RIETER

EXPERTISE, TRENDS, DIALOG – Rieter symposia are also proving to be a win-win situation in 2017 • THE BALL IS ROLLING – A journey through 50 years of rotor spinning • UNIMAGINED POSSIBILITIES – Air-jet yarns have huge potential • WINNERS AND LOSERS – Examining spinning mills and the machinery market

link

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Cover:
Technology testing at Rieter does not stop with yarn, rather it continues with woven fabric or knitted fabric. Visitors to Rieter symposia benefit from this comprehensive know-how. Find more information on page 3.

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Expertise, Trends, Dialog

Rieter symposia are also proving to be a win-win situation in 2017

Customer benefits are the primary focus of the worldwide Rieter symposia. They provide first-hand information. Attendees benefit from the findings of current technological studies, market-relevant information and dialog with experts.

Wikipedia defines a symposium as a “conference for researchers to present and discuss their work”. The reference to a particular topic and the possibility of dialog are exactly in line with the objectives of Rieter symposia. They provide an ideal platform for intensive exchange between experts from textile machine engineering and those with spinning mill experience. Data and facts concerning current developments are paired with specialist discussions.

Tailored to local market requirements

The lecture program always focuses on local market conditions and customer interests. Furthermore, sufficient time for discussions is made available. In this way, attendees are able to actively participate. They receive immediate responses to their questions and feedback to their suggestions. Proven specialists from various Rieter divisions or local agents give lectures. The main topics of the symposia usually relate to technology. In addition, market-relevant product innovations and services are presented. Dialog is a win-win situation: Firstly, attendees learn more about the latest spinning mill trends, from the machines to the finished product. They benefit from the competence that Rieter provides in various ways. Secondly, Rieter is able to incorporate the suggestions and ideas of attendees into the development of future products.

Technology testing is performed even for fabric or knitted fabric. A comparison of fabric samples is often very informative.

Lively discussions during breaks

2017 focus

No leading industry trade fairs, such as ITMA Europe, ITMA Asia + CITME or India ITME, took place in 2017. For this reason, the focus of Rieter event marketing was on local events: A total of 23 symposia were held in North Africa, South America and South Asia, East Asia and Central Asia. A main topic of this year's symposia was a comparison of ring spinning process and compact spinning process. A technology study demonstrated the advantages of compact yarns over ring yarns. The study compared carded and combed cotton yarns and analyzed their behavior during further processing and in the finished product. In many markets, a large number of attendees also requested information about the new semi-automatic rotor spinning machine R 36. The machine enables customers to produce high-quality rotor yarns economically. The main focus of the symposia in China was on air-jet spinning machine J 26 and the potential of air-jet yarn in the finished product. In India, the processing of man-made fibers and blends took center stage. The experts demonstrated the solutions of the individual spinning machines available for this purpose.

Burning questions are answered immediately.

Rieter is already looking forward to further interesting symposia and lively exchange. Local sales partners will gladly provide details of upcoming events.

72-201●

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The Ball is Rolling

A journey through 50 years of rotor spinning

Rising demand for textiles in the 1950s and 60s led to a change in thinking, as ring spinning alone did not produce enough yarn. New processes were sought. Development was successful in Czechoslovakia. The first rotor spinning machine went into series production there in 1967. Global interest was aroused.

The history of rotor spinning is a good example of how a principle – although known for a long time – is first commercialized when new findings emerge. The basic idea of rotor spinning was known in the first half of the 20th century, but was not used industrially until the 1960s and 1970s.

An exceptional task

In the post-war period, Europe needed to significantly increase the production of clothing, especially in the production of yarns as the initial material for textile products. At that time, the socialist Czechoslovakia made it a priority to meet the population's need for textile products. Meanwhile, the prevalent ring spinning had already reached its technical limits. A significant increase in productivity was only possible with considerably higher maintenance costs. Therefore, Czechoslovakia formulated a very ambitious plan: to abandon conventional solutions and develop new processes that enabled substantial increases in production.

Considerable funds were available for this exceptional task. The assignment was given to teams from Cotton Industry Research Institute (VUB) in Usti nad Orlici and the Research Institute of Textile Machinery (VUTS) in Liberec. Other companies and institutes also provided them with support. The first attempts at spinning were started by VUB employees in 1958, and a year later, a primitive model of a new spinning unit was created, producing the yarn in a completely new way. The process was later called "open-end spinning" (also referred to as "OE spinning").

Further development encouraged by success

A model with three spinning positions proved the industrial feasibility of the new technology in 1961. The first complete machine was named the DT 20. It first went into operation in May 1962 and worked with vertically arranged spinning rotors and a 4-roller drafting system. The passage of the material was from the bottom upwards, and this concept has been preserved to rotor spinning today.

The positive results encouraged the developers and led to the construction of the KS 200 machine. This brought considerable interest and attention to experts at the international technical fair in Brno in 1965. In the meantime, development progressed rapidly, and a model with 14 spinning positions, based on a modified concept, emerged in the VUB laboratories. In this machine, a needle roller – the so-called opening roller – replaced the drafting arrangement used to separate the fibers. This made it possible to feed individual fibers into the spinning rotor. The result was a yarn with astounding consistency.

This unique combination of an opening roller and a spinning rotor made rotor spinning a success. Rotor spinning technology, as we know it today, was born. With the experience gained from operation of the test model (Fig. 1), the M 40-V machine with 40 spinning positions was then created.

Fig. 1: The world's first model of a rotor spinning machine, in which opening rollers replaced the drafting systems (basis for the M 40-V).

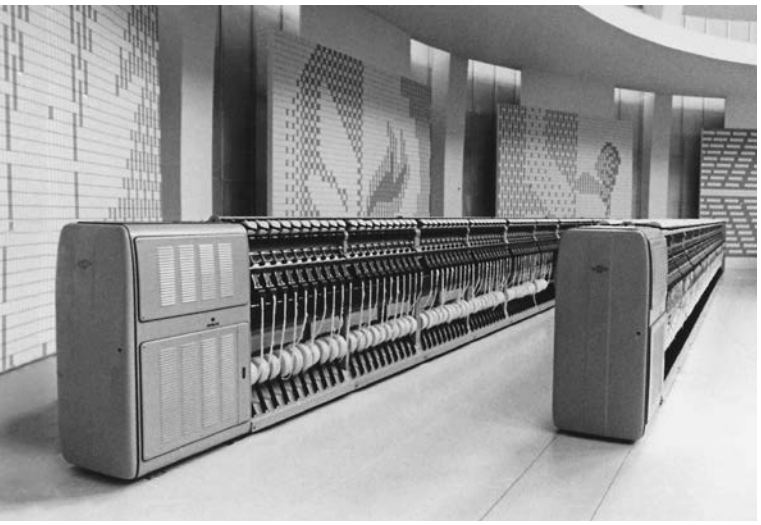

Fig. 2: The first rotor spinning machine BD 200 – at that time, still with sliver laps at the infeed

The bd project as a starting point for success

The era of rotor spinning began in 1965 with the development of prototypes of a BD 200 machine (Fig. 2). The first pilot series machines with the new spinning unit emerged in June 1966 (Fig. 3). Thanks to favorable results in the field, a machine went into series production for the first time in the history of rotor spinning in 1967. In August 1967, the first rotor spinning mill in the world, equipped with 10 BD 200 machines, opened at the VUB location in Usti nad Orlici.

In the same year, the BD 200 was launched as the only representative of the new technology of spinning on the occasion of the international textile machinery exhibition (ITMA) in Basel, Switzerland. However, for political reasons the machine was exhibited outside the exhibition grounds.

The BD 200 was a huge success, and its use in operating conditions gave rise to the unprecedented interest of experts from around the world. The result of negotiations with foreign companies was the conclusion of license agreements with the Japanese companies Daiwa and Toyoda and with the Italian company Nuova San Giorgio, Platt & Co of Great Britain, Schubert & Salzer, Germany, and the Rieter Machine Works Ltd., Switzerland.

From Usti to the world

Following the successful market launch, Kovostav (later Elitex, now Rieter CZ s.r.o.) firstly had to begin the series production of BD machines.

BD machines produced by Kovostav were successfully exported to the whole world. In 1971 the first rotor spinning mills in former Czechoslovakia (Perla, Veba, BZVIL – Levice) were created. A mill with 134 machines went to the Soviet Union. Other large spinning mills went into operation in the German Democratic Republic and in England. License agreements for the production of rotor spinning machines were concluded with partners in the Soviet Union, Japan and Italy.

