answers are supplied by Dr. Martin Folini, CEO of both the Saurer Group and its largest business unit, Schlafhorst Zinser – leading in the production of roving frames, ring and rotor spinning and winding machines.

Manufacturing carpet yarn is very energy-intensive. When winding, one strand is wound around the inner strand at very high speed. The innovation starts here.

Our engineers have succeeded reducing the rotating mass of the spindle significantly by decreasing its dimensions. At the same time, with the aid of laser measurements they have streamlined the yarn balloon in a controlled manner. By harmonising the spindle diameter and the balloon geometry, energy consumption compared with conventional technology is reduced by as much as 40 percent. Special drives and bearings are also needed to deal with the high speeds involved. These are practically frictionless and operate extremely quietly.

What is the significance of the balloon geometry in this?

When a strand is wound around something very fast, it is subject to centrifugal force. It is like skipping with a rope: As the rope turns, it forms an arc that simulates the contour of a balloon. So the faster the strand turns, the harder it pushes outwards – like the skipping rope. This tends to increase its aerodynamic drag. So we need more force to drive the spindle and to control this balloon. If we can keep the balloon relatively small, the aerodynamic drag is also not so powerful and our energy requirement is reduced correspondingly. After all, it takes much more force to turn a 20 metre long skipping rope than a very short one.

Can these energy savings be quantified?

The energy savings can be measured very precisely. Consequently, the investor has a reliable tool that he can use to compare old generation machines with the new generation. The benefit to the buyer is twofold. Certainly, he can count on using much less energy to make the yarn, but one must also consider that most textile manufacturing machines are air conditioned. If less energy is consumed, less waste heat is generated, so the operator saves energy here too, because the system does not have to be cooled as intensively to maintain its operating temperature.

After sales is an important sustainability tool for Saurer. You offer your customers a lifecycle partnership ...

... because we want our customers to remain competitive, we offer them a lifecycle guarantee on their machines, which also covers innovation growth. They have access to the latest technologies developed by us in their respective field. If possible, these are then retrofitted in the existing system so that it reflects the most up-to-date state of the art, which can also prolong its service life by several years. This enables the customer’s existing machine park to be updated inexpensively and without long production downtimes. You might be interested to know, the oldest machine Saurer looks after in this way has been in production for more than 40 years.
Please give us an example of the innovation growth you mentioned.

One example is the improved aerodynamics of a fan wheel, which is even more economical in terms of energy. The operator does not just receive a duplicate of the old component. We send a replacement fan wheel incorporating the new geometry that is compatible with the existing equipment. So the operator knows that his machine always reflects the latest state of our technical development.

What is the essence of the guiding principles behind the E³ logo?

These are the guiding principles that inform the design of every Saurer product and ensure that it will meet the challenges of the future. Energy is a huge topic, which will only loom larger in future. Every new machine we bring onto the market has a smaller specific energy footprint than its predecessor. This means that we are constantly reducing the amount of energy required to produce each kilogramme of yarn. Secondly, Economics represents increased productivity of the manufacturing process, which is the most important consideration in the customer’s purchasing decisions. And finally, Ergonomics: in our customers’ factories, employees with a high level of education tend to be in the minority. But even those with less advanced academic qualifications must be able to continue working effectively in the face of the progressing of electronic features in the machines. The great art of ergonomics consists in configuring the human-machine interface such that the equipment can be managed safely and without difficulty by workers on the factory floor. This includes self-explanatory menu structures, largely centralised control and monitoring so the machine does not have to be configured and adjusted at a large number of different points. In short: E³ represents our ongoing efforts to reduce consumption in the yarn production processes still further, make them more economical and improve the ergonomic environment for the operator.

Schlafhorst is also a partner in the BLUECOMPETENCE initiative and thus actively involved in the VDMA sustainability initiative.

