

Recycling
Rieter Recycling Spinning Systems

RIETER



Recycling

Rieter Com4recycling systems

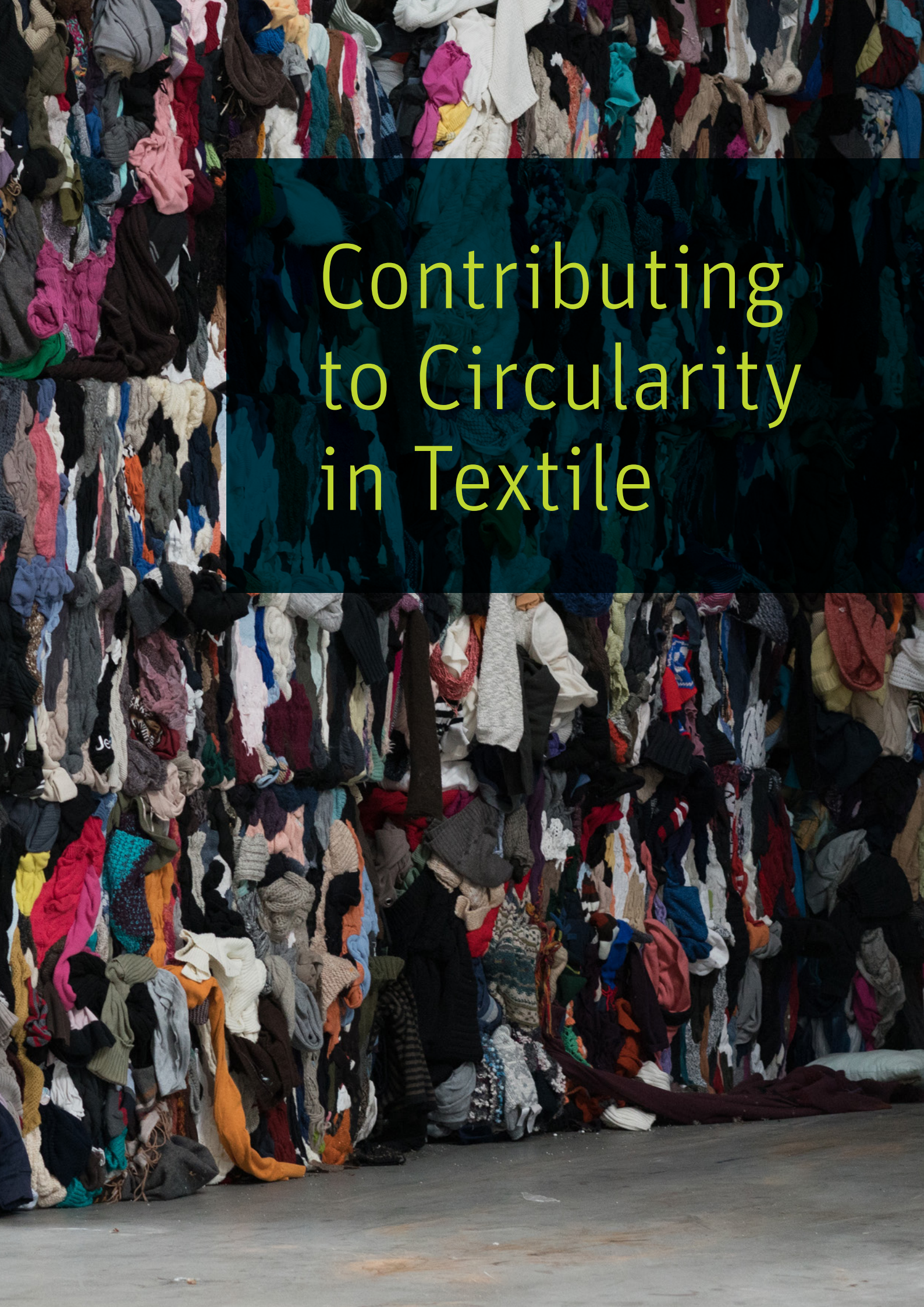


Closing the loop for good



Recycling

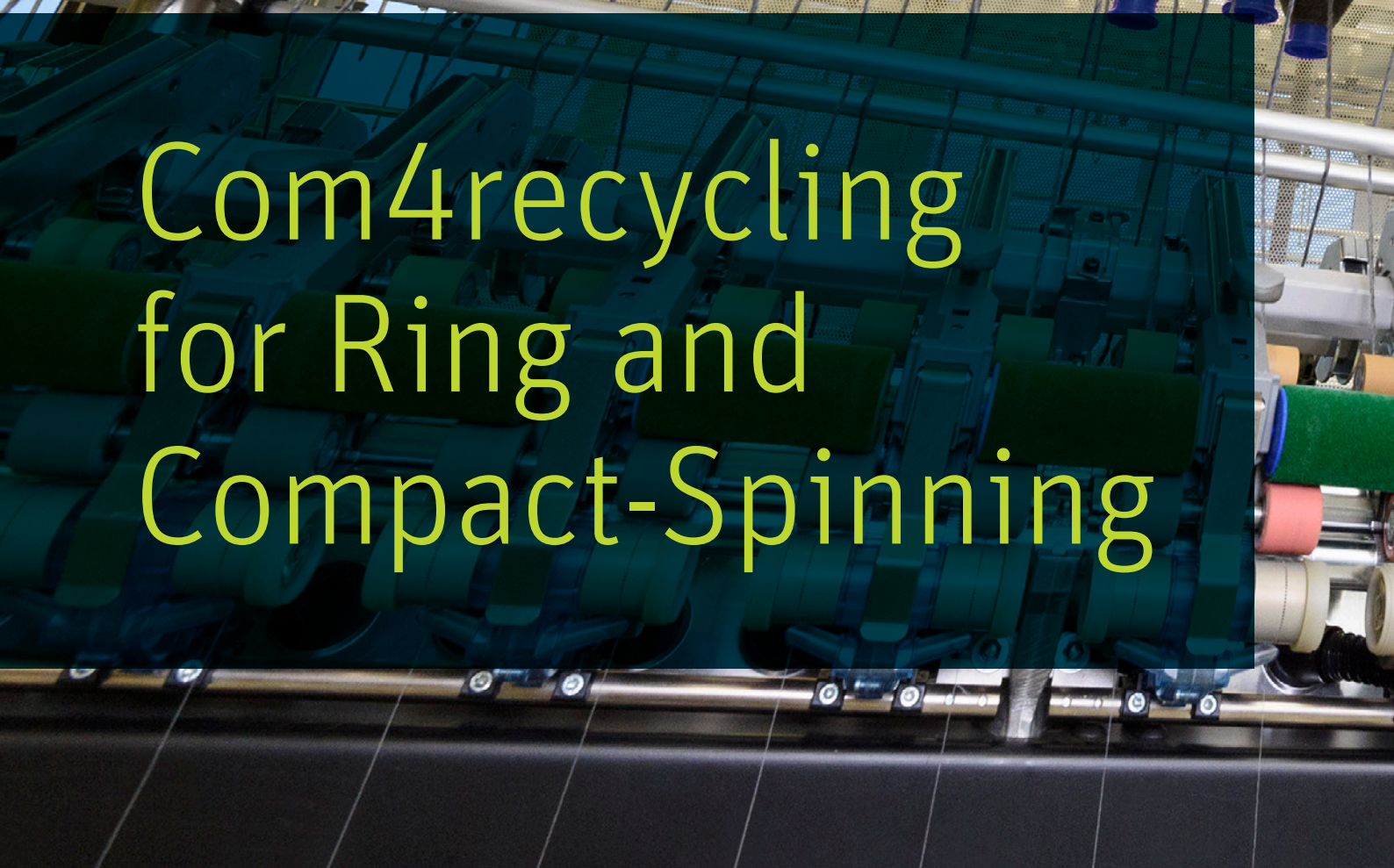
Rieter's technology know-how enables the use of recycled fibers to spin ring, compact and rotor yarns. By pushing the technological boundaries of recycling, Rieter systems contribute to closing the loop in the textile sector.