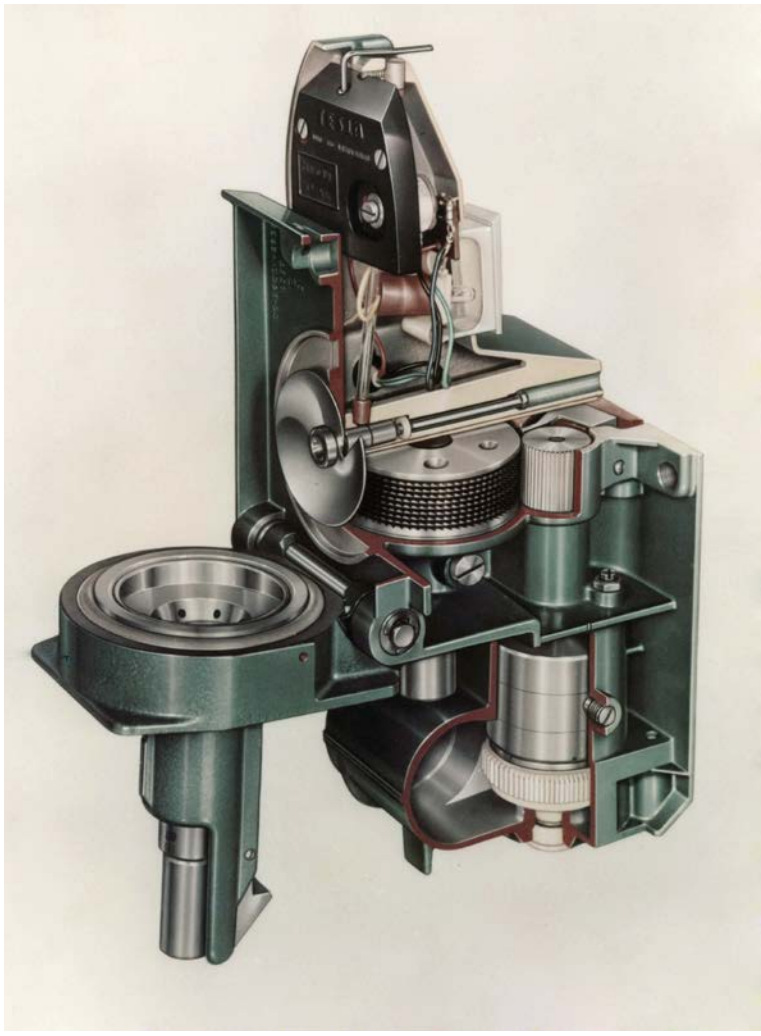

Fig. 3: View inside a spinning unit of the BD 200

Besides launching series production, the new technology also had to be promoted. VUB took on the commitment to provide technological support to customers in Czechoslovakia and abroad. Textile technologists, who also had linguistic skills, were required for this. Their findings from the field in terms of machine design, the running properties of the machines, results of technological tests, as well as the experiences and ideas of customers, flowed back to the production sites.

At the ITMA 1971 in Paris, 11 manufacturers exhibited a total of 15 exhibits from rotor spinning. As a result, the new technology became definitive and widely recognized.

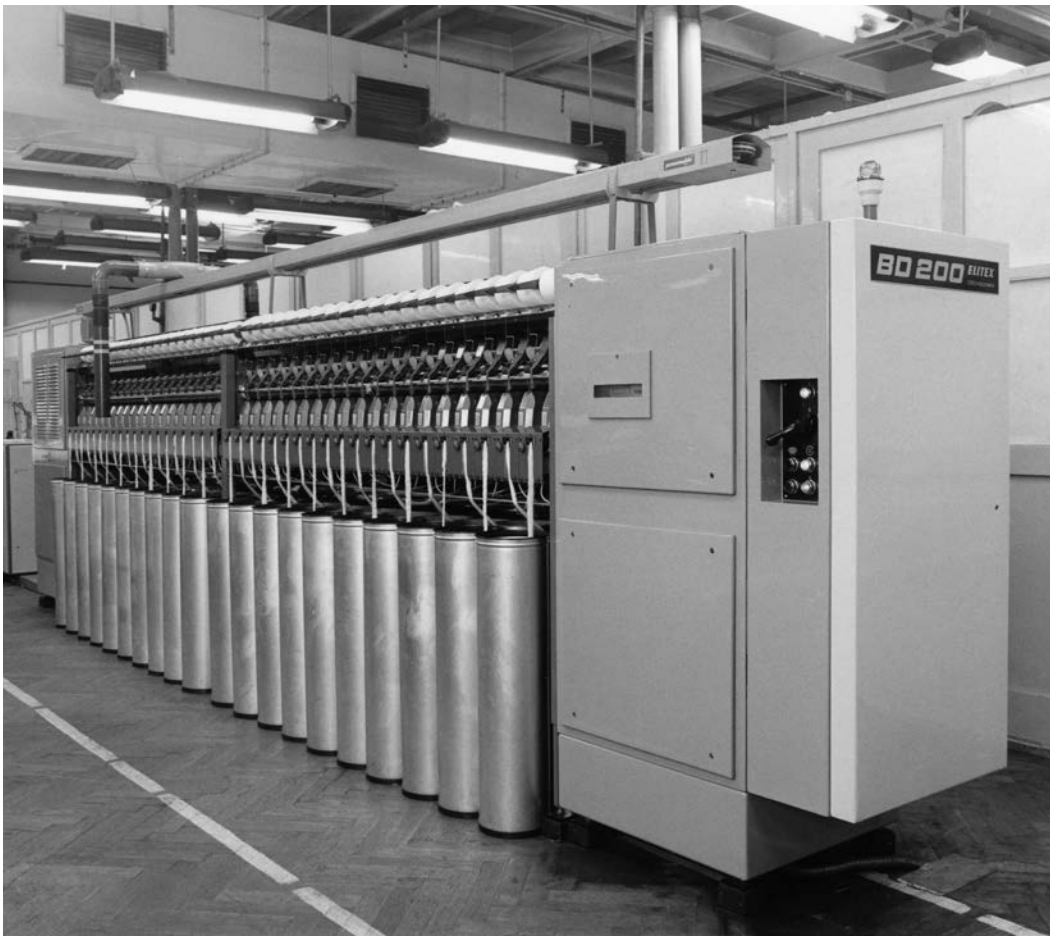

Fig. 4: Rotor spinning machine BD 200-M – the first model in which the sliver was fed from cans

A technology for a range of yarns

Further research activities at VUB and Elitex led to further improvements to the BD 200 (Fig. 4) machine, in particular with regard to rotor speed and the processing of man-made fibers as well as a wider range of yarn counts. The improved BD 200-R model came onto the market in 1974, and the BD 200-RS for spinning man-made fibers followed in 1975.

VUB's many years of research work focused on the spinning of highly contaminated cotton. The results were incorporated into the BD 200-RC machine, which was then produced from 1976. The spinning unit of this machine had a special device to remove impurities from the fibers before they are fed into the spinning rotor. This made it possible to process contaminated cotton into coarse yarns, thus improving the profitability of production. This cleaning effect also had an impact on the spinning of lightly contaminated cotton: It resulted in fewer thread breaks and an improved yarn quality. The advantage of the BD 200-RC and later of the Elitex improved BD 200-RCE was increased productivity, increased yarn quality and reduced yarn production costs. The next generation of the BD 200 series was the BD 200-S, the production of which began in 1978 and then the production of its evolutionary version BD 200-SN launched in 1981. VUB in co-operation with Elitex designed a new spinning unit for both machines to increase productivity.

Fully automated high-performance machine

In the following years, research on the construction of a fully automated rotor spinning machine was launched. In addition to a significant increase in production, the aim was also to save human labor through automation. For this purpose, it was necessary to completely change the concept of the spinning unit and to provide a system of automatic piecing and cleaning of the spinning rotors. Microprocessors were used to control this system.

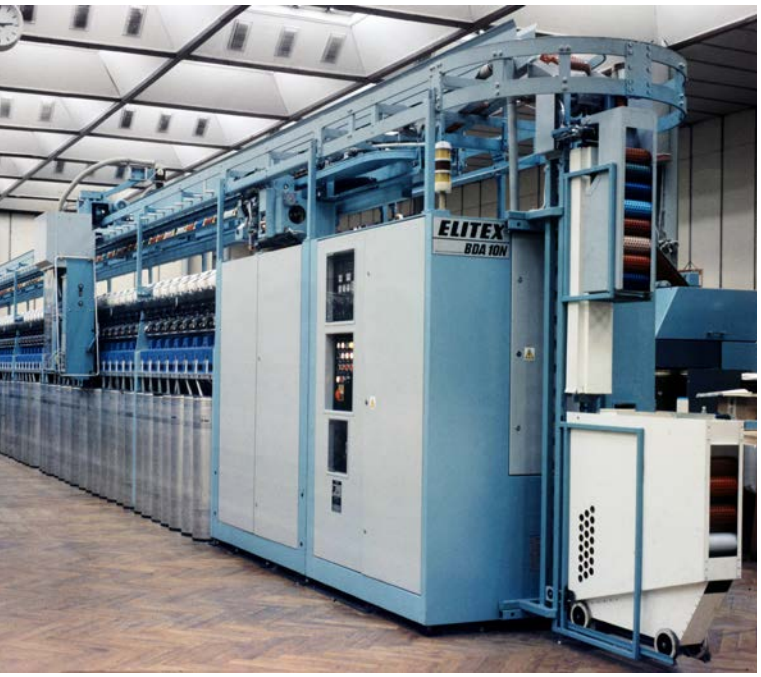

Fig. 5: The first automatic rotor spinning machine – BDA-10 – with automatic rotor cleaning and piecing

The new SJ-CU spinning unit emerged as a result of this sophisticated development. It was integrated into the first automated machine, the BDA-10 (Fig. 5), and its successor, the BDA-10N.

At the end of 1986, Elitex produced the BDA-10 with two independent robots – a package changer (SMZ) and a robot that both clean the rotor and perform yarn piecing (ACZ). Following the BDA-20 model, between 1987 and 1989, Elitex developed another model of a fully automated rotor spinning machine, equipped with a transport and packing system for yarn packages, under the name of BDA-30. VUB, Elitex and VUTS work closely together. The Austrian company Sprecher & Schuh based in Linz developed a new machine control system. Two prototypes were built and successfully tested.
However, due to political changes in 1989, the company could no longer put these machines into series production. However, lessons learned from the development of this machine were subsequently used in the development of the BT 905.