Dr.-Ing. Jürgen Meyer, General Manager of our Schlafhorst Winding Business Unit, has been a committed supporter of BLUECOMPETENCE since its inception, working to incorporate sustainable textile production as a general principle in the German textile machine building industry and so increase its effectiveness.

BLUECOMPETENCE is the international brand name for sustainable solutions in machine and plant building, and it identifies those companies that align their development and production efforts with this criterion. Nowadays, users expect nothing less than productivity enhancing machines with automation options tailored to their specific needs, as well as optimised energy consumption while also satisfying the highest ergonomic standards.

„Our innovations are designed to continue reducing consumption in energy-intensive yarn production processes, make them more economical and further improve the ergonomics of machine operation in the future as well.”

Dr. Martin Folini, CEO of the Saurer Group and Schlafhorst Zinser Business Unit
New circular knitting machine: knitting and spinning all in one

Circular knitting machines that spin as well: A new technical approach by Mayer & Cie. makes it possible. The knitting machines still need prefabricated yarn to do their work – the end product from the spinning plant. But with Spinit Systems, the new generation of machines from the SME in Albstadt only require the intermediate yarn stage, so an entire process step can be omitted. In an interview, Benjamin Mayer, managing director of the world market leader from the Swabian Jura explains how voluntary commitment to sustainability affects not just the products, but the company itself.

Mr. Mayer, the ITMA solution sounds like a rallying cry: „Master the Art of Sustainable Innovation.“ Your company chose the road to sustainability long ago. How far along this path have you come?

Two years ago, Mayer & Cie. GmbH & Co. KG launched a comprehensive energy management project, which is planned to last a total of four years. We intend to completely modernise our infrastructure, parts of it are rather outdated. The most important objective is to save energy. Our goal is to consume significantly fewer resources, meaning power above all, for each machine we make.

The topic of sustainability not only affects your internal operating infrastructure, but also your products, of course. You are shortly going to launch a new generation of circular knitting machines fitted with your proprietary Spinit technology.

Spinit is a neologism created by combining two English words, spin and knit. The innovative feature of this method consists of integrating a part of the spinning process in the machine, before or during the knitting process. The normal sequence of events is that finished yarn runs into the circular knitting machine and is processed there. But Spinit starts working with the semi-finished, „flyer“ yarn, the yarn that has just left the prespinning machine, which is called the flyer.

In order to turn the semi-treated yarn into finished yarn, it needs to pass through ring spinning machines, for example, which take up space and use a lot of energy.

Not any more with Spinit. The semi-treated yarn is 3 to 5 mm thick, and now it passes straight into the circular knitting machine, where it is spun and then knitted. The entire machine park involved in this process is then no longer part of the plan. A company that carries out the entire manufacturing chain from treating the cotton to the knitted product needs up to 40 percent less space to do the same job. That is the really huge advantage of this technology.

„Sustainability is becoming more important on the market. Even in countries where you would not expect it. I can think of Bangladesh as just one example, we receive enquiries about sustainable products from there.“

Benjamin Mayer, Managing Director, Mayer & Cie.
But you don’t just save an enormous amount of space.

It goes without saying, investments in machinery are cut dramatically. But at Mayer & Cie. we have also made some deliberate calculations: What does a kilogram of fabric cost normally, and what does it cost with Spinit technology? With Spinit, we can save as much as 25 percent. For example, depending on the energy and labour costs in a given country, one kilo of knitted fabric can be up to a quarter less expensive than the same item made conventionally.

How important is the „sustainable“ label for customers who decide to use your machines?

A great deal has changed in this respect over the last five years. I can think of Bangladesh as just one example, we receive enquiries about sustainable products from there. All over the world, the number of customers who are interested in durability and sustainable consumption is growing. Besides investing in the energy management project, we are also extremely committed to improving the performance of our products. Every machine type that we are going to exhibit at the ITMA is 10 to 25 percent more powerful. This means that they produce significantly more for similar energy consumption.