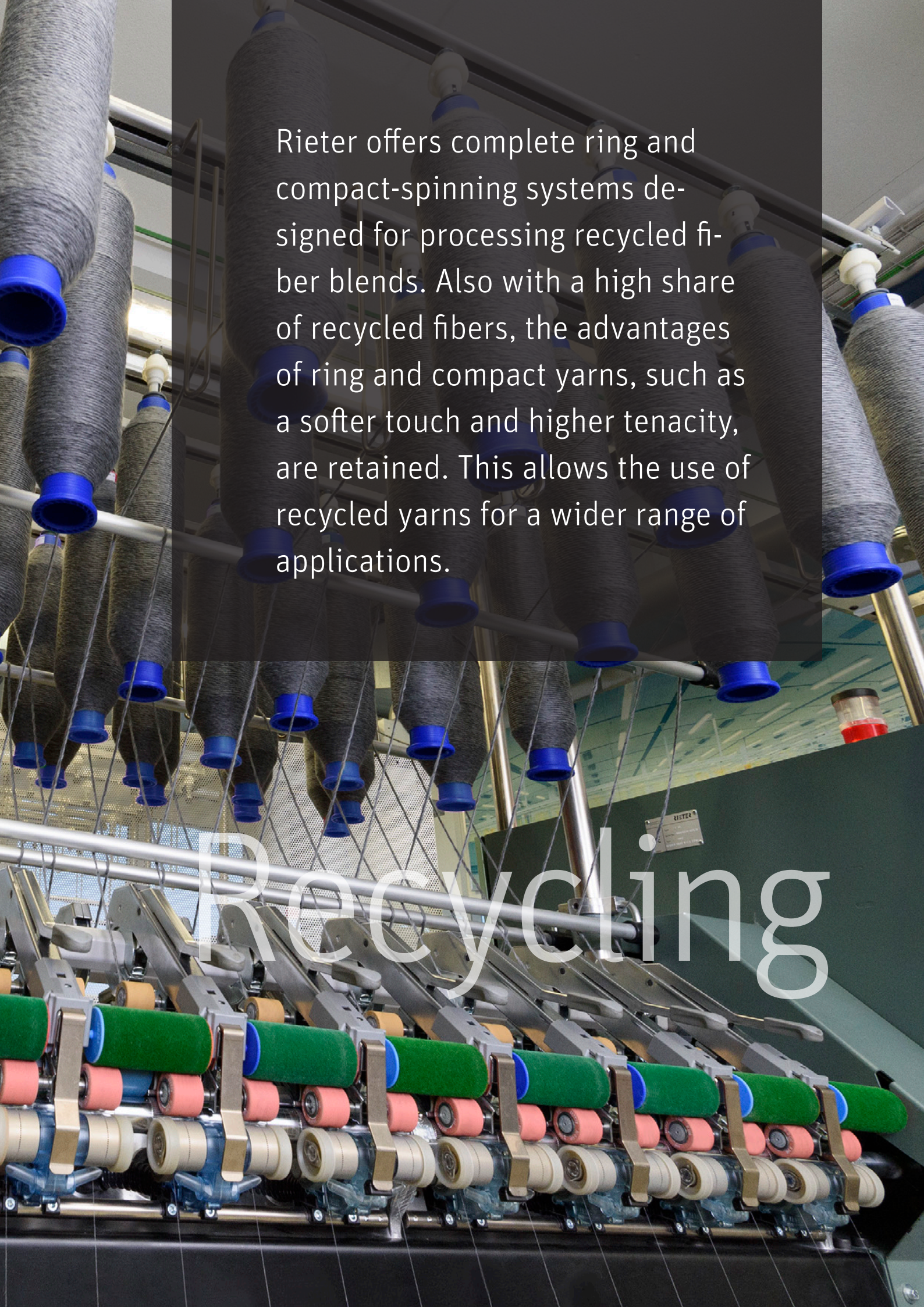


Contributing to Circularity in Textile



Com4recycling
for Ring and
Compact-Spinning





Rieter offers complete ring and compact-spinning systems designed for processing recycled fiber blends. Also with a high share of recycled fibers, the advantages of ring and compact yarns, such as a softer touch and higher tenacity, are retained. This allows the use of recycled yarns for a wider range of applications.