A new rotor spinning machine came onto the market every three to four years in the 1960s to 1980s. Every single machine showed tremendous progress in terms of rotor spinning technology; whether through an increase in production, improved yarn quality or an expansion in terms of spun yarn counts and fiber types. This led to an enormous increase in textile production, labor savings and, not least, to cost savings at the spinning mill.

Critical situations mastered

After the political changes in 1989 and the disintegration of the Elitex Textile Machinery Group in Liberec, Elitex in Usti nad Orlici first had to solve the basic existence problems. The reason for this was the liquidation of the foreign trading company Investa, which had not paid for delivered machines. The machines had been ordered and produced based on a government plan, without the existence of any real customers. This critical situation was resolved by the privatization of the company and its sale to Rieter in 1994.

Fig. 6: Spinning mill in Spain with multiple BT 905 machines for processing regenerated fibers

Eastern European markets collapsed during this period. At this time, the technical level of the machines was inadequate, automation components and control components were unavailable.

To ensure competitiveness in these hard times, a large amount of money was invested in research and development. The result was a fully automated BT 905 machine that contained the existing spinning unit from the BDA-10N. It had a modern, integrated robot. Package changes took place using modern electrical and pneumatic components. Experience from the development of the BDA-30 was now proving beneficial. The BT 905 was first introduced to the public at the ITMA in Milan in 1995. Successful exports to Spain followed (Fig. 6), where the machine proved its worth in the production of yarns from regenerated textile fibers.

New technologies break the limits

In the 1990s, the global trend to relocate yarn production capacities to Asia on a large scale gathered pace. Due to extremely low labor costs, Asian customers preferred manually operated machines. By simplifying the BT 905, the hand-held BT 902 emerged and went down well in Asian markets. Unfortunately, the manually performed yarn piecing was of poor quality. This made it impossible to sell textile products made of these yarns in demanding western markets.

Rieter Elitex a.s. responded to this with the invention of a new solution for automated piecing on manual machines. This unique solution was patented and introduced under the name AMIspin. The public saw this device for the first time as part of the new BT 903 at the ITMA 1999 in Paris. The success of this innovation was demonstrated, among other things, by the fact that many Asian manufacturers of textile machines immediately copied the device. Nowadays, there is no rotor spinning machine on the market that is not equipped with a similar device.

Successful privatization of Elitex Usti nad Orlici brought, in addition to a strong financial background, access to modern production technologies. One of these technologies introduced to Rieter in Usti nad Orlici was laser sheet metal working and powder coating. These processes significantly modernized the technical solution of the rotor spinning machine. From 2004, the new rotor spinning machine BT 923 (Fig. 7) was built with these modern production technologies

Fig. 7: The BT 923 machine, here in a spinning mill in Thailand, surpassed the magic limit of 100 000 rotor revolutions per minute for the first time in 2005.

and a significantly improved spinning unit. With newly developed ball bearings for the rotors, the machine from Usti nad Orlici surpassed the – until then – magic limit of 100 000 rotor revolutions per minute.

Rieter currently offers the fully automatic rotor spinning machine R 66 and the semi-automatic rotor spinning machine R 36. Nowadays, the strengths of Rieter rotor spinning can be found in its high productivity and, at the same time, its great flexibility with regard to raw material and yarn characteristics.

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Source: Archive material of VUB Usti nad Orlici, Czech Republic and Rieter CZ s.r.o., Czech Republic

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F 18 and F 38 Give Advantages

New roving frame generation produces high-quality roving even more economically

The new F 18 and F 38 roving frame models not only guarantee a high level of production, but also consistently high roving quality as well as correct bobbin arrangement. And all with low space requirements. The bobbin changer to the transport system can newly be installed at the head or foot of the machine.

The two new F 18 and F 38 roving frame models (Fig. 1) make it possible to produce roving even more economically. Additionally, short doffing times guarantee a high production rate. The F 38 model doffs full bobbins automatically. Rieter offers the most reliable and fastest system available on the market. The extension of the spindle rail and the simultaneous doffing of all bobbins shorten the doffing process to just three minutes. The time required for the bobbin change is equal for all machine lengths. The machine length, therefore, does not influence machine downtime. High efficiency is, therefore, ensured in any case.

The roving bobbins of the F 18 model are removed by hand. The swiveled bobbin rail improves the accessibility of bobbins for the operator. In this way, they are easily removed and placed in a trolley, preserving the quality. However, it is also possible to insert bobbins into a transport system by hand. To prepare for fast doffing, the empty tubes can be provided in a storage unit in front of the machine while the machine is running.

Optimal use of space

Both machines require less space than their respective predecessor models. More spindles are producing on the same area. Operating costs and building costs are reduced. Decentralized motors make this possible. For two sections, there is one motor for the flyers and one for the bobbins. For a machine with 110 millimeters spacing, a motor drives 32 spindles; for a machine with 130 millimeter spacing, this is 24 spindles. The omission of the central drive motors short-

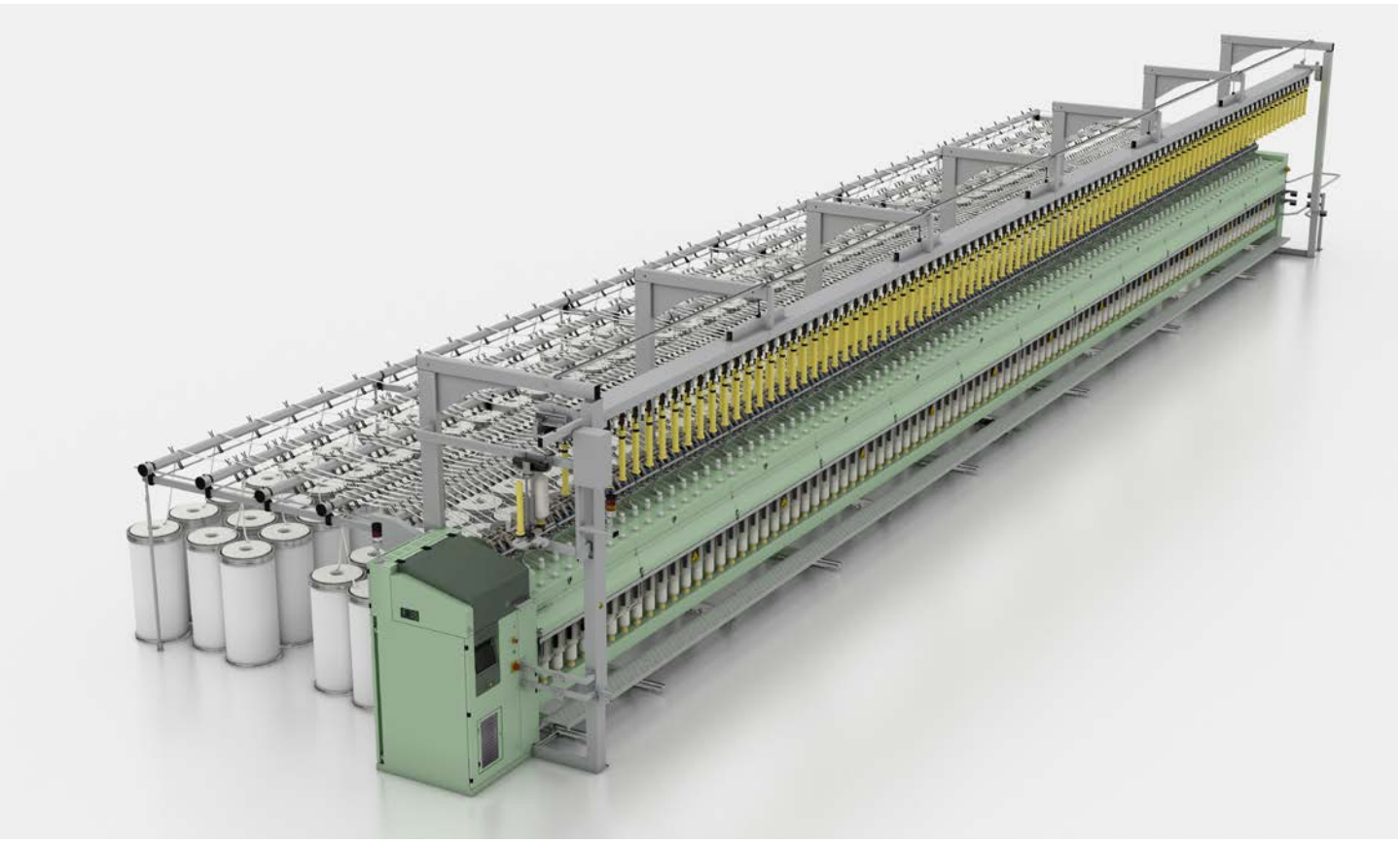


Fig. 1: The new roving frame models, here the F 38, produce high-quality rovings economically and reliably.

ens the drive unit. In addition, all doors open either to the front or back. The omission of the side doors means the roving frames can be positioned closer together. The available space is used optimally.

Following the trend

Increasingly long ring spinning machines determine the layout of a spinning mill. The roving frame must also grow to enable its adequate arrangement. The new roving frame models are available with up to 224 spindles (Fig. 2).