Mayer & Cie. is a member of the BLUECOMPETENCE VDMA Initiative, and „takes responsibility for meeting durable sustainability criteria and standards“. What does that mean?

Many countries are tightening their environmental regulations. As a German machine builder, we want to set a good example and lead the movement. For example, our manufacturing operation in Shanghai is moving into a new assembly hall. The requirements we have to satisfy there are stringent to say the least ... Even the Chinese are taking a giant step in the direction of environmental protection and are no longer that different from the conditions in Germany. But of course, this will not happen overnight, after all, even we in Germany have taken decades to get to where we are.
Right-first-time with task compression

Integrated robotics replaces the simplest manual labour – high-tech equipment like the ultra-efficient iCone yarn dyeing machine from Thies can reduce the human error rate in dyeing plants dramatically. In many of these factories, the dye is still brought to the preparation vessel in buckets by the operators – to ensure that the correct mixture is supplied for dyeing the next batch. While this is still standard practice in many factories in Asia, for example, in state-of-the-art machine parks, the work is done by robots. Thies GmbH is a market leader in this segment – and systematically continues to compress tasks in all production workflows as well as in the finished products. Marketing expert and Joint Director of Sales Jürgen Brockmann explains how function integration works at Thies GmbH. The company has manufactured bleaching and drying equipment as well as yarn and fabric dyeing machines from its headquarters in Coesfeld for 123 years.

How does function integration work?

It is no secret that yarn dyeing is an extremely complex process, and a great deal of work goes into ultimately achieving a world-class right-first-time rate with regard to the finished goods. A certain degree of automation is essential for this, which means we must eliminate the „human factor“ from the operating procedures and automate system in such a way that the process can be carried out without hitches. To do this, we have to address the entire dye weighing and dye delivery systems – processes which, in most dyeing plants in the world, are still carried out by hand. And as a result of our technology, the number of factories where these process steps are automated is growing.

What exactly are the error sources that automation is intended to eliminate in this context?

Wherever people work, mistakes are made: dyes are not added in the ordered quantity, or they are not at the right temperature. Sometimes they are not even delivered to the dyeing machine when they are needed. The dye delivery system itself also represents a possible source of errors, making it difficult to achieve perfect dyeing results. We try to remove this from the equation by automating everything from weighing to delivery.

How does that work specifically?

The dye silos receive a signal from the control system, which might order, for example: Dispense 30 grams each of red, yellow and blue dyes! Upon receiving this signal, the dyes are automatically weighed, dispensed into a container and transported to a dye dissolving station. Here, the dye is brought to the required temperature and then runs into the dyeing machine at the correct time. Before dyeing, the product undergoes the bleaching process. The same thing happens here with the chemicals. For bleaching too, the chemicals must be delivered to the system by a pump in exactly the right quantities, at exactly the right temperature and at exactly the right time. The same applies for solids such as salts and hydrosulfite for vat dyeing, for example. This method is capable of achieving very high levels of colour authenticity. And the procedure for ensuring that the liquor is introduced into the dyeing machine in the best possible condition is similar.
Is function integration a viable solution for your customers in low-wage countries?

There are some customers who buy our entire programme, and others are only interested in parts of it. For many dyeing operations in Bangladesh, for example, it is not worth buying a robot bobbin loading system because the wage level there is so low. But it is very well worth their while to automate the delivery of dyes, chemicals and solids. This raises the quality of the product, and they can offer their customers a better result.

What trends do you see in the future?

Until about ten years ago, the major subject of discussion in the textile industry was labour costs. Nowadays, labour costs have yielded the spotlight almost everywhere to the topic of energy. In particular, economising on water and power, and generally improving process times. If processes and cycles are shortened, energy consumption is also reduced.

Jürgen Brockmann, Director, Thies GmbH

With the new machinery line, it is not only the actual dyeing that is carried out by robots?