Recycling



Com4recycling for Rotor Spinning

A wooden shelf holds several large spools of yarn in various colors: grey, blue, yellow, white, and green. The word "Recycling" is overlaid in large white text across the middle of the image.

Recycling

Rotor spinning is generally well suited for processing fibers with a high short-fiber content. Special geometries and options of the machines allow optimized processes to achieve finer yarn counts, maximize the share of recycled fibers or increase yarn quality.

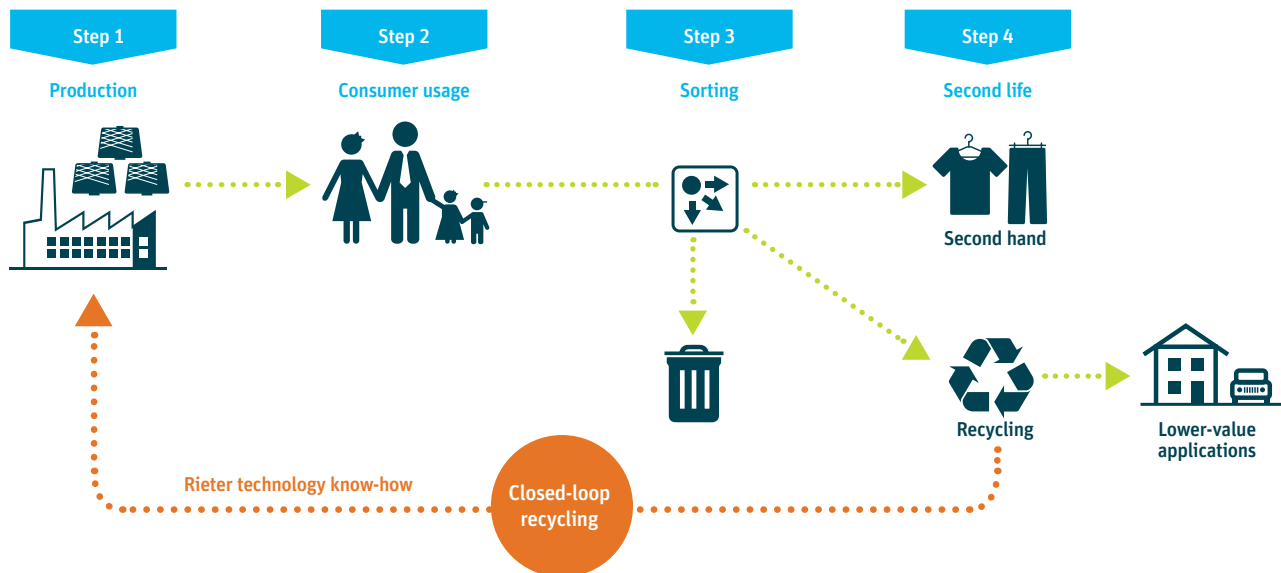
Recycling is Here to Stay

Market potential for recycled materials

Closing the loop for good

Barely 1% of garments is recycled in a closed loop, and 3% are recycled into lower value applications. Three quarters of the clothing produced worldwide end up in landfills. These numbers show why the textile industry is actively seeking ways to make production patterns more sustainable.

Rieter uses its technological expertise to offer a complete recycling spinning system for both ring and rotor spinning lines. This enables customers to spin fibers from used garments and production waste into yarns. The focus is on closed-loop recycling, this means producing similar applications from the recycled garments instead of producing applications with lower value.

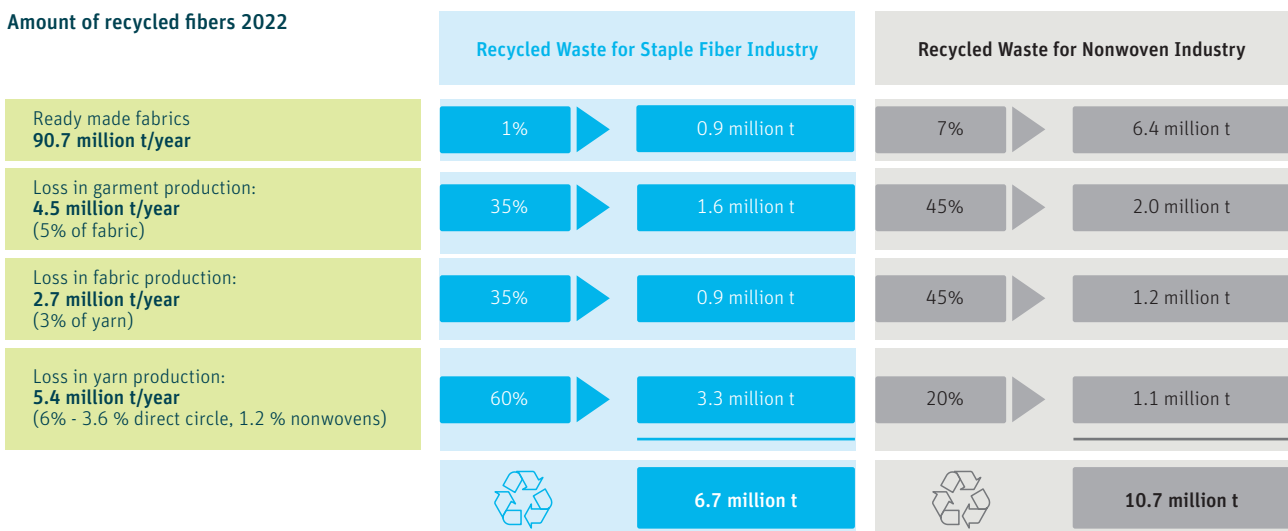


Drivers for recycling

In 2022, 6.7 million tons of recycled fibers per year were taken from various stages of the textile manufacturing chain and were fed back into the spinning system. Legal requirements are the most important drivers for recycling. Specific legislation has been introduced over the last years, such as the European Union’s “European Green Deal” or the United Nation’s “Fashion Industry Charter for Climate Action”.