Depending on the yarn count, a roving frame spindle supplies 20 to 40 spindles at the ring spinning machine. Thus, a new roving frame with up to 224 spindles is able to supply a group of three or four ring spinning machines. Depending on the can arrangement and the spindle gauge, a roving frame requires approximately the same building width as three to four ring spinning machines. This ensures the optimal use of the width determined by the ring spinning machine.

Fig. 2: A long roving frame with 224 spindles supplies three to four ring spinning machines.

Fig. 3: The bobbin changer can be installed at the head or foot of the machine. This facilitates integration into a transport system.

For a bobbin diameter of six inches and a gauge of 110 millimeter, the F 18 and F 38 roving frame models are fitted with up to 224 spindles. 130 millimeter spacing with up to 168 spindles is available for coarse rovings and a bobbin diameter of seven inches.

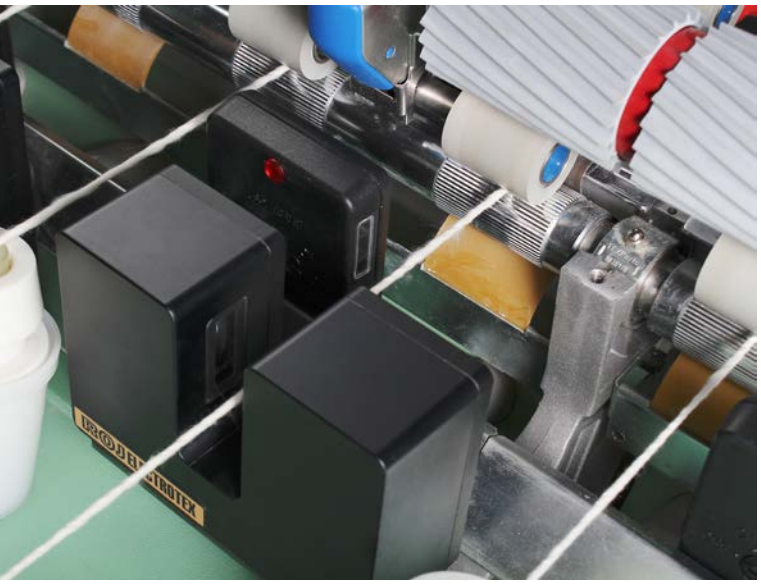
New bobbin transport possibilities

On the F 38 model, bobbins are reinserted into the bobbin transport system automatically. No manual intervention is necessary. The bobbin changer (Fig. 3) can now be mounted at both ends of the machine. This opens up new possibilities for the design of the transport system. Travel paths for the bobbin trains can be simplified and shortened. The bobbin changer can be mounted in the more strategically favorable position.

Shorter transport distances

With the F 38 model, the tube cleaner can be integrated into the transfer station. This combines the two work steps, cleaning and changing. Unnecessary transport routes to a central cleaning station are a thing of the past.

Fig. 4: The roving tension regulation and the individual roving monitoring with integrated statistical analysis ensure consistent quality.



The tubes require cleaning, because some roving residue remains on the roving frame tubes returned from the ring spinning machine. Directly at the roving frame the integrated cleaning unit vacuums the residual roving. In this way, the empty tubes are more quickly ready for use again.

Save energy and control production

The F 18 and F 38 roving frame models are always equipped with individual roving monitoring (Fig. 4). In this way, the running properties of each roving are monitored. In the event of a roving break, the machine stops immediately. This pre-

Fig. 5: Roving tension regulation ensures a homogeneous bobbin build-up and, thus, good running properties of the bobbins on the ring spinning machine.

vents further roving breaks at the neighboring spinning positions. Due to this rapid stop, a suction unit is not required. This saves 3 kWh of energy.

Individual roving monitoring enables analysis of the machine's productivity. All downtime is recorded and evaluated centrally in the machine control system. Personnel can see the reasons for machine downtime on the display. Faulty spinning positions are quickly identified and can be repaired in a targeted manner. In this way, the efficiency of the roving frame and also the quality of the rovings remain at a high level.

Assuring the quality

30 to 40 cops of yarn are produced from a roving bobbin on a spindle of the ring spinning machine. A poor roving bobbin consequently results in faulty yarn over a long period.

Good yarn quality is based on a low variation in roving quality. Besides individual roving monitoring, tension regulation also contributes to quality assurance (Fig. 5). It is integrated in every machine. The tension of the roving is constantly monitored and regulated. This results in a constant tension when winding roving onto the tube. This is the basis for uniform roving and a good bobbin build-up. Thus, the bobbins run smoothly on the ring spinning machine, and a consistently high quality is ensured.

Quick adjustment at the touch of a button

The new optional electronic drafting system makes it possible to set the draft directly on the display. Available reference values from other machines or from batches previously produced on the machine can be easily adopted. All important settings are quickly transferred to the machine control system. This reduces machine downtime for spinning mills with small batch sizes and frequent changes in roving count.

Advantageous combination

A combination of roving frames and the Rieter roving bobbin transport system SERVOtrail offers several advantages. This system transports the hanging roving bobbins safely and with minimum space requirements through the spinning mill. The bobbins do not touch each other, so the outer layer of the roving remains unimpaired. This is also an aspect of quality assurance.

Fig. 6: The roving bobbin transport system SERVOtrail enables space-saving and safer interim storage of roving bobbins.

SERVOtrail also offers the option to locate a material storage unit in a suitable position in the spinning mill. The interim storage of the suspended bobbins over the machines and cans is particularly space-saving (Fig. 6).

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Unimagined Possibilities

Air-jet yarns have huge potential

Customers who use Rieter air-jet spinning machines and are, therefore, familiar with the advantages of air-jet spinning, are not only able to broaden the application range, but also increase their innovation and flexibility. But that's not all: air-jet spinning has much more to offer.

As of late, the air-jet spinning machine J 26 from Rieter processes a broader selection of raw materials and covers a wider yarn count range. This is all to the advantage of the customer: A combination of innovative ideas and an extensive range of yarns make it possible to manufacture products with higher profit margins. Two manufacturers of branded products were convinced.

Better than the original

There are polo shirts and polo shirts. What sounds the same is far from identical. The starting point of the analysis was polo shirts from renowned manufacturers. They were analyzed with regard to the raw material and knitted fabric construction. The shirts were slightly crispy in the handle, but still felt relatively soft. Using the standard settings of the J 26, Rieter produced yarns from two different types of cotton. The "Rieter" polo shirts produced from this cotton were then tested and compared with the originals.

Original polo shirt made of ring yarn

0 abrasion cycles | 2 000 abrasion cycles | 7 000 abrasion cycles

"Rieter" polo shirt made of Com4®jet yarn

0 abrasion cycles | 2 000 abrasion cycles | 7 000 abrasion cycles

Fig. 1: The pilling test shows significant advantages for the "Rieter" polo shirt made of Com4®jet yarn.

Fig. 2 The polo shirt made of Com4®jet yarn shows considerably better color stability after 20 wash cycles than the original made of ring yarn.

Original polo shirt | "Rieter" polo shirt | Original polo shirt after 20 wash cycles | "Rieter" polo shirt after 20 wash cycles

The "Rieter" polo shirts made of air-jet yarn had the following properties in comparison with the originals:

- better pilling behavior (Fig. 1),
- somewhat better fabric strength,
- much better color stability after 20 wash cycles, especially at the collar (Fig. 2) and sleeves, and
- higher softness level, although this reversed after 10 wash cycles.

Valuable information

The loss of softness was an unsatisfactory result. For this reason, Rieter made some adjustments before the second test. The yarn was spun with modified machine settings and a special setting for soft yarns. Valuable information was also provided by the knitter. He discovered that the tension of the wet fabric on the stabilizing frame was too high for air-jet yarn. The fabric shrunk after washing and became harsh. Rieter also adjusted this setting for the second test. That was the correct decision: The fabric remained soft after washing.

Consequently, the quality of the "Rieter" polo shirt was equal to or better than the originals. Thanks to the J 26 yarn, the advantages of the Com4®jet polo shirt were clear to see, both for manufacturers and consumers:

- Contrary to the original product, no chemical softeners had to be used.
- Very often enzyme treatment is applied to ring yarn poloshirts to remove protruding hairs and to achieve higher color intensity. Com4®jet yarn already has a very low level of hairiness, meaning that this step could be skipped.
- Com4®jet yarns have an open structure. Applied color does not stay at the surface; rather it penetrates through to the core of the yarn. To also achieve this with ring yarns, the yarn must be chemically treated. This process is cost-intensive and challenging in terms of environmental compatibility. It is omitted entirely for Com4®jet yarns.

Ultimately, the manufacturer of brand polo shirts opted for the Com4®jet yarn with the two unique selling points of color stability and softness. It launched a new product line of high-quality black polo shirts. This product line is specially tailored to people who do not like to go shopping – and want to wear their favorite black shirts for as long as possible.

Com4®jet yarn also as an ideal solution for socks

The new Com4®jet yarns are not only used to produce traditional items of clothing. A Swiss manufacturer used Com4®jet yarn to produce socks with great success.