That is correct. They also take care of all upstream and downstream process steps. A robot system picks up the bobbins with the yarn, individually or in batches, and loads them onto a self-propelled bobbin carrier for transporting to the dyeing machine or the dryer. This means that the lids on the dyeing machine and dryer must open and close automatically at the right time as well. Unloading of the bobbin carrier after drying is also automated. Humans have a monitoring role in this system and working conditions are less dangerous.

Does this high degree of automation create competitive advantages for the customers?

Absolutely. With automation, the result of the dyeing process is unmistakeably better, of very high quality. Subsequent additions to correct the result are significantly reduced. Making repairs after the run is very expensive for dyeing companies, and it seriously impacts the already very tight profit margins.
Step by step to success through integration of functions

With modular platforms and flexible machinery concepts, Dienes Apparatebau GmbH in Mühlheim am Main supports research facilities in the development of innovative filaments. As Managing Partner Steffen Müller-Probandt explains in an interview, the MultiMode systems in particular are well adapted to enable intelligent networking of the production steps for product development. In this way, Dienes ensures that it continues to meet the ever increasing demands for efficiency and productivity in textile machinery construction.

How is your company helping to advance the cause of sustainability in the industry?

The trend towards manufacturing technical textiles as the primary focus of textile manufacturers in Europe has been gaining momentum steadily. Against this background, much effort is being devoted to perfecting processing technologies. In this respect, the main objective is to be able to carry out complex manufacturing processes as efficiently as possible. Of course, one of the principle points of the textile machinery industry thereby is the reduction of energy consumption by the machinery.

What does function integration mean to you as a provider of machines and components for manufacturing synthetic fibres?

The trend toward function integration is an important issue for us on two levels. Firstly, Dienes has set itself the task of creating a modular pilot line in order to help research institutions in fibre technology in their efforts to develop new, innovative filaments. To this end, we ourselves have developed intelligent production modules that can be combined in a modular arrangement, so the pilot line can be adapted to any new discoveries that are made during the development phase. Secondly, as the world of machine building becomes increasingly globalised, there is a constant requirement to increase efficiency and productivity levels. This is why integrated solutions with continuously improving efficiency are in such great demand.

What benefit can the user of your MultiMode systems gain from function integration?

Function integration stands for the intelligent networking of production steps for product development. We thus use the term function to refer to the manufacture of synthetic yarn as a process. One of the main objectives of Dienes is to enable research institutions that are in the business of developing new, innovative filaments to reach a position in which they are equipped to carry out experimental work that is efficient, systematic, and to some degree self-optimising. In general, every module in a MultiMode system can be operated independently and alone. All individual modules can be configured to create a system by the user via the master functionality. The system may be viewed as an intelligent, modular platform.

„Function integration stands for the intelligent networking of production steps for product development.“

Steffen Müller-Probandt, Managing Partner, Dienes Apparatebau GmbH
Where do you see the greatest potential for function integration in textile machinery manufacturing in the next few years?

End-to-end system concepts are needed here. As is also revealed clearly in the large-scale „Industry 4.0” project, the trend towards intelligent networking of production process data is becoming more and more clear. This means that more and more powerful machine controllers are also needed. On the other hand, of course, it is equally essential to be able to distil the important information from this welter of data, in order to generate real added value. This is why targeted function integration is becoming more important.

Does the energy efficiency of your systems figure in the considerations of your customers?

Yes, this subject is becoming more and more significant in our field of activities as well. At the moment, we are developing an energy management system (EMS) that can analyse and control a company’s energy consumption from a central location. It captures not only all electrical consumers, but also the consumption rates for other media, such as gas, water, etc. An incidentally, the EMS itself can be integrated in the MultiMode systems.
**Heavy bobbins move as if by magic**

Since a while now, 169,728 spindles have been doing their duty under one roof at the largest ring spinning plant in the world. The Welspun manufacturing facility in Anjar, India is an enterprise of superlatives, and the Neuenhauser Group has been instrumental in its development: 55 kilometres of track with 944 switches were installed just to transport the roving bobbins. 872 bobbin trolley trains travel on the tracks, guided and monitored by more than 1,000 sensors. Over 15 kilometres of cable and 2 kilometres of optical waveguides have been installed so that the enormous plant can be controlled through a single command centre. The site offers a tantalising glimpse of how Project Industry 4.0 – the fusion of information technology and machine building – will affect industrial production in the future. Wilhelm Langius, Head of Textile Industry Automation, explains why automation is the only possible way of the future.

