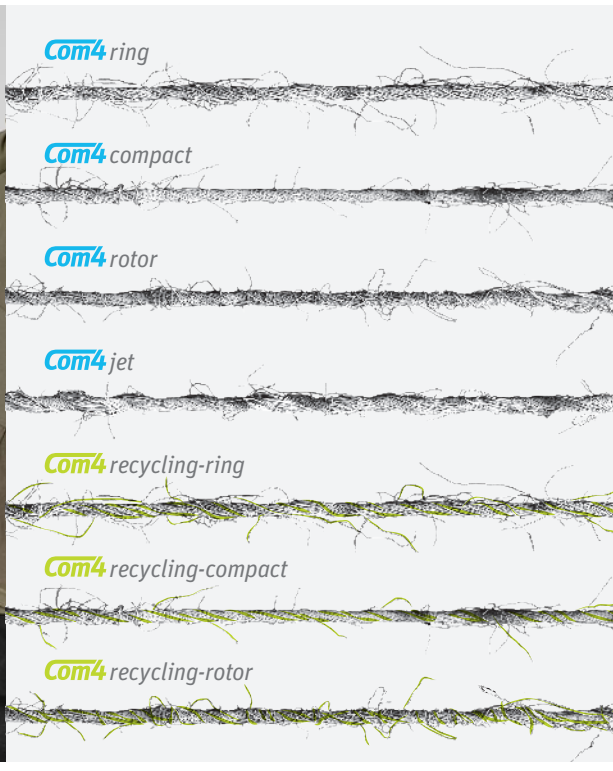
Rieter Com4 Yarns

Yarns of Choice



Content

1 What is Com4 Yarn?

1.1 Rieter Com4 yarns – Yarns of choice

Com4 (pronounced: comfor) yarns are yarns that fulfil the most exacting requirements and ensure competitiveness in a dynamic market. The benefits of the Com4 yarns are visible in spinning, in downstream processing and in the final product, e.g. from high processing speeds, less fiber fly and low size pick-up through to excellent pilling values and high wearing comfort.

Com4 yarns are spun on Rieter end spinning machines. Thanks to mature technologies, yarn production in Rieter ring, compact, rotor and air-jet spinning processes demonstrates a high level of efficiency and achieves excellent constant yarn quality.

The family of Com4 yarns consists of (Fig. 1):
Com4ring – ring-spun yarn,
Com4compact – compacted ring-spun yarn,
Com4rotor – rotor-spun yarn,
Com4jet – air-jet-spun yarn.

In reponse to the growing market demand for recycled yarns, Rieter extended the brand. In conjunction with a Global Recycled Standard (GRS) certification, the following yarns containing recycled material can be licenced:
Com4recycling-ring – ring-spun yarn
Com4recycling-compact – compacted ring-spun yarn
Com4recycling-rotor – rotor spun yarn.

Fig. 1: The Com4 yarn brands

Com4 is a worldwide registered Rieter trademark. As well as Rieter customers who wish to have their yarns licensed, downstream processors can also have their textile fabrics licensed which are verifiably manufactured from Com4 yarn.

1.2 Diversity results in flexibility and creativity

Creativity has no limits in the textile industry. In order to produce innovative textile surfaces, varied yarns are needed. To bring special designs or functions into the fabric, textile designers require a vast selection of yarn types. In addition to the yarn structure variants such as the yarn count, volume and the raw material in use, options are necessary to provide designers with a large yarn variety (Fig. 2).

The 4 end spinning systems can produce additional yarn variants by adaptation of special facilities. For instance, core yarns can be produced in Com4ring-core and Com4compact-core versions.

Fancy yarns are possible in Com4ring-vario, Com4compact-vario and Com4rotor-vario versions. Twin facilities – for manufacture two ply yarns – are made possible by Com4ring-twin and Com4compact-twin. A special yarn is Com4compact-light with reduced compacting of the yarn.

	Ring-spun yarn	**Compacted ring-spun yarn**	**Rotor-spun yarn**	**Air-Jet-spun yarn**
Standard yarn	Com4ring	Com4compact	Com4rotor	Com4jet
Core-spun yarn	core	core		
Fancy yarn	vario	vario	vario	
Spin-twist yarn	twin	twin		
Special yarn		light		

Fig. 2: Extended Com4 yarn range to make creativity possible for designers.

1.3 Which yarn is recommended for which application?

The question is not always easy to answer because the application range of the yarn depends on the requirements placed on the end product, the economic demands of the spinning plant as well as the customer base of the yarn manufacturer. The following information is designed to help decide which Com4 yarn is the best for the individual customer and for the textile application.

2 Different Views on a Com4 Yarn

For the successful textile manufacturer it is absolutely relevant which characteristics the yarns provide (Fig. 3).
In order to describe the differences between the Com4 yarns themselves or to compare them to competitor yarns, individual consideration must be given to each aspect.
Each Com4 yarn has its own properties – not in comparison to other yarns but rather for what the respective Com4 yarns stand. The comparison of the properties is decisive in the selection of the most suitable Com4 yarn for the respective textile application.

The description of what sets a Com4 yarn apart when compared to other ring, compact, rotor or air-jet yarns on the market is equally important for the yarn trade and yarn buyers, as well as for the decision of the spinning company in which technology of which supplier to invest.
In yarn manufacture, compromises must often be made between quality and costs and this can lead to the benefits offered by a spinning technology not being fully exploited. Thus, a smaller rotor is used to achieve higher productivity which conversely leads to lower yarn volume.

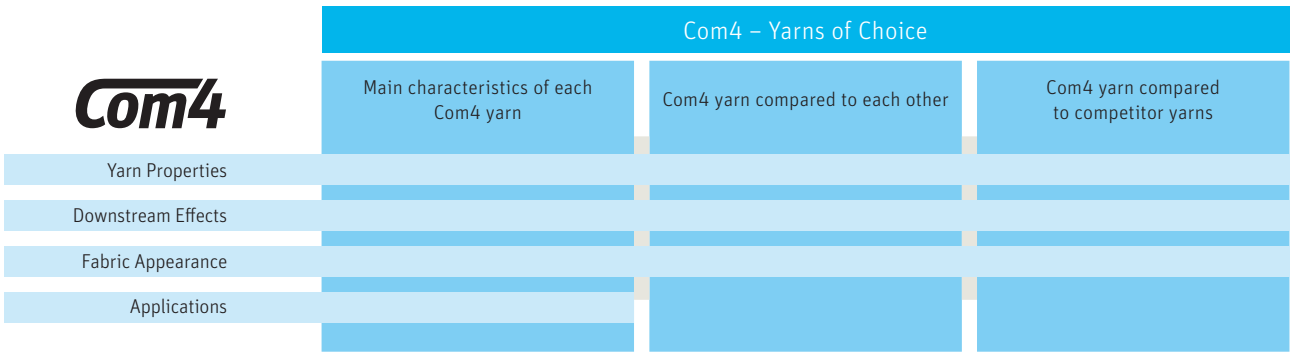


Fig. 3: Three different views for the Com4 comparison

2.1 Main characteristics of each Com4 yarn

Many properties are strongly dependent on the yarn count and the raw material used. The tables show the main characteristics of each yarn that can be found in practice.

2.1.1 Yarn characteristics

Com4ring	Com4compact	Com4rotor	Com4jet
Most flexible in raw material, count, characteristics	Highest tenacity	High optical evenness	Unique low hairiness
High tenacity	Even yarn structure	Low variation in strength	High volume
High hairiness	Low hairiness	Designable hairiness	Low tendency for fluff
	High yarn density	High abrasion resistance	High abrasion resistance
		Highest volume	

Fig. 4: Each yarn has unique properties.

A look at the yarn properties points out the substantial differences of the 4 yarns (Fig. 4).

Com4ring is characterized by high flexibility in the use of the raw material, the yarn count and the yarn character. It possesses a high degree of strength and high yarn hairiness.

Com4compact is distinguished by extremely high tenacity, even yarn structure, low hairiness and high yarn density.

Com4rotor has a high optical evenness which leads to a very even fabric appearance due to its special yarn structure. With a high short fiber proportion in the raw material, the evenness is even better when compared to other Com4 yarns.
Particularly in the main application area of Com4rotor – coarser yarn counts of cotton – the yarn shows a low strength variation. The yarn hairiness is to a great degree designable. That means, according to the requirement of the textile end product, high or low yarn hairiness can be produced.

Com4jet has a unique yarn structure with very low, short hairiness. Com4jet yarn is a voluminous yarn which positively influences the opacity of the yarn in the fabric. Due to its special fiber bonding, it also has a high level of resistance to abrasion.

2.1.2 Com4 in downstream

The yarn properties shown above lead to benefits in downstream processing (Fig. 5).

Com4ring	Com4compact	Com4rotor	Com4jet
Good running performance	High processing speed	Low ends down rate	Low dyestuff for comparable color intensity
Good picking and low air consumption in air-jet weaving	Low warp breaks during weaving	Low size pick-up	Low snagging tendency
	Low strength loss after finishing process	Reduced generation of dust and fiber fly	Lowest generation of dust and fiber fly

Fig. 5: Com4 yarns support a smooth downstream processing.

The yarn properties shown above lead to benefits in downstream processing (Fig. 5).

Com4ring basically exhibits good properties in downstream processing. This results in good efficiency and high process speeds, mainly because of the constant yarn quality. Of special note is the benefit with weft insertion on the air-jet weaving machines. Due to the comparably high hairiness, the yarn can be safely transported by the air through the weaving shed.

Com4compact shows great advantages in relation to the process respectively processing speed. The high yarn strength makes the yarn substantially more resistant to the subsequent processes. Low ends down rates in downstream processing, especially in weaving, are recorded. The high tenacity additionally offers potential in high-grade finishing. Every high-grade finishing process adversely affects the fabric strength. If the yarn is inherently strong, the finishing potential can be far better exploited.

Com4rotor: By the low variation of yarn strength, stable running characteristics can generally be realized in further processing. Through the special yarn structure, less sizing agent is needed. The yarn does not snag as strongly in the weaving process and the yarn structure absorbs sizing agent more rapidly. If a rotor yarn were to be treated with the same sizing agent recipe as a ring yarn, then the danger of over-sizing would exist. The consequence is that the yarn breaks more frequently, it is stiffer and therefore more brittle. Basically a Com4rotor yarn exhibits less fiber fly in further processing. This has a direct and positive effect on the required cleaning intervals for the weaving or knitting machine.

Com4jet: At equal color intensity, a Com4jet fabric requires less dyestuff with dark colors which leads to a great saving potential in the dyeing plant. This, however, also comprised risks. If the color recipe is not adapted, the fabric will be "overdyed", resulting in a harder touch and diminished color fastness. Due to the good fiber bonding, the running properties in downstream processing are excellent. As a rule, this is reflected in lower maintenance requirements in the knitting unit. In the weaving plant, the yarn snags far less – a lower fiber fly can be registered.