A typical problem with socks is that they lose fibers in high-wear areas and become thin. Furthermore, they deform very quickly. Socks that no longer encountered these problems

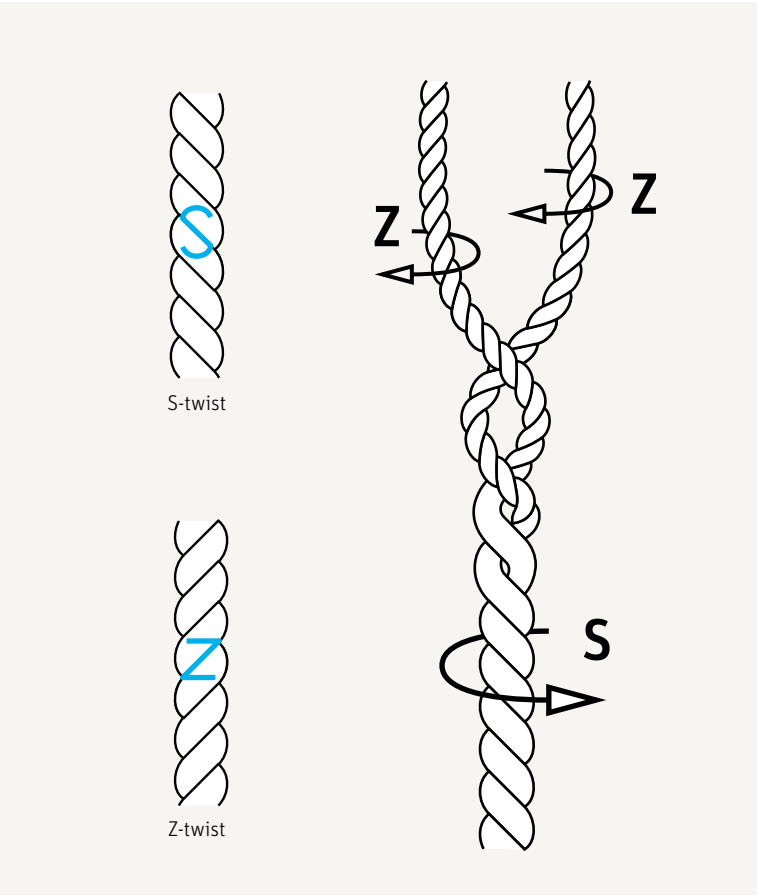

Fig. 3: The two possible structures of a single-ply yarn and an S-twisted ply yarn, consisting of two Z-twisted yarns.

were made of 2-ply micromodal yarn of count Ne 60, spun on the air-jet spinning machine.

Therefore, this was the way to go to produce more durable socks. A test was started with air-jet yarn. In general it has to be considered that success was rarely achieved when ring yarn was replaced with air-jet yarn on a one-to-one basis. This was also confirmed in this case. With Z-twisted ring yarn, the plying is mostly in the S direction to reach higher strength, better evenness and higher stability against wear (Fig. 3). In the case of Com4®jet threads, this approach must be reconsidered. The air-jet yarns are twisted only in the outer layer, the core is parallel. If air-jet yarn twisted in Z direction is also plied in the same Z direction it results in:

- increased yarn strength,
- increased elongation and
- lower hairiness compared to single yarn (Fig. 4).

If air-jet yarn twisted in Z direction is plied in S direction, it results in:

- an even higher increase in yarn strength (compared to Z direction),
- increased elongation (less compared to Z direction) and
- increased hairiness compared to Z-twisted yarns (Fig. 4).

Fig. 4: Because of the special yarn structure, a plied Com4®jet yarn behaves differently than a plied ring yarn.

Comparison of plied ring yarn and air-jet yarn			
	Ring yarn	**Com4®jet yarn**	**Com4®jet yarn**
Yarn twist direction	Z	Z	Z
Ply yarn twist direction	S	Z	S
Criteria for the plied yarn in comparison with single yarn			
Strength	++	+	++
Elongation	++	++	+
Reduced hairiness	+	+++	++
Twist factor	Standard	Highly reduced	Reduced

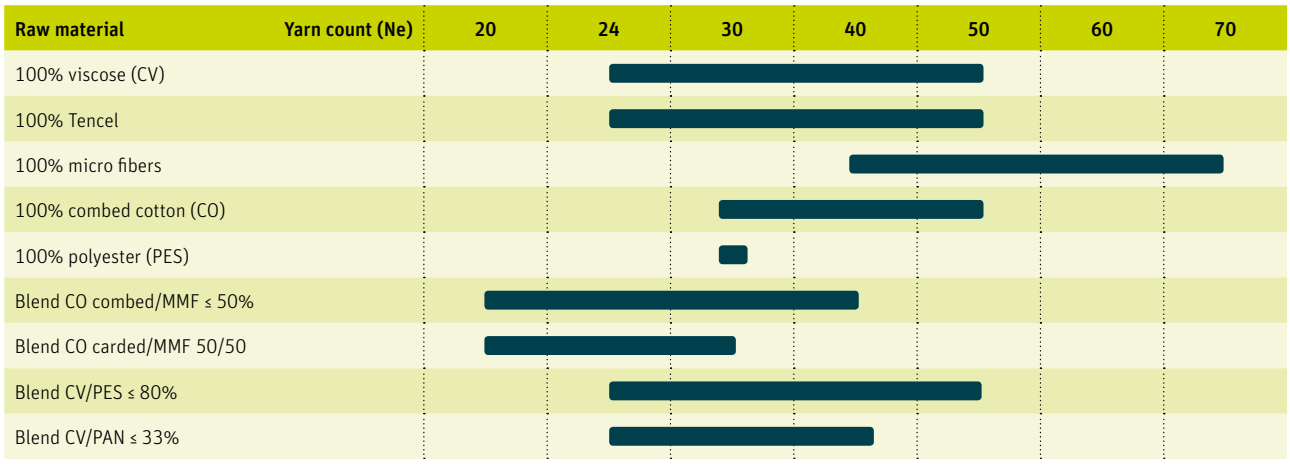

Fig. 5: Capturing new markets: The air-jet spinning machine J 26 now offers a larger selection of raw materials and a broader yarn count range.

In general, the twist coefficient for plied air-jet yarn is lower than for plied ring yarn. If air-jet yarn is twisted in the S direction, the twist coefficient alpha e should be in the area of 3.0 to 3.3. If Z-twisting is used for the thread (same twisting as in the yarn), the twist coefficient should be 2.2 to 2.5.

A decision had to be made for the socks application. In other applications, plying in the S direction can be the better option, but due to requirements regarding the socks the air-jet yarn, twisted in Z direction was also plied in Z direction. This improves the yarn elongation and gives the lowest hairiness. The pilling values are optimal in this case, and this is one of the most important criteria for the sock application.

To conclude this story: The socks are a total success. They do not pill and do not wear so easily and the look of the product is maintained for a long period. As before with the polo shirt, there was also a clear added value for the consumer here, for which he accepts a higher price.

The two examples presented show clear advantages for products made of Com4®jet-yarn. No additional investments are required to produce these yarns on existing air-jet spinning machines J 26. The adjustments to the downstream processes must be kept in mind. Then new products can be developed, new markets captured.

Broader application of air-jet spinning technology

New markets can also be captured with the above-mentioned application range of the J 26 (Fig. 5). During 2017 new technology applications of the J 26 were released based on further developments and long-term customer practices. This included a broader selection of raw materials, a wider yarn count range and new weaving applications. The broader selection of fibers ranges from traditional viscose to combed cotton and various blends.

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Cost-Efficient Production

R 36 – strong in spinning regenerated fibers

Regenerated fibers are gaining importance, as they reduce the raw material cost of spinning. Rotor spinning technology is most suitable for these fibers. High-quality yarns can be produced cost-efficiently with the new semi-automatic rotor spinning machine R 36.

They are less expensive than new raw material: regenerated fibers that are recycled from woven fabric or knitted fabric. This variant is playing an increasingly important role in reducing yarn costs around the globe. However, a prerequisite is that the resulting yarn characteristics find the necessary level of acceptance. The high amount of short fibers limits the strength of the yarn and reduces the stability of the spinning process. The newly developed rotor spinning machine R 36 is particularly suitable for spinning regenerated fibers. The quality of the yarns produced on the semi-automatic rotor spinning machine R 36 is greatly appreciated by the market. The consistently high piecing quality with the AMIspin system ensures that the follow-up process flows smoothly. Customers frequently prefer this quality from R 36 compared to yarns from automated machines with outdated piecing mechanisms.

Better yarn quality, finer count

Customers who use the R 36 observe a significantly better spinning stability of the new S 36 spin box compared to the spin box of older models R 35 or R 923. They are right, since quality tests confirm a yarn strength that is more than 0.5 cN/tex higher with the R 36. Furthermore, the yarn has a better unevenness. This supports the possibility with R 36 to also go for finer counts with regenerated fibers, if the fiber material is still suitable.

Less dust

Extensive tests with the R 36 demonstrated a relationship between yarn abrasion and rotor diameter. This opens up new possibilities for spinning regenerated fibers. With smaller rotors, yarn strength and evenness are getting better thanks to optimized fiber flow and improved spinning tension. At the same time, yarn abrasion is reducing (Fig. 1). This means that yarns made of regenerated fibers produce less disturbing dust in the follow-up process. This tendency also increases with the R 35. Some customers already use rotors with diameters of 36 or 38 millimeter for spinning in such applications.