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Please would you outline briefly the path transport automation in spinning mills took to reach its present state.

As automation became increasingly widespread in natural and chemical fibre spinning mills, it gave rise to an enormous leap in productivity. It was then a logical progression to build apparatuses and systems that used technology to enable them to handle the heavy, delicate bobbins for natural, chemical and carbon fibres. Accordingly, Neuenhauser developed the world’s first fully automated handling system as early as 1985. It was designed with a device for removing the bobbins from production machines that is now well known in the textile industry, called the „lifter-doffer“. But this was just the first step on the road to full automation. Over time, our group of companies developed other automated handling systems for the textile industry, including not only devices for removing BCF bobbins from the spinning or winding machines, but also for overhead transport, intermediate storage and automatic packaging of the bobbins. So we now support and monitor the entire manufacturing operation, all the way up to loading and shipping.

Why was automation inevitable? Surely, customer countries such as China or India do not lack manpower?

Corporations like Welspun build gigantic production facilities, whose very manufacturing capacity on a daily basis poses problems: In terms of product quality as well as the greater need for human resources. This is further complicated by high turnover in personnel. Over the years, Neuenhauser has developed many automation projects for customers such as these, which have enabled them to prevail in a highly competitive environment.

„The economy will only become 4.0 and digitised in a series of many small steps. Because as internet technologies are also introduced, the data will have to leave the factory. On this point, highest priority must be given to security. The networked products, machinery and systems will be able to interact with each other directly, and will render production considerably more efficient and more flexible."

Wilhelm Langius, Division Head, Neuenhauser Maschinenbau GmbH
What advantages does the automation powered by Neuenhauser also offer with regard to Industry 4.0?

In our vision, automation has a far more complex role than is generally thought. Its purpose is not just to lower payroll costs, although this is also a decision making criterion as well. In fact, our chief consideration in this undertaking is to reduce the need for manual handling of bobbins and the problems arising therefrom to the barest minimum. In this way, we help our users to improve the quality of their products. But automated handling systems also provide them with other advantages, such as a safe, high-performance product flow through the entire plant configuration, or better use of factory space through compact machines and systems. They also help to maintain a clean, tidy and efficient manufacturing environment and a safe, ergonomically less burdensome workflow. Neuenhauser is already considering Industry 4.0 for its future developments. But we have only just started. I believe that the economy will only become fully digitised in a series of many, many small steps.

So with Industry 4.0 we can expect nothing less than a fourth industrial revolution.

Digitisation of our plant equipment is already very advanced; workflow is completely computer-controlled. The relevant data can be retrieved via the human machine interface synchronously with production. We can already track the product back to the beginning of the manufacturing process. And all system components have been integrated in a higher-level plant management system. We certainly still have a long way to go for Industry 4.0. Because as internet technologies are also introduced, the data will have to leave the factory. On this point, highest priority must be given to security. The networked products, machinery and systems will be able to interact with each other directly, and will render production considerably more efficient and more flexible. Customers and business partners will be involved even more closely in the ongoing processes. Industry 4.0 will also pave the way for many new developments, which we cannot even conceive of today.
GERMAN TECHNOLOGY – MASTER THE ART OF SUSTAINABLE INNOVATION

With system integration toward the Internet of things

RFID readers in the dye house read the contents of radio tags, robotic dispensing systems supply the precisely constituted dye mix. If sensors report excessive shrinkage of the textile goods, the smart machine controller corrects the process parameters. If delivery deadlines are not met, downstream production processes are adjusted immediately. For Andreas Hannes, Marketing Manager with Sedo Treepoint GmbH, the company has been on course for Industry 4.0 for a long time. Based in Mengerskirchen, Hesse, Sedo Treepoint GmbH specialises in digitising and automating the manufacturing processes for textile finishing. As a member of the VDMA, it is listed in both the Textile machinery and Software divisions.