As a result, many fashion brands will increase their efforts to source more environmentally friendly yarns in the upcoming years. This commitment from brands in combination with the changing demands from end users make clear that recycling is not a trend but is here to stay.

Amount of recycled fibers 2022



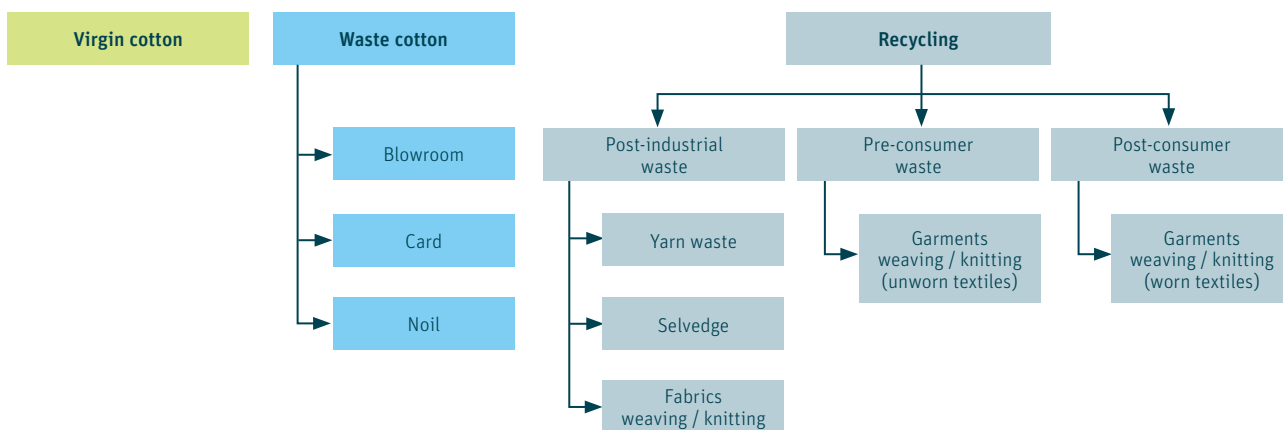
Challenges of Mechanically Recycled Material

High short-fiber content and unopened material

Special properties of recycled fibers

Mechanical recycling means the reopening of garments and fabrics into fibers by mechanical force. This opening process leads to a shortening of the original fiber length. The resulting fibers are characterized by a high short-fiber and nep content and the presence of unopened yarn pieces. Today's technologies are improving; however, the fibers remain with a very high short-fiber content. With Rieter's technological know-how, however, the spinning process is adapted to these challenges and spinners can spin quality yarns to produce recycled garments.

Different recycling raw materials



Today, most of the available fibers from mechanical recycling originate from post-industrial waste, because the effort required to open the material is lower. With almost endless possibilities of material blends and colors, the sorting, cleaning and opening process of post-consumer garments remains the main challenge. As new sorting technologies are developed, the availability of post-consumer fibers for re-spinning is going to increase in the next years. In terms of sustainability and the goal of reducing the amount of clothing going to landfill, this is the most effective lever and the direction, where the industry needs to move.

Blending with longer fibers

The higher amount of short fibers makes it necessary to blend the mechanically recycled fibers with longer fibers, like virgin cotton or man-made fibers. The fiber length of mechanically recycled fibers is determined by many different factors, such as original raw material, fabric construction, dyeing, finishing techniques, and the settings during the tearing process.



Setting New Standards

Providing recycling classifications and licenses

Rieter recycling classification

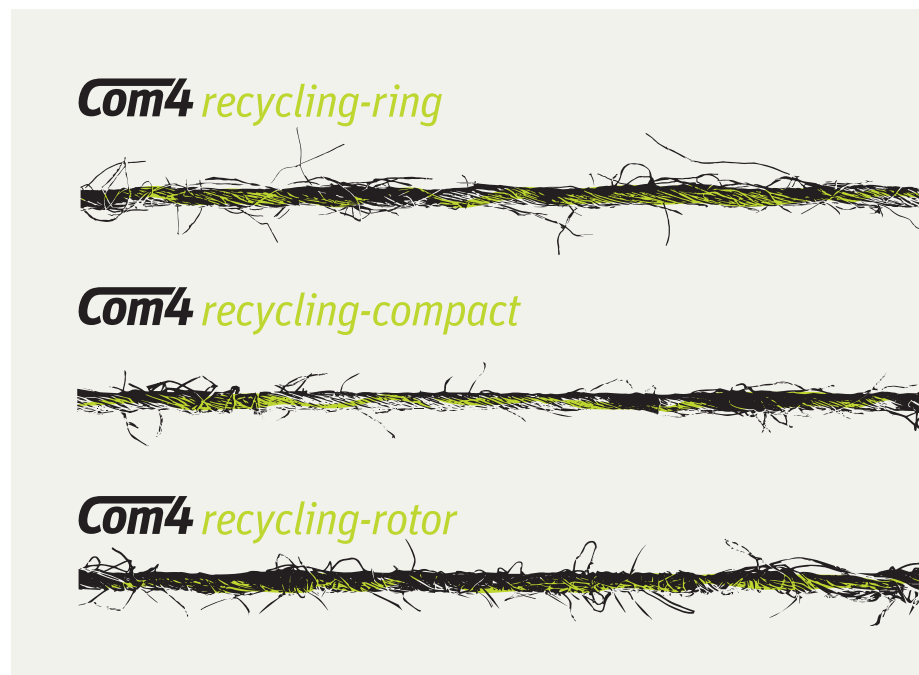
When using recycled fibers, spinners can choose from an almost endless variety of different raw material sources. Rieter has established a classification system to help spinning mills navigate this jungle and to find the right raw material for their demands.