2.1.3 Com4 in the fabric

Here too, the yarn structure is what shapes the fabric characteristics (Fig. 6).

Fabrics from **Com4ring** yarns show predominantly good properties. Especially the opacity in knits due to the high yarn hairiness can be named as a benefit. But also the extremely soft touch of the fabric should be mentioned. Basically, a ring yarn enjoys the greatest acceptance by users – by the fact of its long history.

Com4compact has the highest fabric strength. The absolutely clear defined structures with printed products, Jacquard and shaft patterns are immediately obvious to the user. The reason for this is the compact yarn structure. Fewer hairs also mean less light refraction on the fabric surface – Com4compact products usually show an outstanding luster.

Com4rotor demonstrates a very uniform appearance of the fabric particularly with knits. The high abrasion resistance in the yarn is also found in the fabric. The rather open yarn structure provides a great potential in the rough process, e.g. for blankets in the area of household textiles. The best rough surfaces in respect of evenness and longevity are obtained with Com4rotor products.

Com4jet is the favorite with anti-pilling – especially with knitted fabrics. The reason can be found in the unique hairiness of the Com4jet yarns. A next clear advantage is the high water absorption compared to the yarns. A fabric made of Com4jet yarn is very wash and wear resistant. Despite washing and wearing the surface hardly changes.

Com4ring	Com4compact	Com4rotor	Com4jet
Pleasant soft touch and drape	High fabric strength	Very uniform fabric appearance	Low pilling tendency
Good opacity	Absolutely clear defined structures (stripes, prints)	High abrasion resistance	High water absorption
Widest range for fabric designs	Finest lustre	Good appearance after raising	High wash resistance

Fig. 6: Positive Com4 textile characteristics for the user

2.1.4 Com4 in final products

The yarn characteristics determine the preferred areas of application of the Com4 yarns (Fig. 7).

Com4ring has the most universal area of application. This is mainly in the outerwear and underwear sector but also in the range of home textiles. In terry articles, ring yarns with their typical yarn strength support the sub-structure.

The absolute domain of **Com4compact** is the fine shirting sector. In addition, high-quality knitted products and superior bed linen produced with fine yarn counts are typical applications. A further field in which Com4compact excels is the manufacture of socks.

Com4rotor and denim is a symbiosis in the market. Robust workwear as well as home textiles and technical applications such as the base structure of emery paper are, as a rule, also manufactured from Com4rotor.

The **Com4jet** yarns started in the field of knitting application. Dominated by viscose yarns the products are ladies outerwear like T-shirts, leggings, cardigans and skirts. Meanwhile the yarn is also often used for underwear. In weaving blouses are one application covered by the Com4jet yarns. New developments like softer Com4jet yarns will show further advantages and open more new fields of applications.

Com4ring	Com4compact	Com4rotor	Com4jet
Universally applicable	Business shirts	Denim	Knitwear in general
Outerwear	High quality knitwear	Workwear	Outerwear
Underwear	Fine bed linen	Technical applications	Underwear
Home textiles	Fine socks	Terry clothes	Bed linen

Fig. 7: Main textile applications of each Com4 yarn

2.2 Com4 yarns compared to each other

Also when comparing the yarns to each other, the differences in yarn characteristics, properties in downstream processing and the appearance of the end product are important. The following descriptions are general rules and attempt to show the differences in relation to all the raw materials and yarn counts. According to the raw material used and the yarn count, shifts in comparison to the yarn are possible. However, in general the statements made are valid. Basically the tables should be read as follows: the more plus signs, the more positive the described property of the relevant yarn.

2.2.1 Yarn properties

The following table shows the most important yarn properties and gives a hint which yarn is most suitable for one or the other property (Fig. 8).

Yarn Properties	Com4ring	Com4compact	Com4rotor	Com4jet
High tenacity	+++	++++	+	++
High work capacity	+++	++++	+	++
Low variation in strength*	+++	++++	+++	++
Reduced long hairiness (S3)*	+	+++	++	++++
High mass evenness*	+++	++++	++	+++
High optical evenness	++	++	+++	+++
High volume	++	+	++++	+++
Low tendency for fluff	+	+++	++	+++

Fig. 8: Com4 yarn properties in mutual comparison

as more "+" as more positive
*depending on yarn count and raw material

High yarn tenacity and work capacity in the comparison Com4compact demonstrates the highest yarn tenacity and work capacity. It is followed by Com4ring, Com4jet and Com4rotor. The work capacity is the product of tenacity and elongation. The differences in elongation are small.

Low variation of the strength is an advantage of Com4compact and Com4rotor, closely followed by Com4ring and Com4jet. This relates to the typical application fields of the yarns. For instance, the low variation of tenacity with rotor with coarse yarn counts and with cotton is more apparent than with finer yarn counts and with blends.

Yarn hairiness can be neither described as positive nor negative. It always depends on the textile application in each case. A decisive factor is how well the hairiness can be influenced, especially concerning higher or lower hairiness, longer or shorter hairs. The reduction potential of longer hairs is particularly great with Com4jet, closely followed by Com4compact. In comparison, Com4rotor and Com4ring have the lowest potential to reduce long hairs.

The yarn evenness must be differentiated between mass evenness and optical evenness. The mass evenness – measured with the capacitive measuring principle expressed in CVm (%) – can be high with one yarn but this does not automatically mean that the yarn in the fabric subsequently looks uneven. For this reason, the technology department at Rieter is always producing a small circular knitted fabric alongside the technically measured yarn evenness values (optically as well as capacitively), to be able to assess the optical evenness in the fabric.

Yarn volumes: Com4rotor followed by Com4jet are the yarns with the highest yarn volumes. Com4compact has the lowest natural volume.

Fiber fluff: Com4compact as well as Com4jet show the best values, i.e. the lowest fiber fly tendency. They are followed by Com4rotor and Com4ring.

2.2.2 Downstream effects

Size pick-up: A Com4compact and Com4jet yarn require the lowest amount of sizing agent, closely followed by Com4rotor. Due to the higher hairiness, Com4ring yarn needs the highest proportion of sizing agent in order to reduce the snagging tendency in the weaving process.

Fiber fluff during downstream processing: As already explained, the fiber fluff tendency depends not only on the basic yarn hairiness but also on the fiber bonding in the yarn bundle – in other words, from the yarn structure. Com4compact and Com4jet show the best characteristics here.

The number of **warp breaks** in downstream processing is closely related to the process speed which, for instance, is used on a weaving machine. The absolute yarn strength and also variation of the strength are decisive. The lowest number of warp breaks in downstream processing can be seen with Com4compact followed by Com4rotor. Alongside the classic yarn properties, also the bobbin build-up influences the ends down situation in further processing. On Rieter rotor and air-jet spinning machines the yarns are spun directly on packages. Optimal adjustments support a good and even bobbin build-up.

A high degree of **dyestuff utilization** is apparent on the one hand, by a high color speed and on the other hand, by a minimal amount of absorbed color at the same color depth respectively intensity. Com4jet has the best color saturation. The required color depth is quickly achieved with a minimal amount of color. Com4rotor and Com4compact show equally good color saturation properties due to their structure.

Downstream Effects	Com4ring	Com4compact	Com4rotor	Com4jet
Low size pick-up	++	++++	+++	++++
Low snagging tendency	+	++++	+++	+++
Low fluff during processing	++	++++	+++	++++
Low warp breaks*	+++	++++	+++	++
High speed on weaving machine	+++	++++	++	++
High dyestuff utilization	++	+++	+++	++++
High strength after non-iron finishing processes	+++	++++	++	++

Fig. 9: Com4 yarn in downstream processing

* Depending on yarn count and raw material
as more "+" as more positive

2.2.3 Fabric appearance

When the fabrics are compared to each other, the following aspects are notable (Fig. 10).

Uniform fabric appearance: An even fabric appearance results with Com4rotor and Com4jet followed by Com4compact and Com4ring.

The **clearest knitted or woven structures** are visible with Com4compact and Com4jet. The special yarn structures support, for instance, the distinctiveness of pinstripe suiting. Even classic twill shows a clearly distinct burr when using a Com4compact or Com4jet yarn.

Low pilling: Com4jet fabrics show the lowest tendency to pilling. Com4compact and Com4rotor exhibit equal behavior. Com4ring shows the highest tendency towards pill formation on the fabric surface.

Textile fabrics with the **softest touch** are undoubtedly produced from Com4ring yarn. But also Com4jet and Com4compact are able to achieve fabrics with a soft hand. In order to manufacture a soft Com4rotor, the twist factor must be set very low and supportive measures undertaken in textile finishing.

Fabric Appearance	Com4ring	Com4compact	Com4rotor	Com4jet
Uniform fabric appearance	+++	++	++++	++++
Clear structures (striping, printing)	++	++++	+++	++++
Low pilling tendency (fine counts)	++	+++		++++
Low pilling tendency (coarse counts)	+	++	+++	++++
High opacity and volume	+++	+	++	++
Soft hand	++++	+++	+	++
Good raising behavior	++	+	+++	++
Fast water absorption (with MMF)	+++	+++	++++	++++
High abrasion resistance *	+++	++++	++++	+++
Reduced spirality	++	++	+++	+++
High fabric strength	+++	++++	+	++
Good lustre on fabric surface	++	++++	+	+++

Fig. 10: Com4 fabrics in mutual comparison

* depending on fabric construction and raw material
as more "+" as more positive

2.3 Com4 yarns compared to competitor yarns

Com4ring stands for consistent yarn quality with low variations and that in a wide diversity of yarn versions compared to competitor ring yarns.

A Com4ring yarn stands out in particular by consistency and high reproducibility of the yarn quality. The high consistency between the spinning positions and between machines of the same construction type across the entire life cycle of the machine provide the yarn seller and yarn buyer with the certitude that they have sold respectively bought a consistent yarn quality.

The integration of options for special yarns already foreseen by Rieter in the machine construction offers a high degree of flexibility within the Com4ring yarn.

The result of all this compared to the ring yarns of competitors:
- Com4ring with the lowest variations between different yarn cops.
- Com4ring with lower variations in the yarn quality within the bobbin.
- Com4ring creates trust with regard to yarn quality, even with follow-up orders.

Com4compact stands for the highest level of compacting, lowest quality variation, highest yarn tenacity and longest experience in compacting technology worldwide in comparison to compact yarns from competitors.

Com4compact stands out by its constant compacting results over long periods of use. The basis for this is provided by the long life cycle of the compacting elements such as the almost wear-free surfaces of the perforated drum, the heart of the compact spinning machine.