Mr Hannes, how do you set about creating a digital network for the purposes of Industry 4.0, and how does this affect the human operators?

In the case of the new textile finishing facility for the Shandong Ruyi Group, one of the largest textile manufacturers in China, in 2014 we carried out a total digitisation project. In terms of data integration, the project involved networking all continuous machines, production data acquisition, an energy management system, the enterprise resource planning (ERP) system, and even printing management as well as other elements. We keep ourselves very closely informed about new trends like the Internet of Things and include them in our developments. This removes much of the burden from human operators. The installed central system is self-explanatory and easy to operate. All information can be accessed at the workstation; machines can be operated and controlled from the work desk. Machine parameters are fine-tuned and production is planned by the system. Maintenance and diagnosis can also be carried out remotely. Consequently, human operators are more mobile and their role becomes one of supervision rather than hands-on intervention.

Please describe the IT/automation in textile finishing. Could you explain what this means specifically?

Dyeing machines were automated for the first time anywhere in the world 30 years ago in by our company in Mengerskirchen. Since then, we have developed many integrated systems; after all, the technology has not ceased its advance. Today, our company offers integrated software and automation solutions for all textile finishing applications, and for other departments too. If a production facility is responsible for multiple processing stages, for example spinning, knitting and weaving, we can offer products for these areas as well. We were one of the first companies in the world to carry out integration – that is what we call the networking of data from various systems – of colorimetry in the laboratory and in production. In the case of a completely new investment, we can carry out a deep integration with all systems, functions and departments.

How is this integration organised?

Vertically, let’s start at the top of the automation pyramid, for example. The apex is the ERP system, in which the orders are entered or invoices are written. The orders then pass right through to the machine level at the bottom. Of course, machines are not intelligent in and of themselves. We equip them with an industrial PC, which makes them „smart” so that they are able to communicate. We are then able to include these machines in the overall business process by means of software, and thus make the information available to all other parts.
systems – a certain independence is often a great advantage. Most importantly, there must be a central information hub that stores and distributes the data to all recipients: horizontally to the production controller, to the machine level, to other auxiliary systems such as the printing department, the colour management or energy management systems, and also exchanging data “upwards” with ERP. All knowledge relating to the process is stored in the system, including colour values, formulas, recipes, tolerances and optimisation options, for instance. The system then uses batch parameters to optimise the process.

How will Industry 4.0 evolve in the textile industry?

As yet, Industry 4.0, the interconnection of everything and everyone, has barely affected the businesses in the textile industry. But the base technologies such as real time/industrial Ethernet, IP protocols, mobile devices, interfaces, Windows, Linux, SQL or HTML are already in place. With regular updates we are providing an evolutionary path that will accelerate the integration of mobile devices, sensors and automatic identification systems such as RFID in the next few years.

The advantages?

Optimised production processes and improved plant efficiency, more economical production processes, energy savings, more flexible production, to name just a few.

What conditions have to be in place for Industry 4.0?

In general, there are many machine manufacturers active in the textile industry with various systems. In this context, it is important to have an open architecture with globally standardised interfaces to ensure that digital data exchange is even possible. I think that only an „external party“ is able to provide optimal integration of the various systems.
What is your main business activity?

Our core business is the manufacture of flat knitting machines, which meanwhile are delivered to more than 70 countries around the world. Knitting mills – from large-scale factories in Asia to premium manufacturers in Europe – use them to produce pullovers, vests, skirts and dresses, as well as seat covers, bandages for medical use and even filters for industrial applications. In addition to the manufacture and sale of flat knitting machines, we also offer a diverse range of services, including application development, in order to assist and support the customer making best use of his machines.