By knowing the opening degree and the fiber length distribution of the mechanically recycled fibers, spinners can determine the type and amount of virgin material, which is needed to achieve the desired yarn quality and yarn counts on rotor or ring spinning machines.

Recycling classification	Short-Fiber Content	Mean Fiber Length	5% Fiber Length
Very good	45%	17 mm	31 mm
Good	55%	14 mm	29 mm
Medium	60%	13 mm	28 mm
Poor	78%	10 mm	22 mm
Cotton as reference	24%	21 mm	34 mm

Yarn licenses for Com4recycling

To further establish recycled yarns in the market, they will be included in the proven Rieter Com4 yarn family. Com4 is a globally registered trademark for yarns spun on Rieter end spinning machines. Com4recycling licenses are now available for recycled ring, compact, and rotor yarns. Spinning mills that produce recycled yarns with a Rieter card, draw frame, and end spinning machine and also have Global Recycling Standard (GRS) certification can apply for a Com4recycling yarn license.



Com4recycling-Ring Spinning Process

Fine ring yarns with recycled material

Rieter offers a complete ring spinning system that is designed to processing recycled fibers in the best possible way. Due to the better integration of the fibers during ring spinning, ring yarn has a higher tenacity compared to rotor spinning. This opens a wider range of applications, namely the increased use of these yarns in weaving and knitting mills.

But ring spinning is more sensitive to the proportion of short fibers which limits the amount of recycled fibers. One reason for this is that the short fibers tend to form packages during all the drafting stages. The Rieter ring recycling system is optimizing the control of the short fibers in the drafting units along the complete process to maximize the share of recycled fibers also for quality yarns.

Ring recycling system

Ne 6 to Ne 30, 100% cotton yarn with up to 30% recycled cotton, blends with man-made fibers with up to 50% recycled cotton



VARIOline



Card



Draw frame



Autoleveler
Draw frame



Roving
frame



Ring spinning
machine with
Q-package



Winding
machine



Com4recycling-Compact Spinning Process

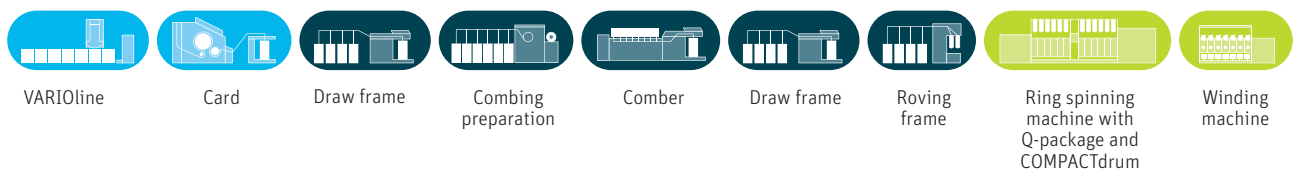
High strength, low hairiness and improved spinning stability

The combed recycling compact-spinning process enables customers to produce fine compact yarns with almost 40% recycled fibers and high yarn quality from demanding raw material. The comber removes very short fibers and neps from blends of recycled and virgin cotton. This makes it possible to increase the recycled content in the blend. At the same time, both unevenness and imperfections in the yarn are improved with the use of the comber.

Tests revealed that the share of recycled material remains significant also in the yarn. The assumption that a large portion of the recycled fibers is removed by combing has been refuted. The noil, which contains both recycled and virgin cotton fibers, is suitable for use in the rotor spinning process. The Q-package and the compacting device COMPACTdrum on the ring spinning machine significantly improves the machine's spinning stability and running behavior and leads to high strength and low hairiness of the yarn.

Compact recycling system

Ne 20 to Ne 40, 100% cotton yarn with up to 40% recycled cotton



Com4recycling-Rotor Spinning Process

Highest recycling share

Rotor spinning is well suited for processing fibers with a high short-fiber content, which is for example reflected in better evenness. The additional dissolution in rotor spinning significantly reduces the number of thin and thick places. The semi-automated rotor spinning machine R 37 has made a name for itself in the market for processing recycled material. Customers working with the R 37 benefit from improved waste and trash ex-

traction thanks to the new spinning box and less imperfections (mainly neps). Dedicated components exist for better performance when processing recycled material, such as various nozzles, rotors or opening rollers. The fully automatic rotor spinning machine R 70 combines high potential for yarn tenacity with the capability to handle many ends down with excellent piecing quality.