Practice confirms the consistently higher tenacity values in comparison to competitor compact yarns. This is achieved by the precise thread guidance during the compacting process.

The know-how gained over decades and the experience with yarn compacting are systematically passed on to the Com4compact customers.

The result of all this compared to the compact yarns of competitors:
- Com4compact with higher degree of compacting.
- Com4compact with consistent compacting results.
- Com4compact with higher tenacity values.
- Com4compact with faster results with new compact applications.

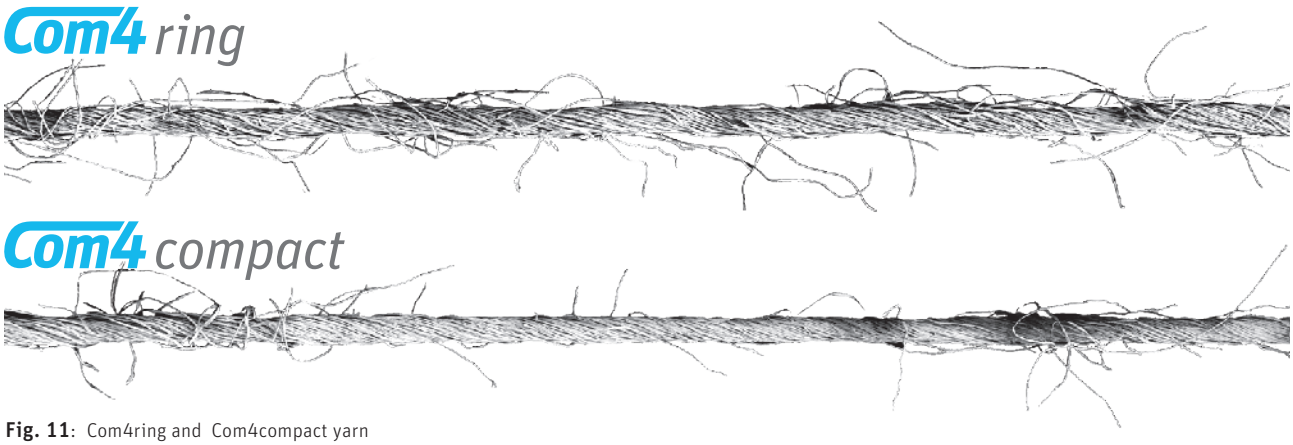


Fig. 11: Com4ring and Com4compact yarn

Com4rotor stands for the lowest achievable yarn twists at certain tenacity, few piecers and the most consistent and yarn-like piecers in comparison to competitor rotor yarns.

Com4rotor yarn has a great potential to reduce the twist factor which is the basic prerequisite for the production of textiles with a soft touch. The state-of-the-art spin box technology of the R 60 rotor spinning machines facilitates the manufacture of yarns with low yarn twists while simultaneously maintaining yarn tenacity and imperfection level.

The low number of start-up joints is a further difference compared to competitor rotor yarns. The optimal running properties of the modern spin box technology lead to a minimal number of ends-down during the spinning process.

The easy realization of the optimal setting for optical and strength-optimized spinning start-up – achieved by an intelligent spinning start-up system with the start-up function AEROpiecing – ensures yarn-like piecers.

The result of all this compared to the rotor yarns of competitors:
- Com4rotor yarn optimal for soft knitted fabrics.
- Com4rotor yarn with better downstream processing properties.
- Com4rotor yarn with invisible piecers in the fabric.

Com4jet yarn exhibits unique yarn hairiness and invisible piecers when compared to air-spun competitor yarns.

The different hairiness character to that of competitor air-jet yarns is attributable to the different fiber guidance in the spinning process in the so-called fiber feeding element (FFE).

The greatest and most decisive difference compared to competitors is the spinning start-up system. Setting of a piecing such as with Com4jet can be made far more easily and precisely in relation to optics and tenacity.

The result of all this compared to the air-jet yarns of competitors:
- Com4jet fabrics with lower pilling tendency.
- Com4jet yarn with fewer ends-down in further processing.
- Com4jet yarn with invisible yarn piecings.

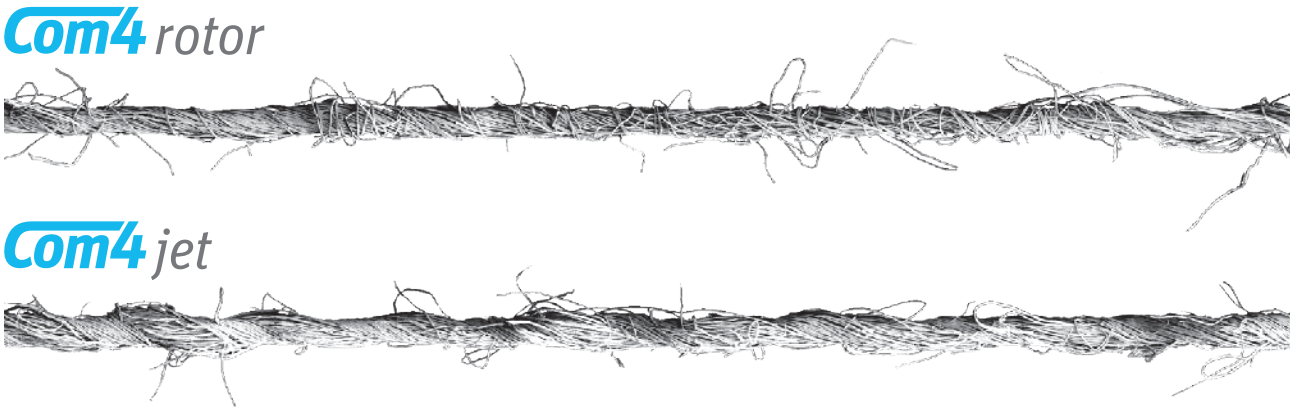


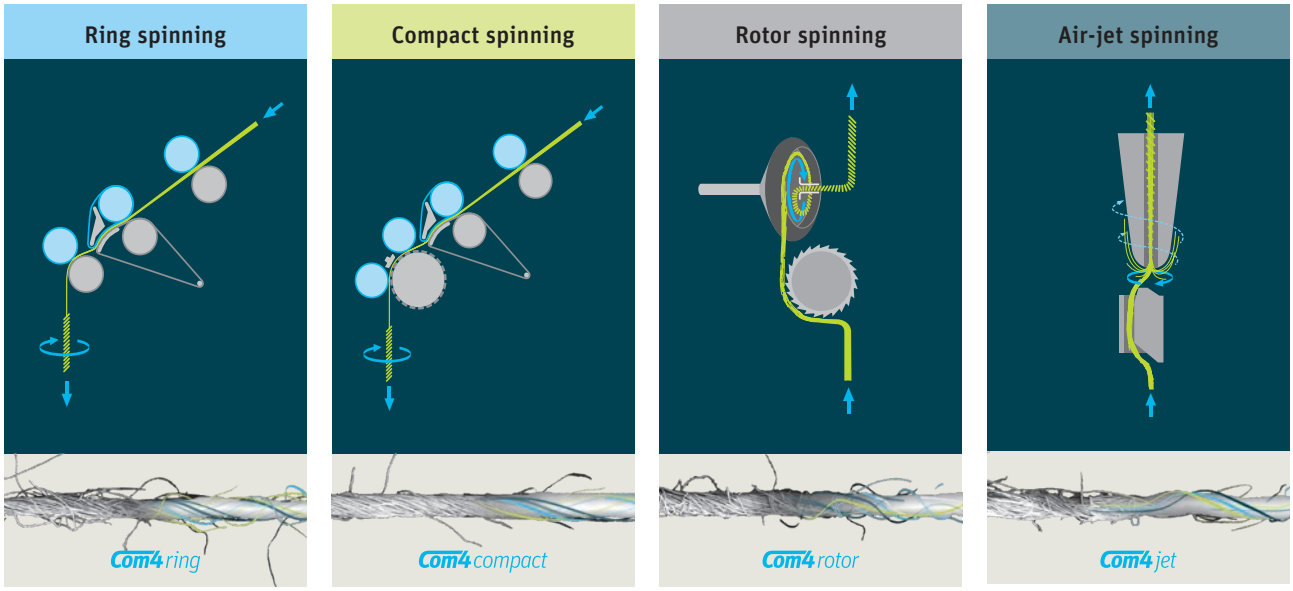
Fig. 12: Com4rotor and Com4jet yarn

3 Com4 Yarn in Practice

3.1 Yarn count range

A look at practical application highlights further differences between the 4 spinning technologies. A decisive parameter for the selection of the suitable spinning process is the yarn count (Fig. 13).

Com4ring has the greatest flexibility in the choice of the yarn count. The spinning range covers Ne 5 – 250. **Com4compact** is seen in the range from Ne 10 – 250. **Com4rotor** is found in practice rather in the coarse range but is also possible from Ne 3 to Ne 60. However, Ne 60 can only be produced with microfibers. With **Com4jet** yarn count ranges of Ne 20 to Ne 70 are being spun. Ne 70 is also only produced with microfibers, as the minimal number of fibers in the yarn cross-section should not be less than approx. 95 fibers.



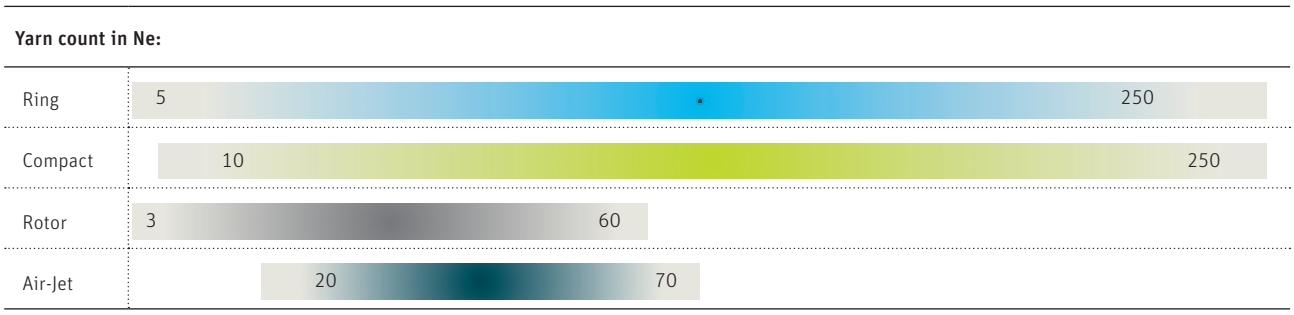


Fig. 13: Yarn count range in comparison

3.2 Material in use

The choice of raw material and yarn type depends on the question of how the spinning process deals with the characteristics of the raw material as well as the combination of fiber property and yarn structure (Fig. 14).