You mention seat covers, medical bandages and industrial filters, which are considered technical textiles. Is this a trend in flat knitting?

The field of technical textiles is gaining importance in flat knitting. For example, the integration of extremely thin metallic threads for lighting or heating functions is becoming more widespread. Since Stoll as a competent solution provider is growing in this area, this segment offers extraordinary potential.

Tradition Meets Digitalisation

The phenomenon of digitalisation and networking of the entire value chain – also known as Industry 4.0 - is gaining importance in the textile industry.

H. Stoll AG & Co. KG, a long-established manufacturer of flat knitting machines based in Reutlingen, Germany, presents an innovative software tool for networking of machine parks with up to a thousand machines. CEO Andreas Schellhammer talks about digitalisation as a challenge and opportunity for the flat knitting machine manufacturer, whose machines are increasingly being used for the production of technical textiles:

Your company is currently drawing attention with an innovative software tool for networking of flat knitting machines. This is in response to the trend of Industry 4.0. Why?

Our multi-functional control center, the “Production Planning System”, is the answer to the question: How can we offer our customers added value within the framework of Industry 4.0? The fact is: Networking of the individual machines in a machine park and digitalisation of the production chain is advancing rapidly and is offering significant potential. We, as a long-established machine builder, are taking these topics very seriously and have therefore increased the number of IT and software specialists.
Back to networking: What challenges do your customers face?

Of course, there still is significant cost pressure which leads to an on-going need for efficiency and productivity. In addition, knitting mills have to become much more responsive, because the fashion companies have shortened the collection cycles enormously. While stores in the past presented two collections per year, it is not unusual to have ten or more nowadays. Consequently, knitting mills have to adapt their production infrastructure very quickly to new collections. This also means a challenge for us as machine manufacturer: we have to make sure that the flat knitting technology keeps up with those new requirements, which means providing state-of-the-art industrial structures to allow our customers to manufacture competitively.

What are the specific advantages of your "Production Planning System" for knitting mills?

The primary purpose of the software is to increase efficiency in production. An example: every flat knitting machine requires a special program for the knitted product provided by the job order. Most knitting mills have hundreds of flat knitting machines in their production halls which give an idea of how much time and effort goes into the programming of job orders. Our PPS is the first software being able to network the production management of knitting machine parks and
orders simultaneously, which in the past was almost impossible due to the enormous cost and effort involved.

What is to be understood by this new way of production?

With our "Production Planning System", a knitting mill with for example a total of 500 machines can simultaneously knit pullovers, leggings and skirts on 400 machines, car seat covers and medical bandages on 80 machines and small orders on the remaining 20 machines. For such an individualized production currently each flat knitting machine has to be individually programmed with the specific job order and restarted locally. Many knitting mills prefer not to produce small batch sizes, simply because of the expense. As a result of networking, knitting mills can then develop new product fields and orders, which will give an enormous boost to their capacity, productivity and therefore their profitability. Based on our research up to now we assume that our PPS can increase productivity by around 10 percent.

Is the software already in use?

Since August, the pilot phase is running at selected customer locations worldwide. All of these customers have meanwhile signalized that they consider to purchase the software. This shows that it is important even for long-established machine manufacturers to recognise technology trends and to respond accordingly. A networked machine park is very important in times of increasingly individualised production – even batch size 1 production, in which a single product is manufactured based on individual customer requirements, will soon be profitable. With the help of our new software, knitting mills can efficiently process a big variety of large and small orders simultaneously, which in the past was almost impossible due to the enormous cost and effort involved.

"Our multi-functional control center is the answer to the question: How can we offer our customers added value within the framework of Industry 4.0?"

Andreas Schellhammer, CEO of H. Stoll AG & Co. KG
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