Rotor recycling system, Ne 3 to Ne 25

100% cotton yarn with up to 50% recycled cotton, blends with man-made fibers with up to 70% recycled cotton (finer yarn counts possible)



VARIOline



Card with RSB-Module 50



Rotor spinning machine



Rieter Spinning System

Optimized for recycling from fiber to package

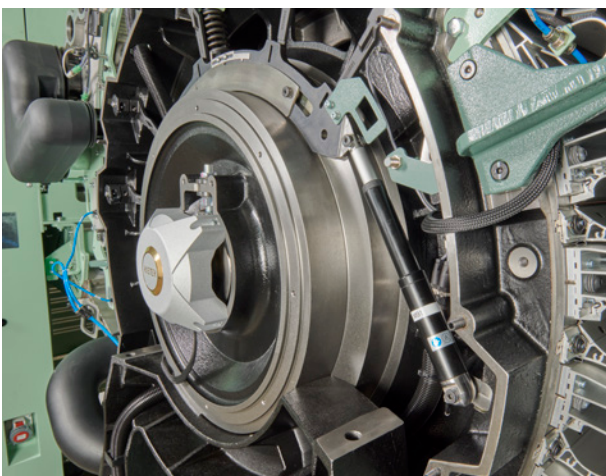
Precision blender UNIblend A 81



Precision blending in the 1% range

Best option to achieve a blend of recycled cotton and virgin cotton or polyester with low blending variation. Highest standards for multi-component blends for best unevenness in sliver and yarn.

High performance card C 81



Metal & foreign part detection

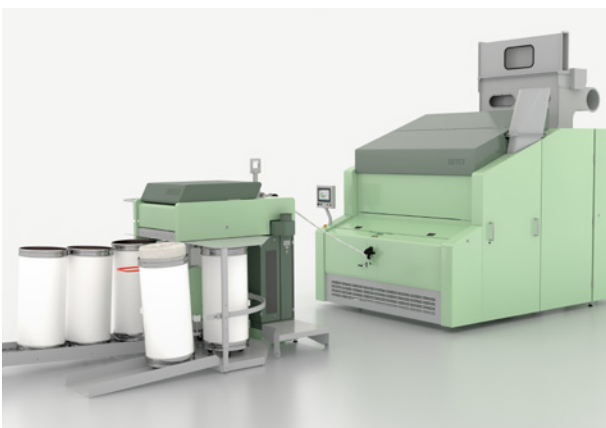
Protects the main carding area against wire damage. Constant resistance measurement monitors the card infeed and stops the material feeding if needed.

Intensive tuft opening at licker in

Removal of non-conforming material, sawtooth clothing is recommended.

Long pre-carding zone

Enables secure intensive opening with simultaneous gentle treatment of recycled fibers, including yarn and fabric remnants.



Premium Graf clothing

Graf clothing sets: Flexible flats for recycled raw material, semi-rigid flats are recommended for special applications.

RSB-Module 55 for process shortening

The direct connection of the card with the autoleveler draw frame module RSB-Module 55 reduces the number of draw frame passages and improves the efficiency of the spinning mill. Narrow cylinder distances are ideal for processing short fiber lengths.

Autoleveler draw frames RSB-D 55/27



Improved suction system

Cleaning lips in the calender area and an additional suction nozzle for the calender roller area for the greatest possible cleanliness. This results in longer cleaning cycles and fewer thick places.

Optimized web funnel

When recycled fibers are processed, 4-fold doubling can be supportive. Here, a new web nozzle improves web guiding and guarantees fault-free operation with a high short-fiber content.

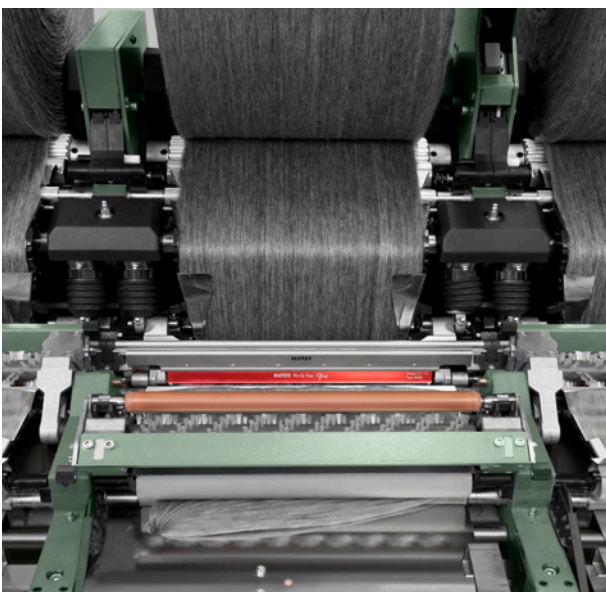
Setting recommendations in SLIVERprofessional

Recycled fibers can now be selected as an application in the SLIVERprofessional expert system. Once the raw material data has been entered, the system offers recommended settings for the entire machine.

35 mm main drafting distance

With 35 mm the main drafting distance can be set very narrow. This optimizes the guidance of short fibers.

Comber E 90



Optionally used for ring and compact recycling spinning

Unevenness and imperfections in the yarn are significantly improved, leading to better yarn values than carded yarns also with a high share of recycled content in the blend.

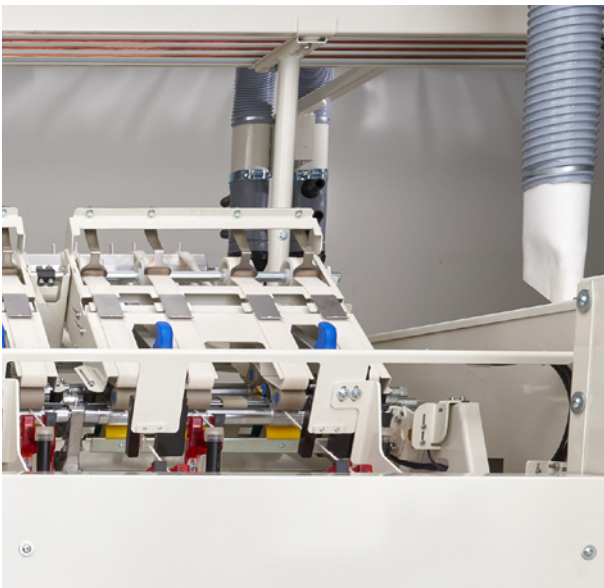
Removing unwanted fibers and neps

When combing blends of recycled and virgin cotton, very short fibers and neps are removed.