Carded cotton is mainly processed to Com4ring and Com4rotor yarns. Combed cotton is processed to Com4ring, Com4compact and Com4jet yarns. With Com4rotor there is no point in using combed feeds, as there is no advantage for volume and yarn.

Cellulosic fibers such as Viscose, Modal or Lyocell are processed in practice from Com4ring, Com4rotor and Com4jet. Cellulosic fibers or synthetically produced fibers lead to such high yarn tenacities and low hairiness values that a compacting process brings only small benefits to Com4ring yarn in the majority of cases. The consequence – in practice the raw material is seldom processed to compact yarns.

Synthetic fibers like polyester are implemented with Com4ring and Com4rotor and meanwhile also started with Com4jet. If, however, the synthetic proportion is smaller than 50%, then Com4jet is also a possible application.

With recycled fibers that are characterized by high trash contents and high proportions of short fibers, the Com4rotor process clearly dominates. No other spinning technology can extract trash so well during the spinning process and use short fibers as filling fibers in the yarn cross-section.

Raw material	Com4ring	Com4compact	Com4rotor	Com4jet
Cotton carded	oo	o	oo	
Cotton combed	oo	oo		oo
Cellulosic fibers	oo	o	oo	oo
Polyester	oo		oo	o
Other synthetics	oo		oo	
Blend: CO/< 50% Cellulosic	oo	o	oo	oo
Blend: CO/>50% Cellulosic	oo	o	oo	oo
Blend: CO/<50% PES	oo	o	oo	oo
Blend: CO/>50% PES	oo		oo	oo
Blend: Cellulosic/<50% PES	oo	o	oo	o
Blend: Cellulosic/>50% PES	oo		oo	oo
Other MMF blends	oo		oo	
Recycled fibers	o		oo	

Fig. 14: Raw material in practical use, split up according to Com4 yarn. usual application; seldom application

3.3 Quality parameters

Each spinning technology forms a typical yarn structure. Similarly, each structure determines the yarn properties and therefore also the character and properties of the final textile. There are clear differences between the four yarn types, as the network diagram illustrates (Fig. 15). The classification into “better” or “worse” values needs to be viewed in the overall context.

Spinning systems for different requirements
Ring and compact yarns have the best unevenness, few imperfections, and relatively good tenacity and elongation values. These results are based on the draft of the fiber mesh and the type of twist distribution on the ring or compact-spinning machine.

In terms of yarn hairiness, the conventional ring spinning process is the worst. A compacting process can significantly reduce the hairiness. However, the lowest hairiness is achieved by the air-jet spinning process. Since hairiness correlates closely with abrasion and pilling, the air-jet spinning process also performs best in these categories.

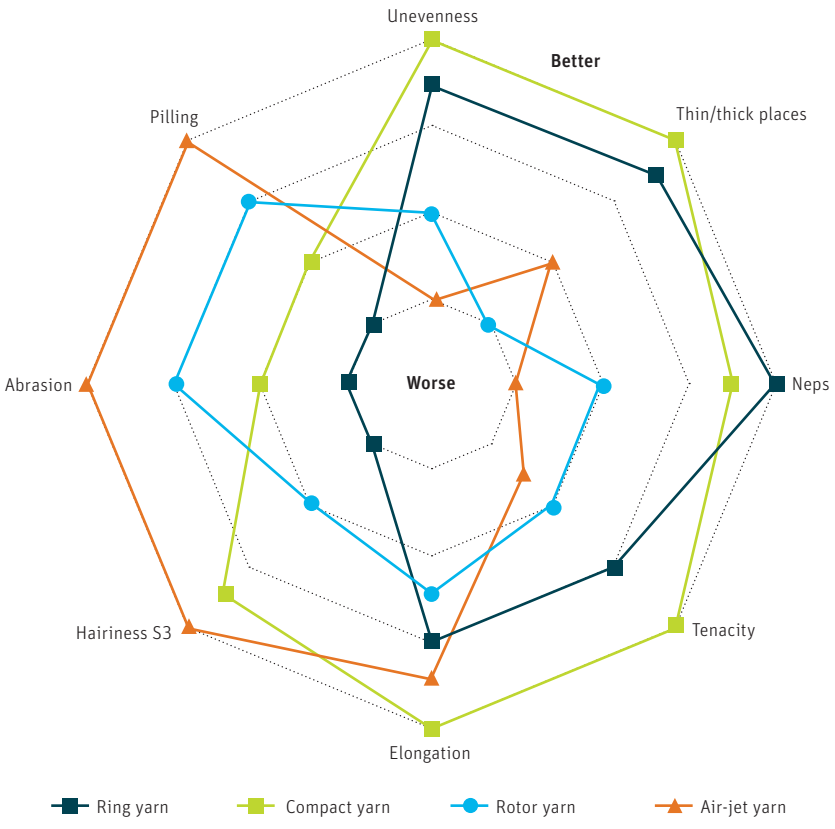
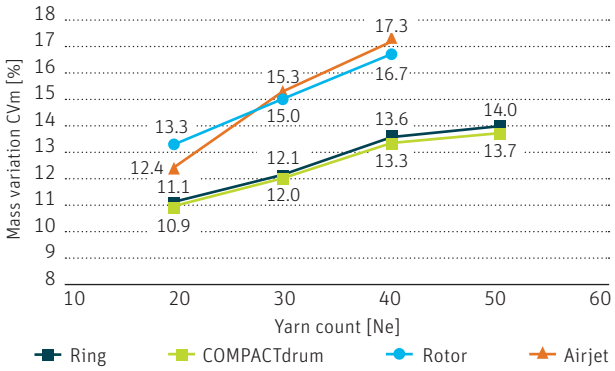


Fig. 15: Depending on the spinning process, the yarns have various properties and are suitable for different applications.

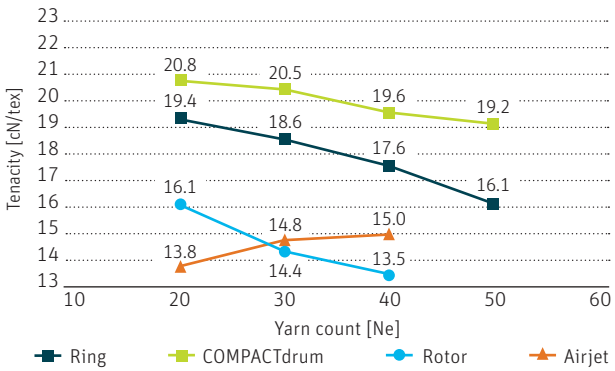
Rieter . **Rieter Com4 Yarns**

Unevenness on different spinning systems
100% CO carded



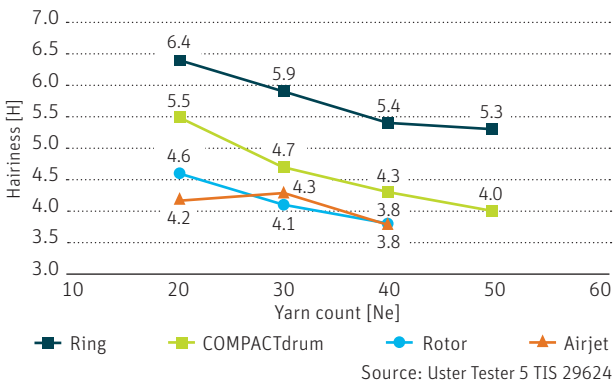
Source: Uster Tester 5 TIS 29624

Breaking tenacity of different spinning systems
100% CO carded



Source: Tensojet TIS 29624

Hairiness on different end spinning systems
100% CO carded



Source: Uster Tester 5 TIS 29624

Fig. 16 – 18: The graphs show that depending on the needed yarn characteristics a different yarn type should be chosen.

For decades, test results derived by the customer technology from practical applications as well as findings from tests in the Rieter Spin Centers have been collected worldwide in a central database. This accumulated knowledge helps to assess the 4 spinning systems from Rieter. Fig. 16 to Fig. 18 show extracts from the Rieter yarn statistics. The graphs emphasise Rieter's technological know-how.

Many quality parameters are strongly dependent on the yarn count as well as on the raw material used. It is clearly seen that due to the yarn properties, typical areas of application in relation to the yarn count of each yarn type have emerged in practice. For instance, rotor yarn which possesses numerous positive yarn characteristics especially in the coarse count range.

Rieter . Rieter Com4 Yarns

3.4 Competent advice for the complete spinning process

Complete Rieter plants, from bales through to yarn, carded or combed, guarantee the best yarn qualities by greatest fiber utilization with the most efficient spinning process (Fig. 19).

As the only textile machine manufacturer worldwide, Rieter provides competent advice for the entire spinning plant. Only someone who masters all 4 spinning processes can offer neutral recommendations, tailor-made to the individual requirements of the customer.