Yarn quality comparison of R 35 and R 36
65% regenerated fibers/35% polyester, Ne 20, rotor speed 80 000 min^{-1}

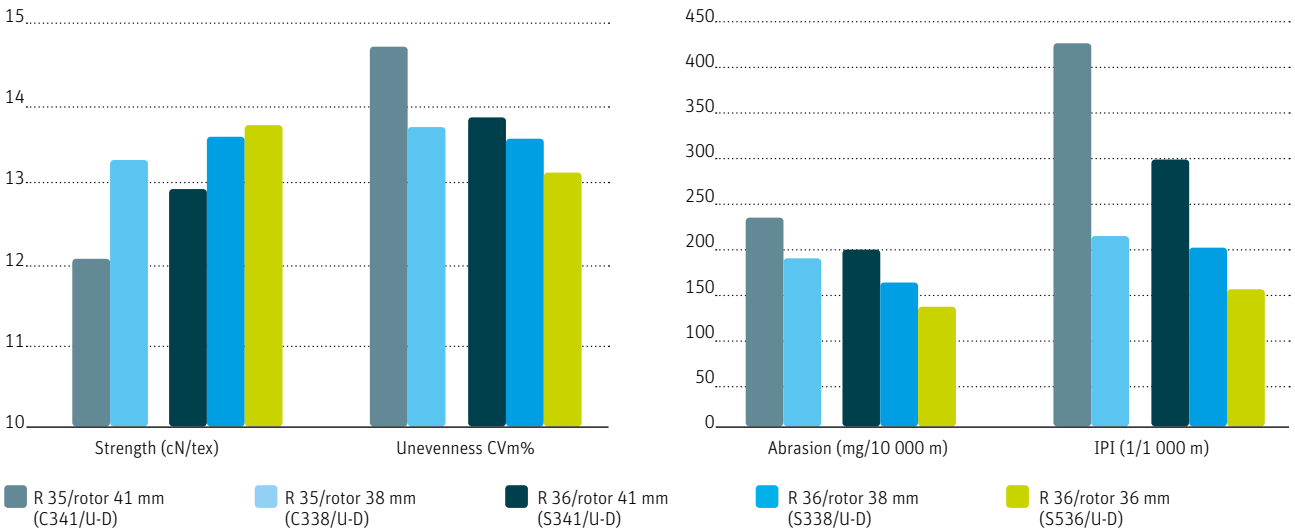

Fig. 1: Smaller rotor diameters can give advantages when spinning regenerated fibers. The yarn shows less abrasion and, consequently, less dust in further processing.

Strengths of R 36 for coarse counts

Complementary to the technological strength of the improved spin box S 36, the new R 36 unrolls functions that are especially interesting for spinning of coarse yarns from regenerated fibers (the R 35 also already has some of these functions):

- The optimized AMIspin spin start assists for good quality and efficiency, especially with yarns of low strength. The new optional AMIspin-Pro technology with better setting possibilities increases the success rate. The fast and simple piecing without having to press another button saves time and ensures uniform quality.
- Thanks to the fully independent sides of the R 36, lot changes are significantly easier.
- Because of the sturdy machine design, long machines are also highly productive, with no speed restrictions.
- The "Quality Spinning-In" (QSI) function starts the whole machine in a time-saving and energy-saving manner. The QSI process guarantees piecings of consistently high AMIspin quality. If yarn clearers are installed, they additionally test all piecings.

More regenerated fibers available

Following the interest of the spinning mills and resulting from an increased environmental awareness, more fabrics are being recycled to recover the fibers. Suitable machines are available for recycling. Numerous suppliers offer pre-processed fibers.

The rotor spinning machine R 36 is well suited to also handle the shorter fibers after recycling. Due to different sources, the composition of the material is less constant than with original cotton. Yarn ends that are not fully opened and contaminations from pieces of filaments, such as from elastomers, are especially demanding for the spinning process. Such elements may be spun into the yarn by the spin box S 36. Nevertheless, the frequency of contaminations will affect the yarn breakage rate.

Experience in various spinning mills has shown that Rieter customers successfully process this challenging material with the R 36 (Fig. 2). Thanks to its easy operation in combination with a sturdy machine design, they achieve commercial success with the R 36.

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Fig. 2: The sliver feed (top) and the dirt particles (bottom) eliminated during spinning show that the good fibers are fully utilized. The optimized air flow and the improved fiber guidance in the S 36 spin box form the basis for this.

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A Star Rises

Rapid boom in tajikistan's textile industry

The Chinese Zhongtai Group is investing in Tajikistan. Part of the project is the new spinning mill Zhongtai Dangara, which is fully equipped with Rieter machines. What was the deciding factor for the involvement in Tajikistan? "Link" made inquiries.

Link: Why did you choose Rieter?
Zhongtai Dangara (ZD): Rieter is the only supplier worldwide to cover spinning preparation processes as well as all four end spinning processes currently established on the market. Rieter's efficient machines, system solutions and good after-sales services are exactly in line with our initial criteria of the project. We believe that choosing Rieter's machines is a sustainable decision, which will secure our company's continuous growth and development during the machine's whole life cycle.

Link: How about the machine performance?
ZD: We use Rieter compact spinning machines. The low energy consumption, the high production output and the high degree of automation show that we made the right decision. We are particularly impressed with the performance of the machines and the consistent yarn quality. Yarn demand is exceeding our current supply possibilities.

Link: Why are you investing in Tajikistan?
ZD: Currently, China is implementing the "One Belt, One Road" development policy. It was in this context that the "Zhongtai Dangara Agricultural Textile Industrial Park" was established.

On the one hand, choosing Tajikistan was a powerful response to China's "One Belt, One Road" policy. In August 2016, the first phase of the "Zhongtai Dangara New Silk Road" project, which involves 60 000 spindles, was put into operation in the Zhongtai Dangara Textile Industrial Park. The successful accomplishment of the first phase represents Tajikistan's significant progress in the cotton spinning industry.

Zhongtai Dangara is a textile company in Tajikistan, using the most advanced Rieter textile technology.

On the other hand, the agricultural environment of Tajikistan is advantageous for cotton cultivation, and this is particularly beneficial for our investment in the textile industrial park. As part of the development strategy of serving the country and autonomous region through the "Going Global" method, the Zhongtai Group closely combines Tajikistan agriculture with manufacturing. This has not only changed local cotton planting but has also perfected the cotton raw material processing industrial chain.

Link: What is your company's main product?
ZD: At present, our main product is 100% cotton yarn. We use the premium fine staple cotton for this, which grows in Tajikistan. The yarn quality currently produced corresponds to up five percent of the "Uster Statistics". This yarn is exported to countries such as Turkey, Ukraine, Egypt, Italy, Germany, Russia, Belarus, Kyrgyzstan and China.

The compact spinning machine K 42 meets Zhongtai Dangara's flexibility requirement.

Link: What do you think of the development prospects of the Tajikistan textile industry?
ZD: We are very confident in Tajikistan's textile development. The investment in the highly automated Rieter equipment goes hand in hand with a very rapid increase in Tajikistan's textile industry. In addition, Tajikistan's cotton planting is also a locational advantage for the development of the textile industry.

Link: What about your company's future development goals?
ZD: We plan to build an integrated textile industrial park that boasts top-rate finished products with leading textile technology and efficient factory management. The Zhongtai Group's project comprises 110 000 spindles, two ginning plants and 17 000 hectares of cotton in the initial phase, as well as weaving, printing, dyeing and further processing in the second phase. By then, the Zhongtai Dangara Textile Industrial Park will have 110 000 spindles, two ginning plants, and the ability to produce 62 500 tons of seed cotton, 25 000 tons of cotton yarn and 50 million meters of woven cotton fabric each year.

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The Tajikistan textile industry

The main industries in Tajikistan are livestock farming and agriculture. However, the Tajik government has focused attention on the textile industry in recent years: Developments in the cotton industry have enabled the cotton processing capacity to constantly improve. This improvement in the economic situation has led to a continual increase in residents' incomes. As a consequence, the market demand for textiles continues to grow. At the same time, the domestic textile enterprises have seen that exporting end products is more profitable than exporting the simple raw materials such as cotton or yarn. Tajikistan's textile industry is gradually attracting the attention of foreign and domestic investors.

From the Fiber to the Yarn
A look at the Zhongtai Dangara spinning mill
QR code scanning for more information
https://youtu.be/WEZJPaOgRaI
(Video)

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Winners and Losers

Examining spinning mills and the machinery market

What is a driver of growth for the market and what is not? What has been the effect of the liberalization of the textiles trade? Who are the winners, who are the losers? What changes are taking place in terms of fiber types and final spinning processes? A look back at the last 30 years that sheds light on the future.

The spinning machines market is very volatile as many factors affect business. Nevertheless: Indicators point to a boom. The following analysis, which provides deep insights into the textile market, also shows this.

Two factors are causing the rising demand for textiles: firstly, the annual one percent increase in population, and secondly, rising prosperity, which is assessed on the basis of gross domestic product (GDP).

The greatest demand for textiles exists in developed countries in North America, Europe and Asia. Here, GDP per person (adjusted for purchasing power) is over 45 000 USD; it is, therefore, very high. This is also reflected in terms of annual fiber consumption, which is nearly 30 kg per person (Fig. 1).