Highest fiber yield

The technology components and flexible setting options allow a precise combing movement for an optimized noil extraction. The noil can be used in the rotor spinning system.

Roving frame F 40



Top roller cleaning device with felt

This optional device takes up the fluff from the top rollers. With the integrated metal comb on top of the felt, the fluff is collected at a specified place and removed by the OHTC suction nozzle.

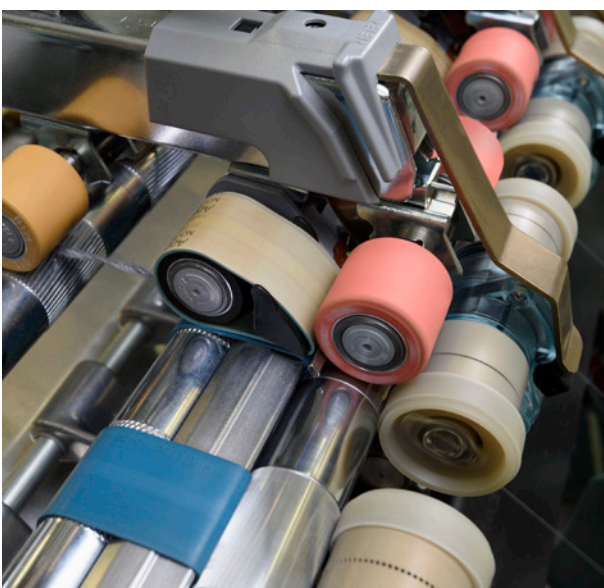
Overhead Travelling Cleaner (OHTC)

The OHTC removes the accumulations from the cleaning felt and reduces fiber fly, which is crucial for materials with a high short-fiber content.

Suction for table cleaning

Recommended option to control fiber fly in the drafting zone. Defined nozzles of the OHTC blow the fluff towards suction funnels below the drafting zone, resulting in a constantly clean table.

Ring spinning machine G 38



Q-package

Better fiber guidance with the 36 mm Active Cradle with stepped nose bar ensures reliable drafting even with the shortest recycled fibers. The additional pressure bar (pin) is recommended for finer yarn counts from Ne 20 to improve unevenness and reduce imperfections.

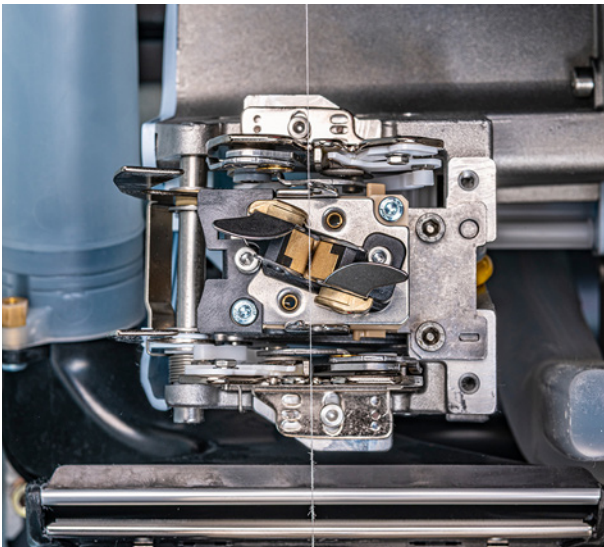
Roving stop

Prevents lapping which can reduce lifetime of drafting components.

Compacting device COMPACTdrum

Improved running behavior, high tenacity and low hairiness for finer recycled yarns from Ne 20.

Winding machine Autoconer X6



Traveling cleaner and open design

Energy-optimized traveling cleaner and open design for easy cleaning.

Dust removal

Additional dust removal for high short-fiber content in the deduction area.

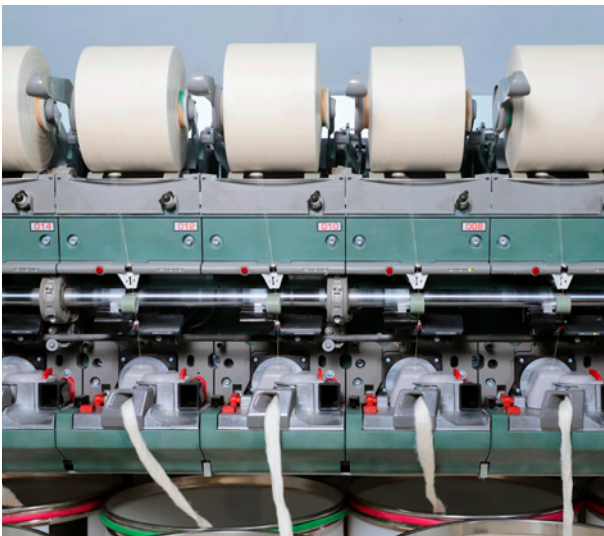
Open prism OZ2 for splicing

High splice tenacity and yarn-like splicing for recycled yarns.

Separate yarn chamber

Dust and yarn waste collected separately; yarn waste can be processed as post-industrial waste.

Rotor spinning machines R 37 and R 70



Exchangeable trash channel

Safe and effective removal of unopened yarn particles, short fibers, neps and trash.

Improved spinning box

Reduced imperfections (mainly neps) in the yarn and reduced dust accumulation in rotor groove.

Dedicated components for better performance

Different nozzles, rotors and opening rollers for trouble-free processing of shortest fibers.

After Sales Solutions and Services

Compatibility Overview

Specific upgrades for the recycling process

Rieter offers comprehensive after sales solutions for specific requirements and processes to produce recycled yarn with the existing setup. Before any major upgrade, Rieter recommends an inspection of the machine by a Rieter service technician. This will not only ensure the compatibility of the upgrade and correct installation but will also determine the condition of the machine and which parts have to be maintained or replaced. If the machine is in good technical condition, customers will benefit most from an upgrade. With just a few clicks, customers can easily order after sales solutions through Rieter's webshop ESSENTIALorder.