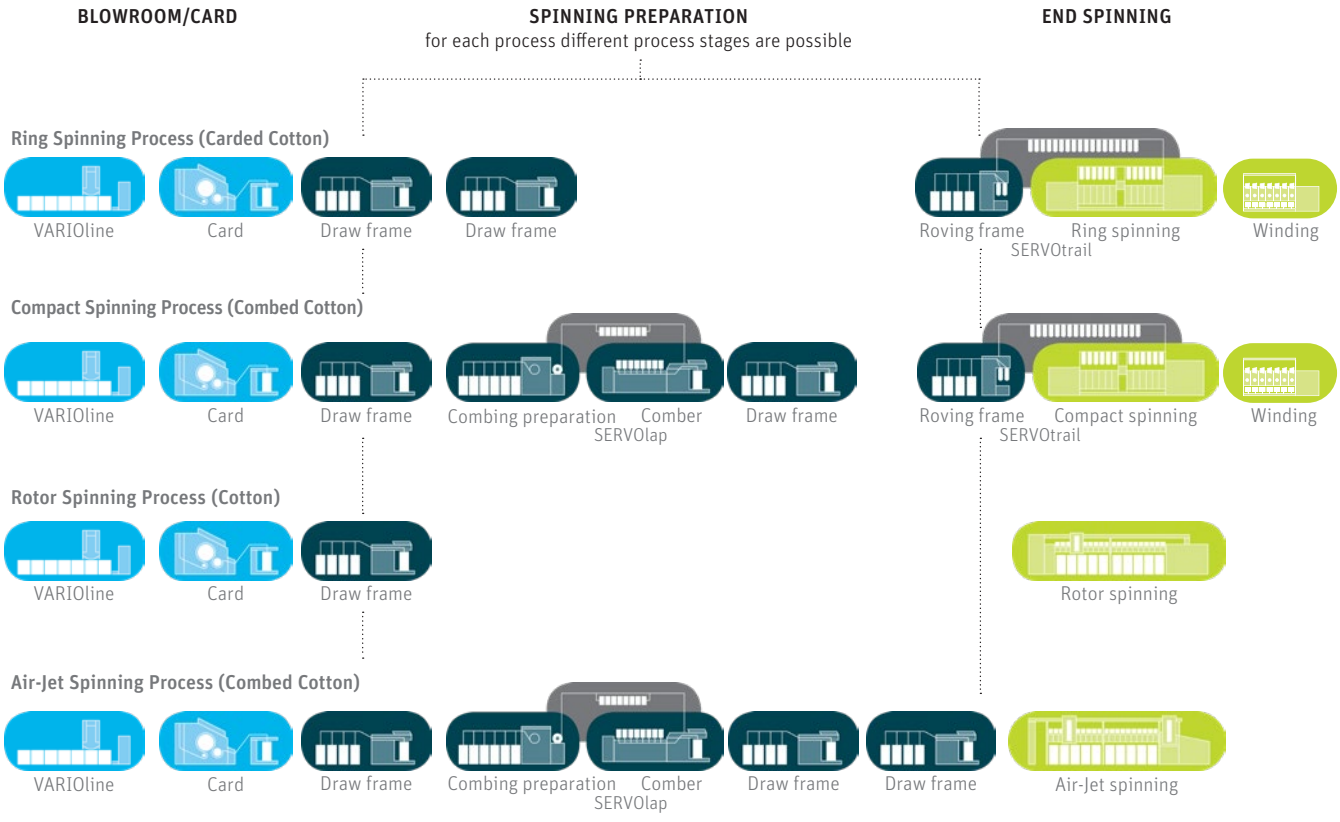


Fig. 19: Examples for complete manufacturing processes of the Com4 yarns

4 All about the Com4 License

4.1 Advantages in using the Com4 brand

Your advantage in using the Com4 brand is, briefly stated, the securing of your sustainable success (Fig. 20). To distance yourself from competitors means being different or better, being able to offer your customers more than the others can. By selling and trading Com4 yarns, you are showing that you offer high-quality yarns. You profit directly from the Com4 campaign launched by Rieter. Knitters and weavers know the benefits of Com4 yarn and trust in the quality of the delivered yarn.

Fig. 20: Your path to success with Com4

4.2 The path to your license

You, as spinning mill or fabric manufacturer, can contact Rieter any time and apply for the Com4 license (Fig. 21).
Either contact the responsible Rieter salesperson or apply on the Rieter website www.rieter.com via contact form.

Rieter experts from the sectors sales, product management, service and textile technology validate the applications. Spinning companies, who have their spinning process completely under control, maintain their machine park well and have high quality expectations that they also implement, have the best chance to obtain a license.

Examined is whether the applicant manufactures yarns on the specified machine generations. Com4ring must be produced on the ring spinning generations.

Com4compact on the compact spinning generations or on Rieter ring spinning machines with COMPACTdrum, COMPACTapron or COMPACTeasy. Com4rotor yarn on the rotor spinning machines. Com4jet yarn is produced on the air-jet spinning machines.

Following a positive decision, a license contract is concluded. The new licensee can directly profit from the Rieter marketing actions.

Fig. 21: The path to Com4 licensing

5 Head Start through Market Know-how

5.1 Textile fibers and their applications

From 118 million tons of fibers, 66 million tons of apparel, 13 million tons of technical textiles and 9 million tons for use in the nonwovens industry are produced every year. 5 million tons are used for non-textile applications such as car tyres. The machines from Rieter are designed for processing 55 million tons respectively 54% of the staple fiber and filaments (Fig. 22). This leads to a total short-staple fiber yarn production of 54 million tons per year.

Textile Fiber Mill Consumption 2022

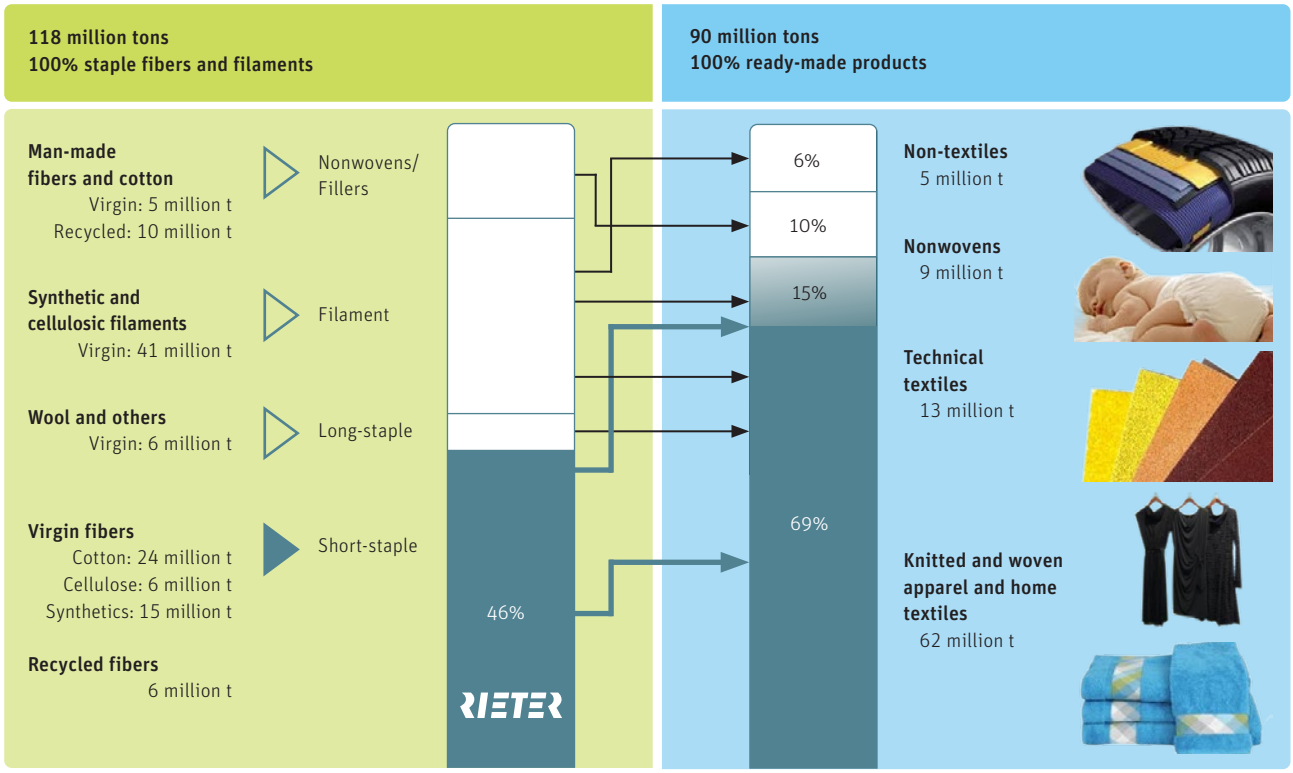


Fig. 22: Almost half of all textile fibers are suitable for processing on machines and plants from Rieter.

Wood Mackinzie,
Rieter Market intelligence estimate

5.2 Recycled fibers in the textile process

Included in the 55 million tons of short-staple fibers are recycled fibers whose percentage has risen in recent years and which have become increasingly important. Currently, around 6.7 million tons of recycled fibers per year are taken from various stages of the textile manufacturing chain and fed back into the spinning system (Fig. 23).