Final consumption of fibers per person

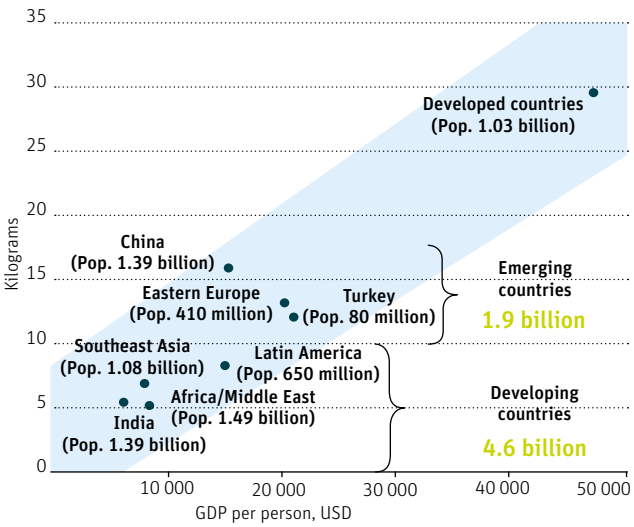

Fig. 1: Higher income increases textile consumption.

Source: US Census Bureau, International Population Database; Central Intelligence Agency, The World Factbook; PCI Redbook.

Growth in gross domestic product (GDP) 2016

Country		GDP growth 2016 (%)
Developing/emerging countries	Bangladesh	7.1
	China	6.7
	India	7.1
	Indonesia	5.0
	Pakistan	5.7
	Vietnam	6.2
Developed countries	Germany	1.9
	Japan	1.0
	USA	1.6
World		**2.4**

Fig. 2: The economies of developing and emerging countries grew considerably in the last year.

Source: World Bank – World Development Indicators.

By contrast, developing countries have an annual GDP per person of 6 200 USD (India) or 15 000 USD (Latin America). Purchasing power is low. Annual fiber consumption is only 5 to 8 kg per person. Emerging countries are practically in the middle range. With a GDP of 15 000 to 25 000 USD, annual fiber consumption in these countries is 12 to 16 kg per person.

Demand for textiles will continue to grow in developing and emerging countries. This shows the GDP growth for 2016 (Fig. 2). According to this, considerable growth of five to seven percent has taken place. In developed countries the figure was between just one and two percent.

China is the exception. In the last 30 years the People's Republic has taken the step from developing country to emerging country and now almost become a developed country. With a large population, good wages and a growing economy, the demand for textiles is extremely high there.

Rising prosperity, declining importance of the spinning industry

Rising prosperity means higher labor costs. Consequently, the labor-intensive production of the clothing industry is migrating to countries with lower wages. The primary textile industry (spinning, weaving, knitting, textile finishing) then follows with a time delay. This causes the importance of spinning to decline in developed countries. The installed

GDP in relation to spinning capacity per 1 000 inhabitants

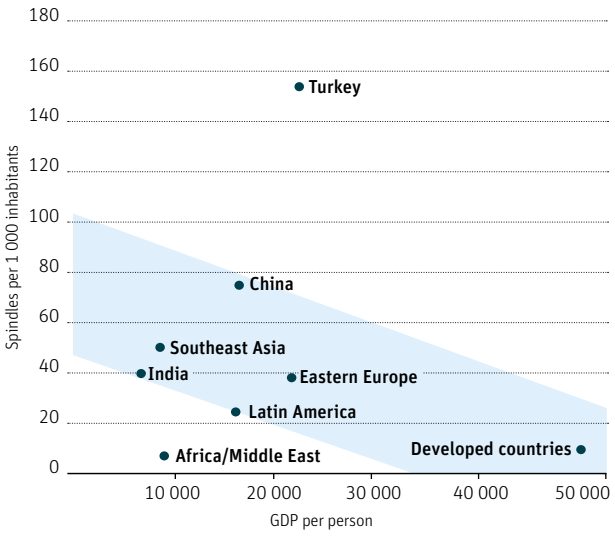

Fig. 3: The weaker the economy (here in relation to GDP), the more important the spinning industry

Source: ITMF; Rieter; US Census Bureau, International Population Database; Central Intelligence Agency, The World Factbook

China, installed spindle equivalents (million)

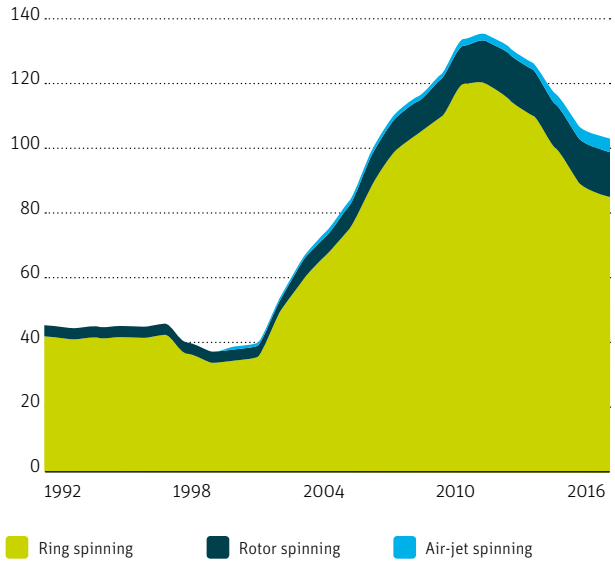

Fig. 4: In China, increases in labor costs resulted in the relocation of spinning capacities.

Source: ITMF; Rieter

spinning capacity per person in relation to GDP shows this (Fig. 3).

In contrast to the final consumption of textiles, the installed spinning capacity behaves precisely inversely proportional. Developing and emerging countries have 20 to 70 spindle equivalents* per 1 000 inhabitants, while developed countries have fewer than 10: the weaker the economy, the more important the spinning industry is. However, there are two exceptions: Turkey – as a gateway to Europe – has the highest spinning capacity in relation to population. Africa and the Middle East have the smallest spinning capacity in relation to population, while simultaneously having a low GDP. Consequently, long-term growth potential there remains purely theoretical for the time being. In particular, the major social, political and ethnic conflicts in these regions hinder economic development.

Winners and losers of globalization

The spinning capacity of developing countries and emerging countries (not including China, India and Eastern Europe) almost doubled from 53 million to 90 million spindle equivalents in the last 25 to 30 years. By contrast, the spinning capacity of industrialized countries shrunk from 40 million (1992) to 10 million.

The growth of the spinning industry in China is noteworthy (Fig. 4). From 45 million spindle equivalents in 1992, the industry grew to over 100 million spindle equivalents by 2017. Growth was particularly robust in the years following China's entry into the World Trade Organization (WTO) in 2002 and the full liberalization of the textiles trade in 2005. However, since 2012, a sharp increase in labor costs led to a decline and the relocation of spinning capacities to countries such as Indonesia and Vietnam. In particular, many Chinese spinning mills emerged in Vietnam in recent years (Fig. 5), meaning Vietnam is showing the greatest growth dynamic. Spinning

***spindle equivalent**
The various end-spinning machines have different levels of productivity. A coefficient is used to compare spinning positions. This is used to calculate the number of spindle equivalents.

1 compact spinning position = 1 ring spinning position = 1 spindle equivalent
1 rotor spinning position = 5.2 ring spinning positions = 5.2 spindle equivalents
1 air-jet spinning position = 20 ring spinning positions = 20 spindle equivalents

Installed spindle equivalents in Vietnam (million)

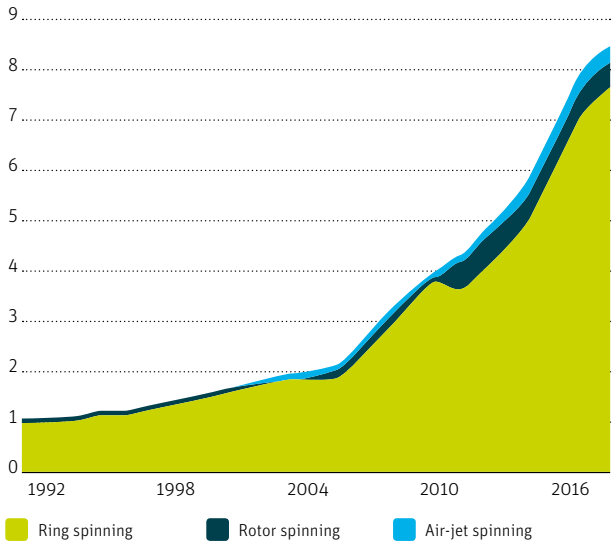

Fig. 5: Vietnam benefits from Chinese investments.

Source: ITMF; Rieter

Short staple spinning, global processing by fiber type

Year	Viscose	Polyester	Cotton
1992	6%	18%	76%
2017	11%	34%	55%

Fig. 6: Although viscose fibers and polyester fibers are gaining importance, cotton remains the leading fiber.

Source: PCI Redbook

Share of end spinning processes as a percentage of installed capacity

Year	Ring spinning	Compact spinning	Rotor spinning	Air-jet spinning
1997	81	0	19	0
2002	80	0	20	0.1
2007	81	2	17	0.3
2012	77	7	15	1.1
2017	65	16.4	16.1	2.5

Fig. 7: Compact spinning has significantly increased its market share to the detriment of ring spinning and rotor spinning.

Source: ITMF, Rieter

capacity rose eightfold from 1992 to 2016 and grew from one million spindle equivalents to over eight million.

Increase in polyester fibers and viscose fibers

Fiber types processed on spinning machines have also undergone major changes in the last 25 years. With a share of over 75 percent, cotton was the main fiber type in 1992. Polyester fibers and viscose fibers nearly doubled their share by 2017, to the detriment of cotton (Fig. 6). However, cotton will remain the dominant fiber for short staple spinning in future with a share of 50 to 55 percent.