Compatibility overview of the solutions suitable for recycling processes

Machine	Solution	Machine models
Card	Premium Graf clothing	C 60, C 70, C 72, C 75, C 80
Autoleveler draw frame	Additional suction nozzle in calender area	D 40, D 45, D 50 D 30 and D 35 only with TOPclean conversion
	Optimized web funnel	D 40, D 45
Roving frame	Top roller cleaning device with felt	F 11, F 15, F 16, F 18, F 19, F 20, F 33, F 35, F 36, F 38, F 39, F 40
	Overhead Traveling Cleaner (OHTC)	F 11, F 15, F 16, F 18, F 19, F 20, F 33, F 35, F 36, F 38, F 39, F 40
Ring spinning	Active cradle with stepped nose bar	G 32, G 33, G 35, G 36, G 37, G 38 K 42, K 44, K 45, K 46, K 47, K 48
	Additional pressure bar (pin)	G 32, G 33, G 35, G 36, G 37, G 38 K 42, K 44, K 45, K 46, K 47, K 48
	Roving stop	G 32*, G 36**, G 37, G 38 K 42*, K 46**, K 47, K 48
	COMPACTdrum	G 32, G 33, G 35, G 36, G 37, G 38
Winding	Traveling cleaner and open design	AC 338, AC 5, AC X5, AC 6, AC X6
	Smart splicer (Open prism OZ2)	AC 338, AC 5, AC X5, AC 6, AC X6
Rotor spinning	Different nozzles, rotors and opening rollers	Semi: BT 923, R 35, R 36, R 37 Automatic: R 40, R 60, R 66, R 70

* V2 - V3
** V1 - V3



Rieter Machine Works Ltd.

Klosterstrasse 20
CH-8406 Winterthur
T +41 52 208 7171
F +41 52 208 8320
machines@rieter.com
aftersales@rieter.com

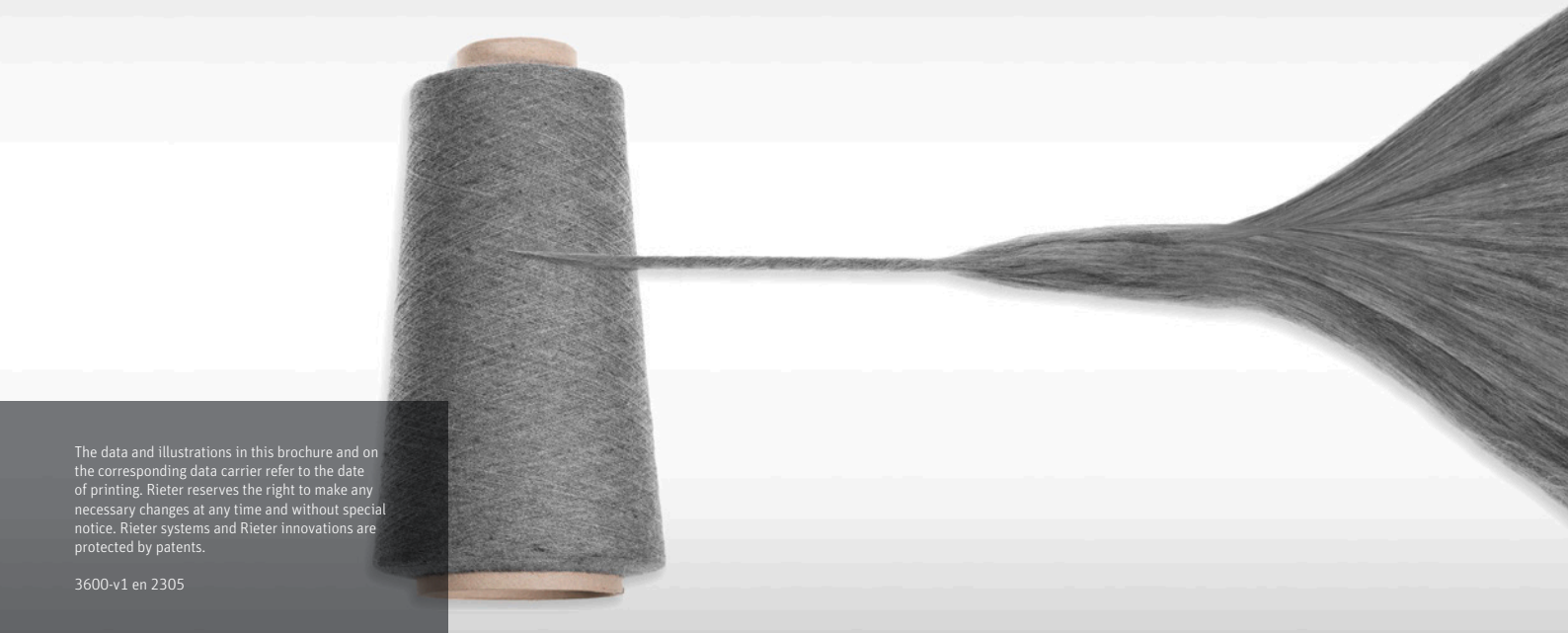
Rieter India Private Ltd.

Gat No. 768/2, Village Wing
Shindewadi-Bhor Road
Taluka Khandala, District Satara
IN-Maharashtra 412 801
T +91 2169 664 141
F +91 2169 664 226

**Rieter (China) Textile
Instruments Co., Ltd.**

390 West Hehai Road
Changzhou 213022, Jiangsu
P.R. China
T +86 519 8511 0675
F +86 519 8511 0673

www.rieter.com



The data and illustrations in this brochure and on the corresponding data carrier refer to the date of printing. Rieter reserves the right to make any necessary changes at any time and without special notice. Rieter systems and Rieter innovations are protected by patents.

3600-v1 en 2305