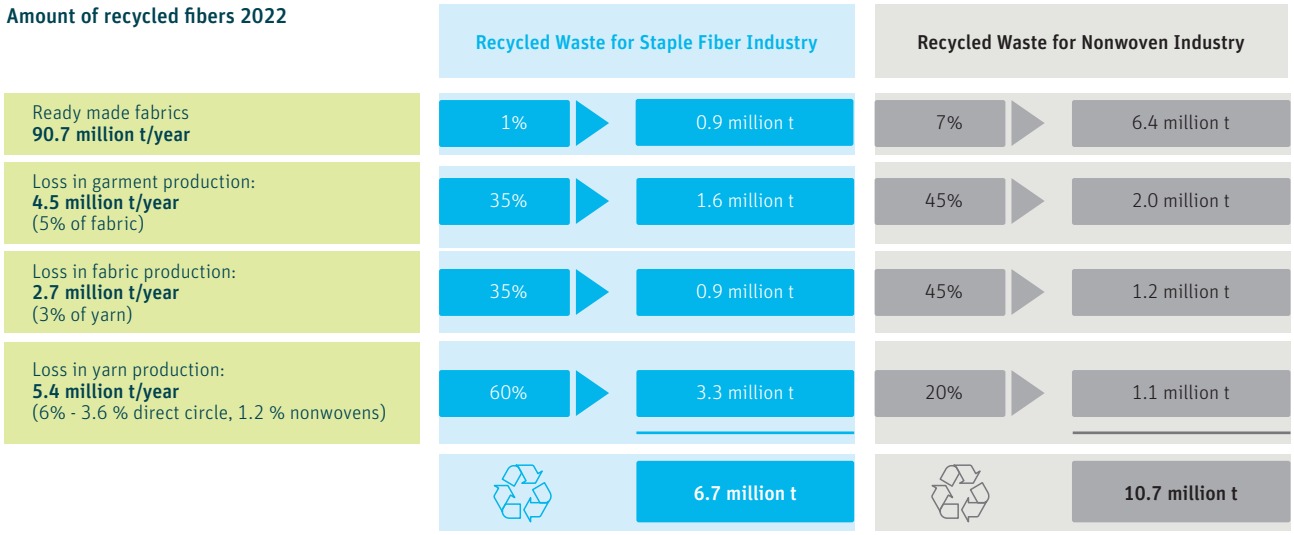


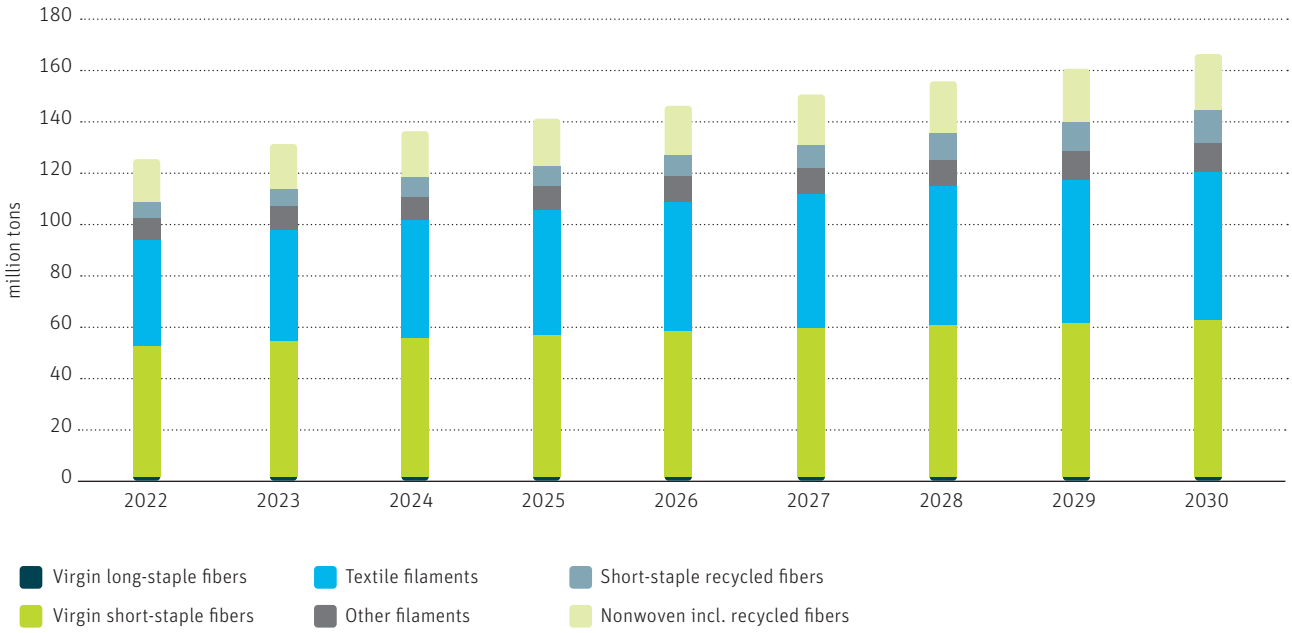
Fig. 23: The material losses in the textile production chain are fully incorporated into the textile process.

Rieter Market Intelligence estimate

5.3 Textile fiber mill consumption continues to grow

From 2022 to 2030, it is forecast that the total fiber mill consumption will rise by 32% – from 125 to 166 million tons of fibers. The ratio of textile filaments to virgin short-staple fibers will grow (Fig. 24).

World Fiber Type Distribution



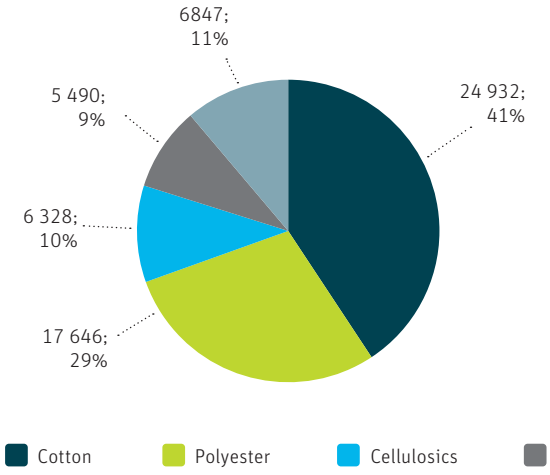
Source:
Wood Mackenzie – Global Fibres Demand 2022

Fig. 24: The total fiber mill consumption increases from 2022 to 2030 by 32% (125 to 166 million tons).

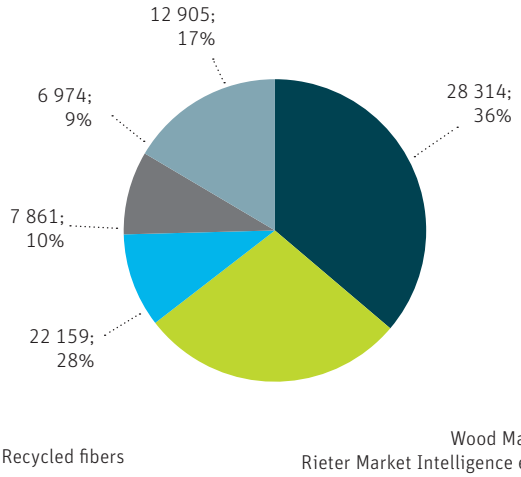
5.4 Cotton remains the dominant fiber

In absolute terms, the amount of short-staple fibers will grow by 30% – from 61 in 2016 to 78 million tons in 2022. The percentage of cotton will reduce slightly, polyester short-staple fibers will stay the same while cellulosics will increase slightly (Fig. 25).

World Short-Staple Fiber Mill Consumption by Material Distribution 2022
61 million tons short-staple fibers



World Short-Staple Fiber Mill Consumption by Material Distribution 2030
78 million tons short-staple fibers



Source:
Wood Mackinzie,
Rieter Market Intelligence estimate

Fig. 25: Cotton remains the dominant fiber in the staple fiber sector.

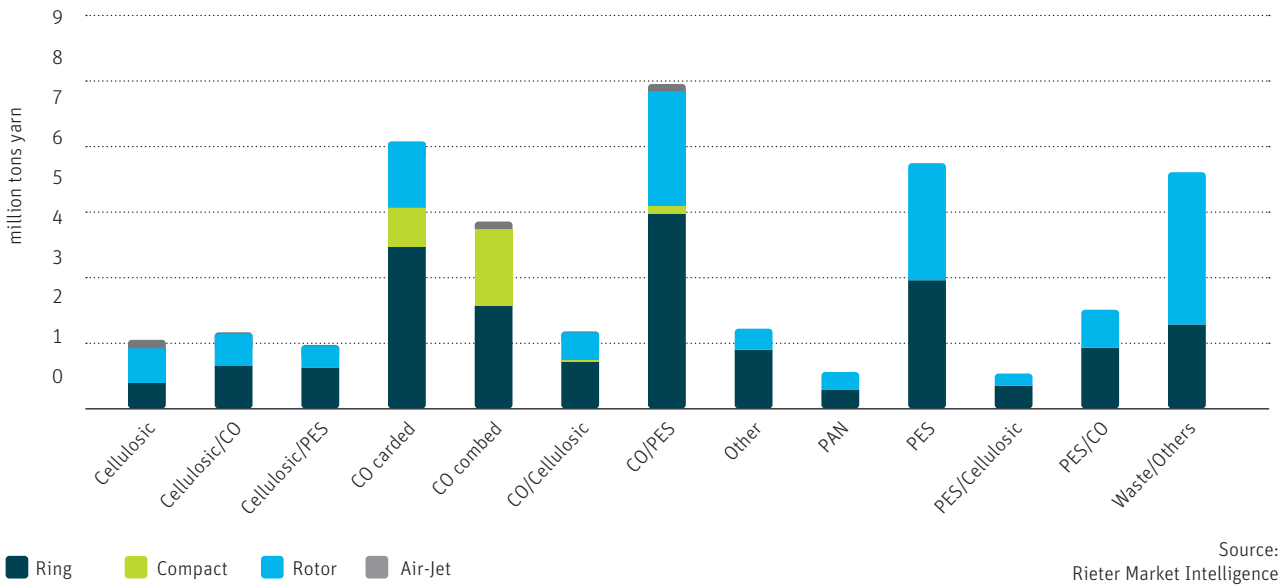
5.5 Blends continue to gain ground

In accordance with the requirements of the various textile applications, the addition of cellulosic or synthetic fibers offers great possibilities for adaptation with regard to fabric characteristics. In the future more and more yarns will be blended yarns. The mix of cotton with polyester dominates the blended yarn range with approx. 60%.

With a view to the distribution of raw material across the 4 spinning systems, ring spinning is the most flexible system that can process all raw materials, closely followed by rotor spinning. With compact spinning of man-made fibers, no technological advantages are achieved. For this reason, compact yarns are mainly produced from cotton. Air-Jet yarns are primarily spun from cellulosic fibers, cotton and blends thereof as well as from blends of cotton and polyester (Fig. 26).

Material blends in textile fabrics are realized with two methods – yarn blends within the fabric structure or yarns from intimately blended fibers that are processed to a fabric.

Current Raw Material Distribution by Spinning Technology



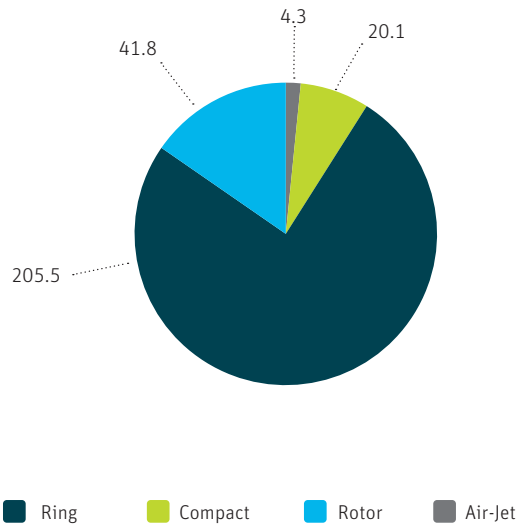
Source:
Rieter Market Intelligence

Fig. 26: Blends are the most dominant raw materials.

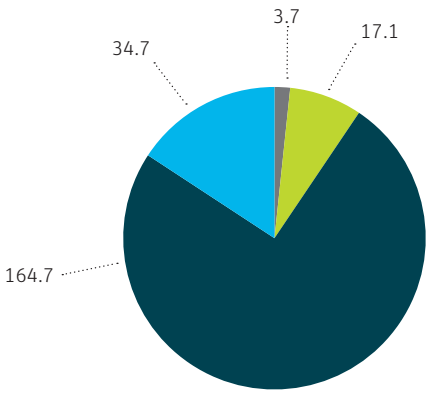
5.6 220 million spindle equivalents are producing for 7 billion humans

From the installed 272 million spindle equivalents* 81% (220 million spindle equivalents) are really in production. Today, 2% of the yarns are produced with air-jet spinning systems, 7% with compact, 15% with rotor and 76% with ring spinning systems. The basis here is the information provided by the ITMF 2018 (International Textile Manufacturers Federation) as well as Rieter internal statistics (Fig. 27).

Installed Capacity Distribution by Spinning Technology 2022
272 million spindle equivalents



Active Capacity Distribution by Spinning Technology 2022
220 million spindle equivalents



* Productivity factor:
Ring: 1
Compact: 1
Rotor: 5.25
Air-Jet: 20

Source:
Rieter Market Intelligence

Fig. 27: In 2018 82% of the installed capacity are permanently used for yarn production.

5.7 Where the journey is heading

Currently, from the 51 million tons of short-staple fiber yarns per year, 28 million tons of ring, 18 million tons of rotor, 3 million tons of compact and approx. 1 million tons of air-jet-spun yarns are produced (Fig. 28).

If the yarns are assessed according to the specific applications, then the potential production of each yarn within the Rieter segmentation model can be derived. In other words, the statement can be made how many tons of yarn per type must be spun when the optimal yarn properties for the application are considered.

According to the potential analysis derived from the Rieter segmentation model, compact and air-jet-spun yarns are growing at the expense of ring yarn.