Compact spinning in the fast lane

The market now offers four different spinning processes for short staple spinning. Ring spinning is the oldest technology. It is – and remains – the dominant spinning process. With the fall in significance of the spinning industry in the USA and Europe, rotor spinning has declined somewhat proportionally. However, compact spinning, which was still insignificant in 1997, has made a triumphant advance in the last 20 years. By the end of 2017 it is expected to grow to 16 percent of total spinning capacity, overtaking rotor spinning (Fig. 7). A 2.5 percent share of installed capacity is forecast for air-jet spinning for 2017. This is increasing by 0.3 to 0.4 percent annually.

Spinning machines in the rise and fall of the economy

75 percent of investments in spinning machines directly or indirectly replace existing spinning mills that are more than 20 years old. Only 25 percent of spinning machine investments made each year are to cover the current and immediate growth of textile consumption. The two demand factors for spinning machines – replacement demand and growth investment – are subject to strong fluctuations. The overall business cycle and price fluctuations for fiber raw materials as well as yarn prices are triggers for this market volatility.

If an economic boom and sharply rising yarn margins occur simultaneously, demand for spinning machines booms. This phenomenon was particularly prevalent from 2009 to 2011.

Two important indicators for investments in spinning mills show the volatility of the market (Fig. 8): firstly, the global economic situation exemplified by the OECD Business Confidence and, secondly, the average gross margin for cotton yarns (basis: count Ne 20 and Ne 30, five main producing

countries). An index value of the OECD Business Confidence above 100 means economic growth, an index value below 100 means recession.

The financial crisis of 2008/2009 was a pronounced negative turning point with a rapid economic recovery. Business confidence was particularly low during the financial crisis. The demand for spinning machines quickly ground to a halt.

Floods in Pakistan in the summer of 2010 reduced the cotton crop. India responded to the resulting shortage on the cotton market with protectionist measures and by limiting cotton and cotton yarn exports. At the same time, China imported large quantities of cotton yarn, meaning that cotton prices and yarn prices exploded. The gross margin on cotton yarns soared to record levels. The concurrence of economic growth and increasing margins was the perfect recipe for the subsequent investment boom in new spinning mills.

Innovations make replacement investments attractive

Each new Rieter machine creates customer benefits such as higher productivity, reduced energy consumption and in terms of optimal fiber utilization.

OECD Business Confidence and cotton yarn gross margin from 2009 to 2011

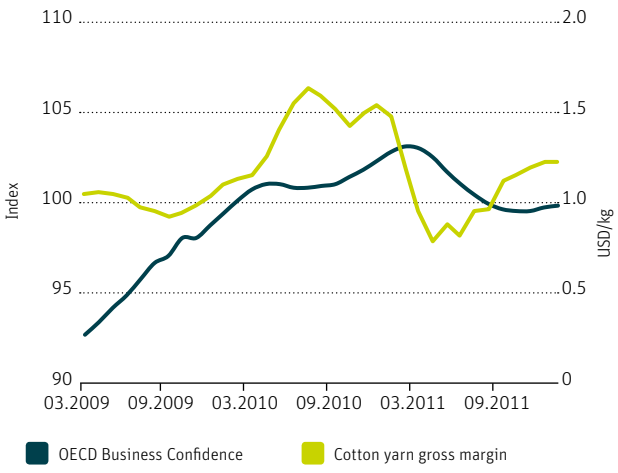

Fig. 8: Significant indicators for investments in spinning mills: the OECD Business Confidence and cotton yarn gross margin

Source: OECD Business Confidence, Rieter
Cotton yarn gross margin: Cotton yarn price minus cotton price
The five main producing countries: China, Indonesia, India, Pakistan, Turkey.

Production output of Rieter cards in kilograms per hour from 1987 to 2017

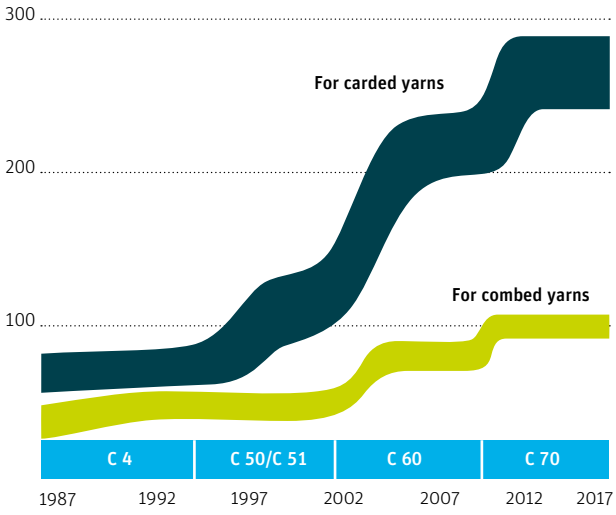

Fig. 9: Card production has increased by a multiple in recent years.

Source: Rieter

Rieter cards serve as an example: In the last 30 years, the maximum production of carded yarns almost quadrupled. In 1997, the C 4 card produced 75 kilograms per hour, while up to 280 kilograms per hour is now possible with the current C 70 card. For combed yarns, production output more than doubled from 43 to 95 kilograms per hour (Fig. 9).

Therefore: High innovation rates make replacement investments attractive and stimulate the market. And: This can be relied upon.

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Right on Track

Successful start for the new Rieter service branch in Kahramanmaraş, Turkey

On April 6. 2017, Rieter inaugurated its new service branch in Kahramanmaraş to better support its customers in the south east of Turkey together with the long-standing sales agent Erbel A.S. Around six months later, it is now clear that the choice of location was absolutely the right decision.

Turkey is one of the key markets for textiles worldwide and Kahramanmaraş is at the heart of the textile industry in Turkey. More than 60% of the installed base of Rieter machines in Turkey is located within a radius of around 200 kilometers around Kahramanmaraş.

The Rieter service branch in Kahramanmaraş guarantees the rapid and reliable support of the customers on-site.

It is therefore unsurprising that Rieter opened a branch there to provide its customers with an improved and rapid service. In the first few months after the inauguration, it quickly became apparent that the decision to establish a branch in Kahramanmaraş was the correct one. Rieter customers are very satisfied with the service offered at the new service branch.

Mechanical and electronic services

The offering of the branch includes mechanical services such as overhauls of gearboxes, servo motor settings, repairs and upgrades with genuine parts. In the electronic workshop Rieter's electronic experts analyze any kind of electronic devices on controls as well as drives and further suggest repair steps to clients. They guide customers towards the most efficient and reliable solution. The short distance to the Rieter service branch enables production downtimes in the spinning mills to be reduced to a minimum, or even eliminated entirely.

Several "Mill Assessments" have already been successfully completed during the first few months. This is for the benefit of the customers who are able to remain competitive thanks to improved performance of their spinning mill. Increasing demand means that Rieter is also reaping the rewards. "Mill Assessments" and "Preventive Maintenance Packages" are likely to become increasingly significant for the service branch in future. Rieter will therefore increase its staff by the end of 2017.

Emergency parts warehouse

The facility features a stock of local spare parts which includes the most important and critical spare parts, from control units to sensors and drive systems. Close to Rieter customers' spinning mills, this emergency warehouse allows an accurate and timely delivery and its stock levels are checked regularly.

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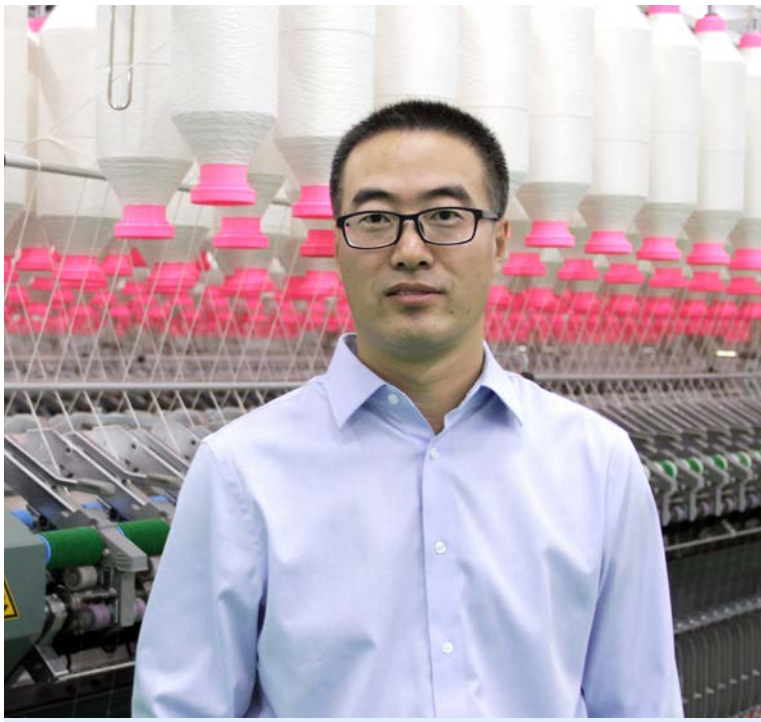
A Different Point of View

What do Rieter customers say about Com4® yarn?

"According to our weaving and knitting customers, Com4®rotor yarn with invisible piecings ensures a very high optical evenness of the fabric."

K. K. Agrawal
President Director



"Textile products manufactured from Com4®compact yarn are warmly welcomed by customers. This yarn is always first choice in the high-end market segment. Com4®compact yarn is the representative of high-quality yarn and is the best guarantee for our success!"

Yang Zhao
General Manager

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Rieter thanks the readers of the Link magazine and wishes all a successful year **2018**.

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