Yarn Quantity Distribution by Spinning Technology 2022
55 million tons short-staple fiber yarn

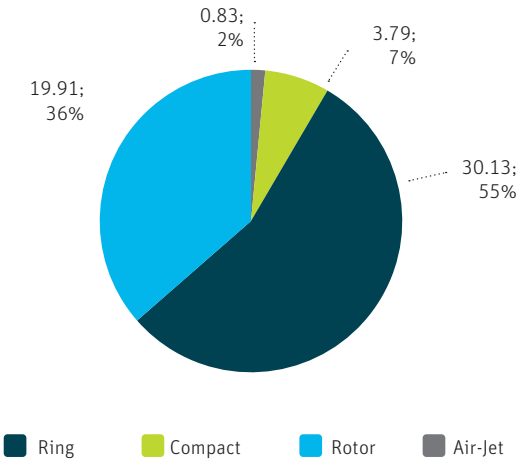


Fig. 28: The current yarn segmentation based on the spinning technology.

Source: Rieter Market Intelligence

5.8 Fabric type and end products

63% of the staple fiber yarns are processed to woven fabrics. Only air-jet yarn takes a larger share in knitting applications (Fig. 29). The young technology was often examined and optimized first for knitting applications. However, weaving applications are increasingly being developed and implemented.

Current Construction Distribution by Spinning Technology

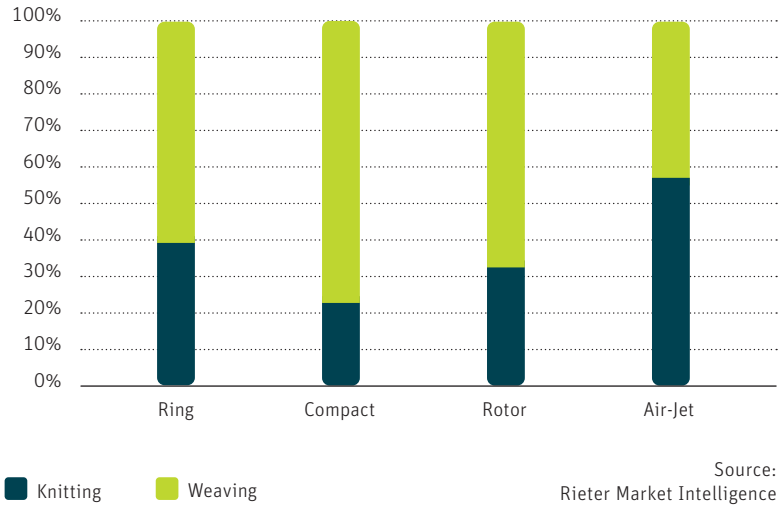


Fig. 29: 63% of the staple fiber yarns are designed for weaving applications.

Source: Rieter Market Intelligence

Outerwear is the largest area of application followed by home textiles and technical applications (Fig. 30).
The main yarn count is Ne 30.

Outerwear is encountered in all yarn count ranges except yarns coarser Ne 6 while home textiles tend to require coarser yarn counts. The underwear sector uses medium to fine yarn counts. Technical textiles use coarse to medium yarn counts.

Current Application Distribution by Yarn Count

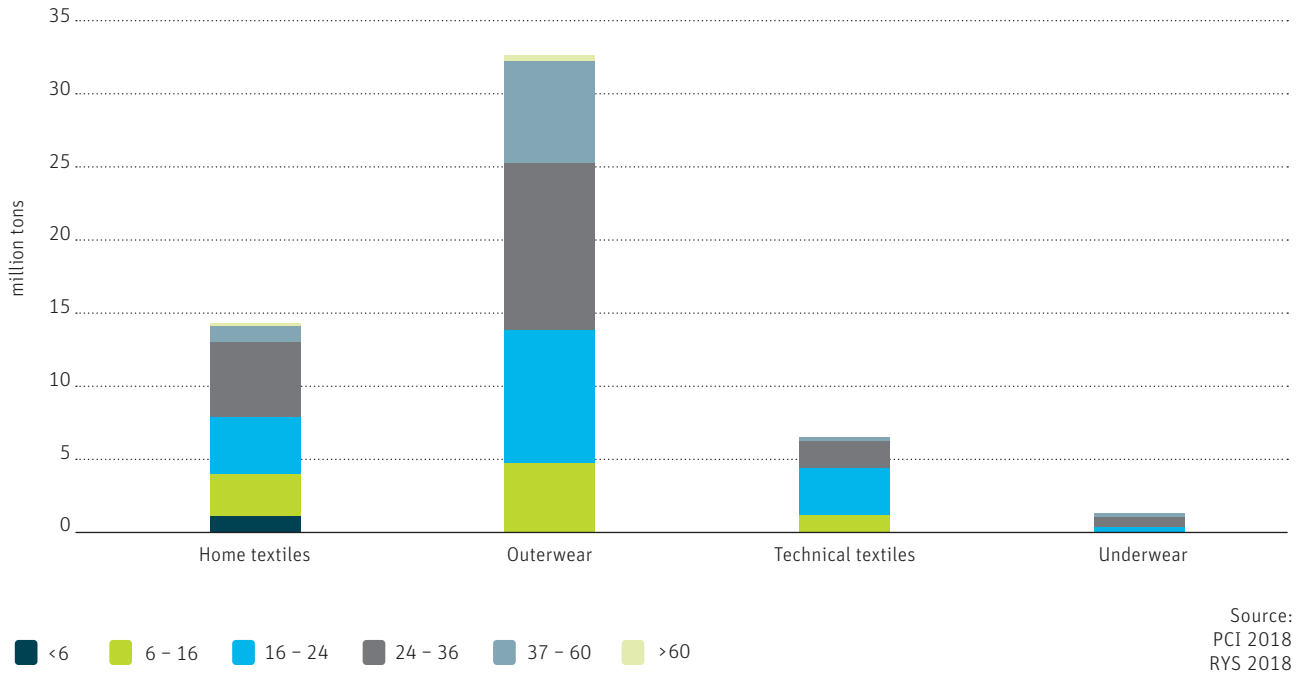


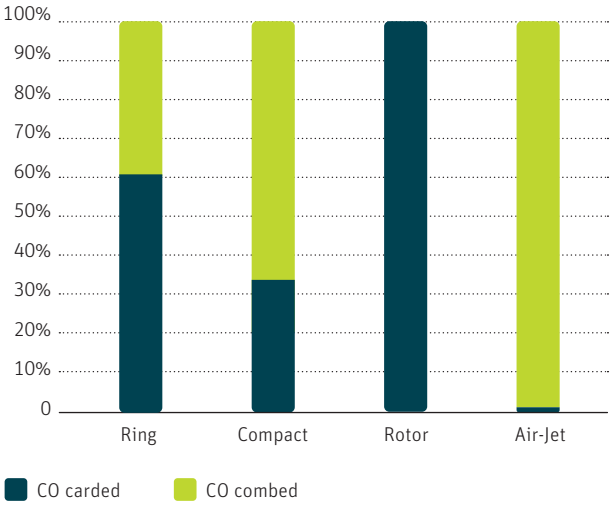
Fig. 30: Outerwear is the most dominant application. The average yarn count is Ne 30.

5.9 Premium through combing

Around 20% of all staple fiber yarns worldwide are combed. More precisely, almost 70% of all cotton compact yarns are combed and more than 40% of all cotton ring yarns. Rotor yarns are, in practice, not generally combed. Almost all air-jet yarns out of cotton use combed raw material (Fig. 31). For blends with cotton used for yarn count Ne 40 and finer combed cotton is preferred.

Technologically, fine yarn counts have a greater requirement for combed feed material than coarse counts. The finer the yarn, the fewer the fibers in the yarn cross-section. This leads to a higher ends-down rate in spinning and thereby to a critical spinning limit. By means of cleanly combed and strongly parallelized fibers the spinning limit can be increased. This part of Rieter's total analysis already shows how different the perspectives of the 4 yarn types are in the market.

Current Fiber Preparation Distribution by Spinning Technology
100% Cotton



Current Fiber Preparation Distribution by Yarn Count
100% Cotton

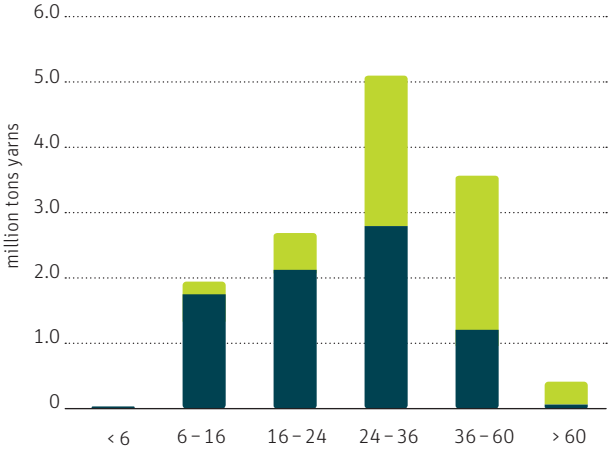


Fig. 31: Great differences in the quantities of combed feed material according to the spinning technology.

Source:
Rieter Market Intelligence
without blends

5.10 Textile knowledge helps to decide

It is not easy to say which spinning process is the best for a spinning plant respectively for an end application. The explanations on the different aspects such as yarn properties, process flexibility and final applications should help spinning plants, yarn sellers and yarn buyers. In practice, it can unfortunately be seen that simply the cheapest yarn is used without taking into consideration the advantages and disadvantages of the downstream processing properties respectively the final product. Great potential for optimizing the fabric characteristics lie idle and are not used. In the end, the seemingly favourably-priced yarn becomes an expensive choice.

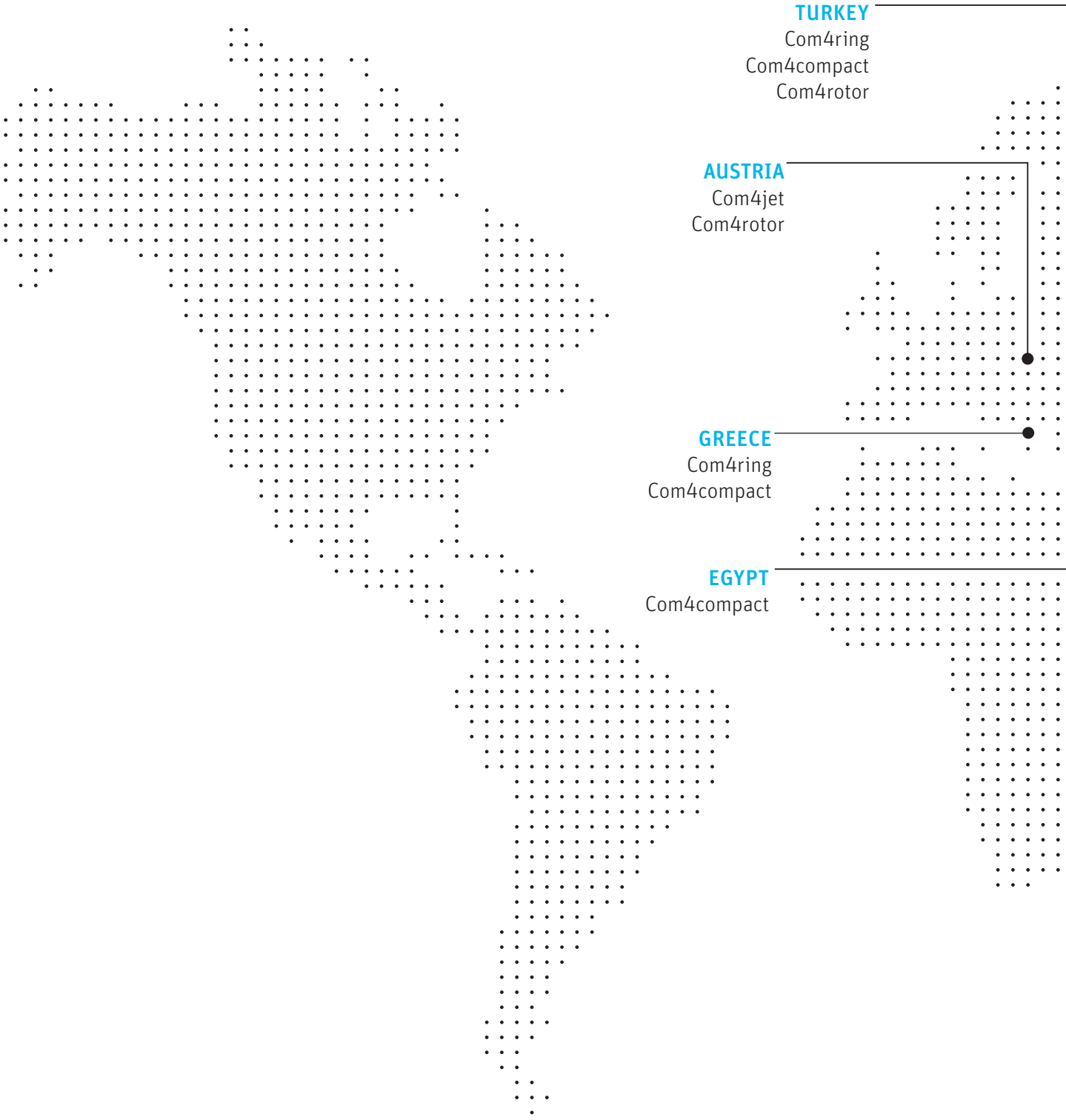
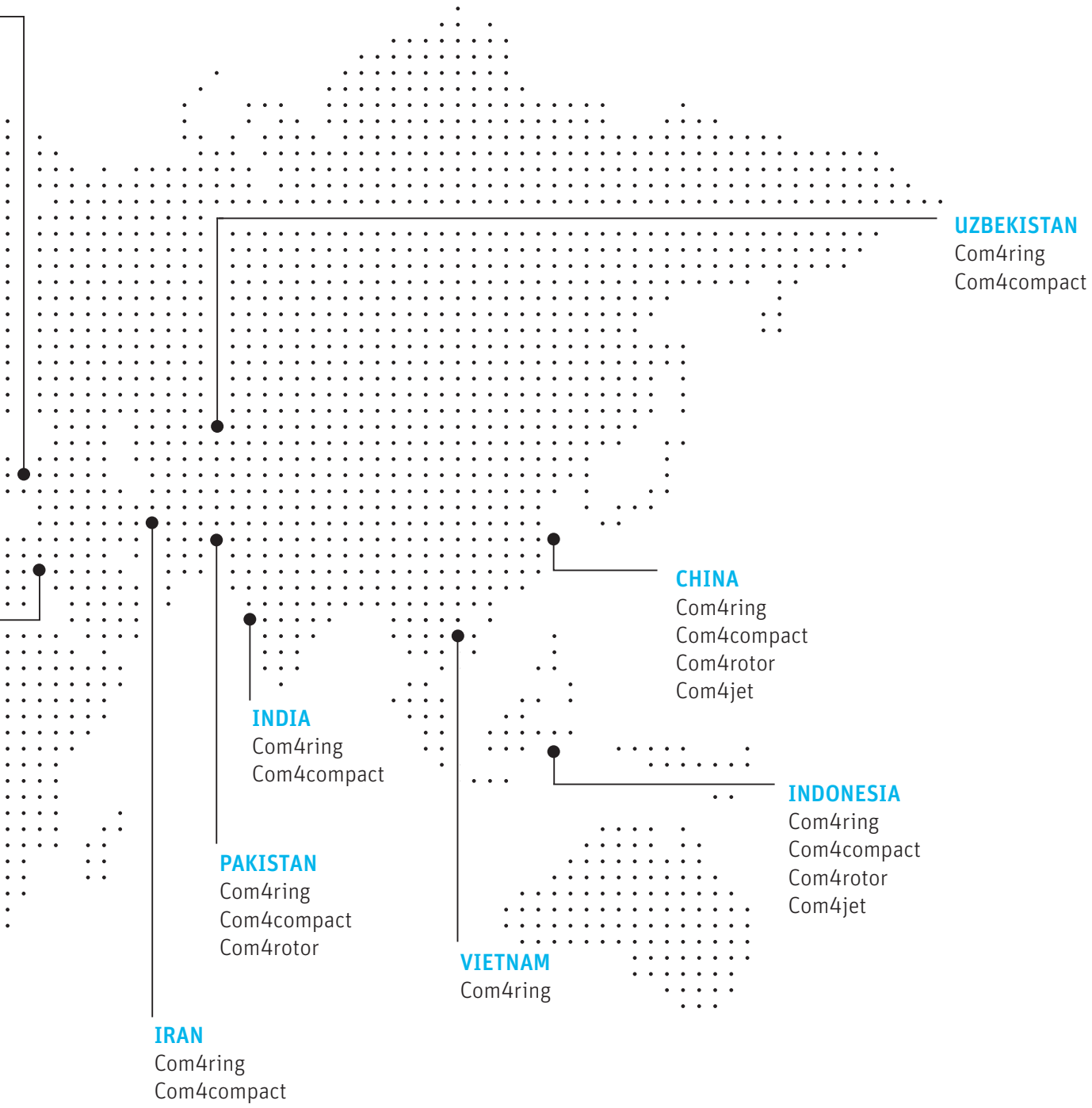


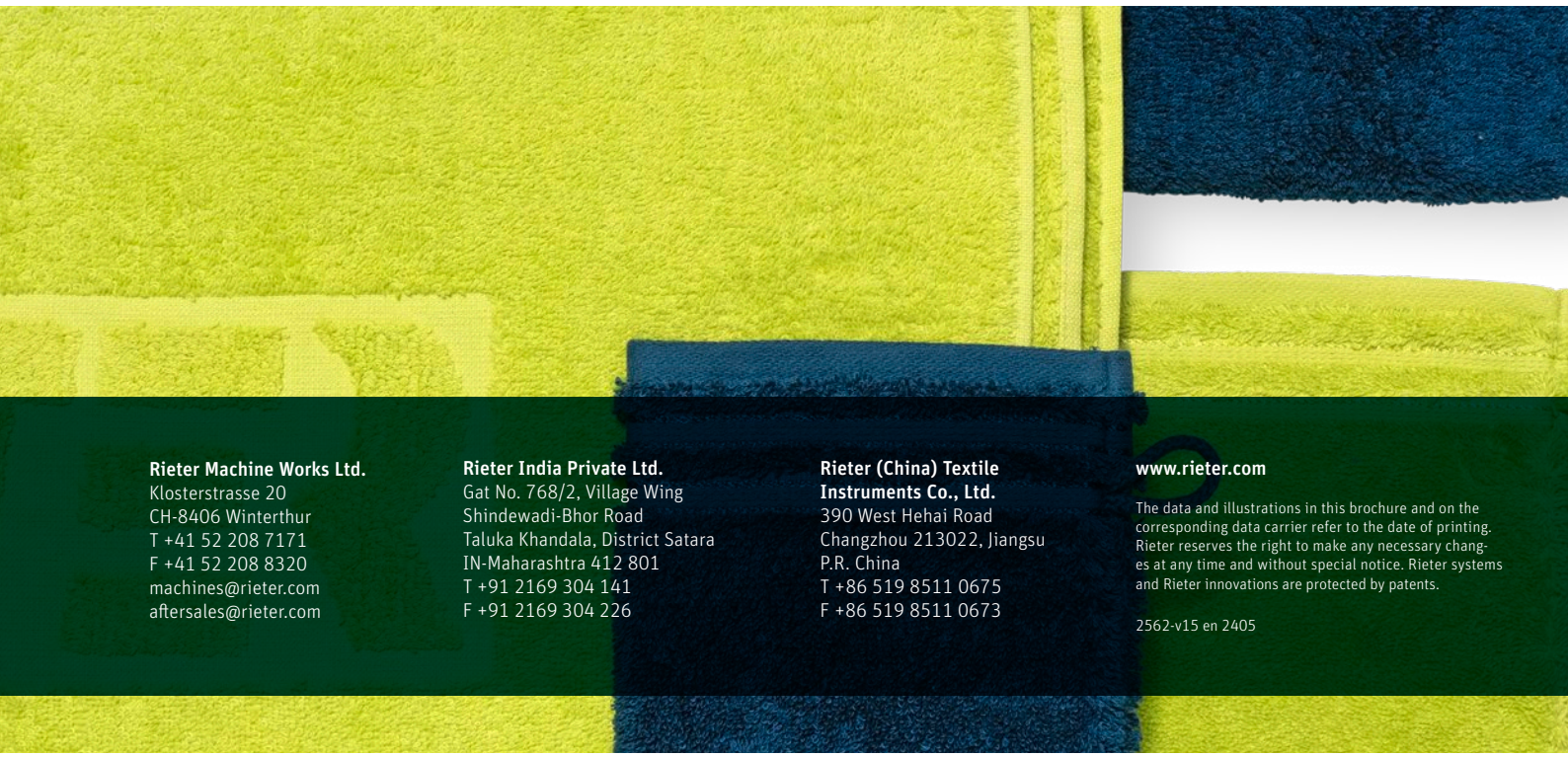
Fig. 32: The Com4 family is steadily growing. Thousands of yarn qualities have been traded as Com4 yarns.



Status: 3Q 2023

Com4 – Yarns of Choice


RIETER



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