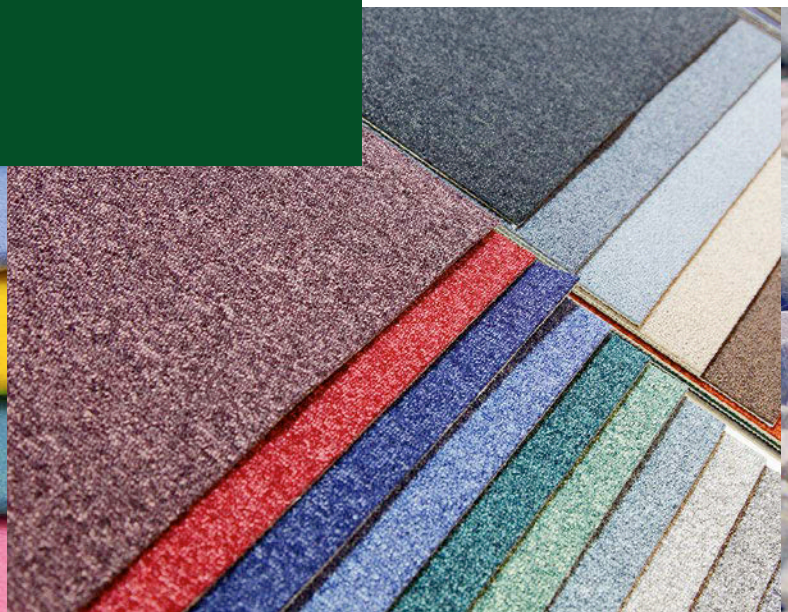
GROZ-BECKERT®

Carding

Card clothing for the
nonwovens industry

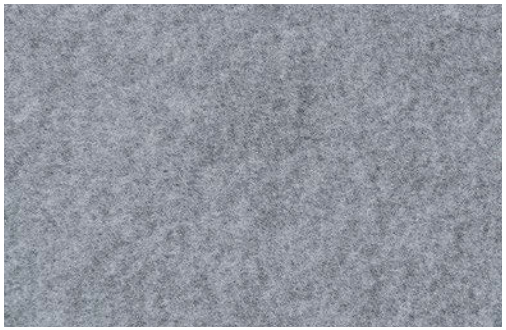


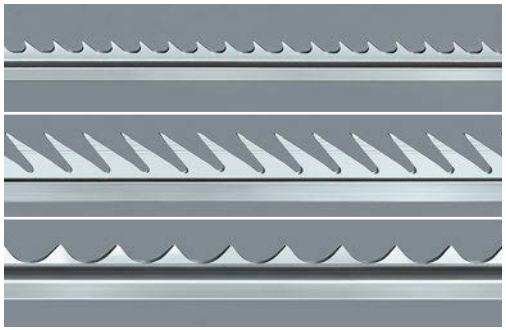


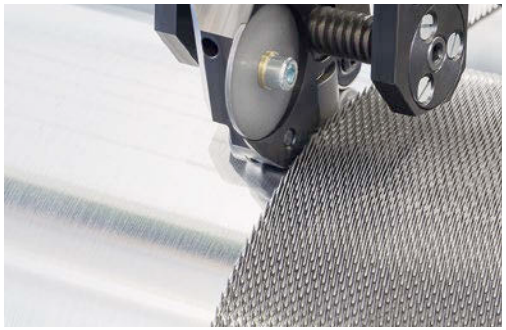


The carding technology

Groz-Beckert is the world's leading provider of industrial machine needles, precision parts and fine tools as well as systems and services for the production and joining of textile fabrics. The products and services support the fields of knitting, weaving, felting, tufting, carding and sewing. In the product group Carding Groz-Beckert offers all card clothing items: from consulting, product recommendation and the entire product range through mounting service and special roll repair to start-up service. The portfolio includes card clothing for the short staple and long staple spinning industry and for the nonwovens industry. Groz-Beckert serves textile machine manufacturers and textile companies worldwide with advanced products and service.







Good carding – essential for economical production of nonwovens

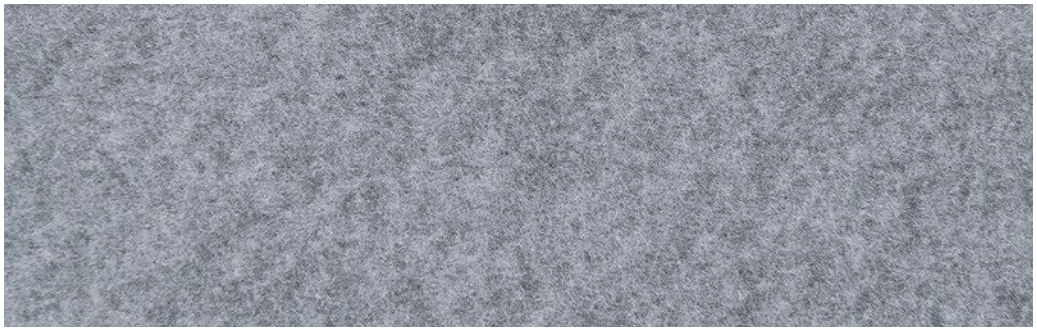
Carding is a very important process step for economical production in the value creation chain from the fibre to the nonwoven fabric. During the carding process, fibres are gently separated and then combined again to produce a uniform fibre mat, the card web. All raw material components are mixed thoroughly during carding, and foreign material is exposed and separated out. The raw material input can only be minimised if all of the fibres which are used help contribute towards achieving the physical properties of the card web. Uniform mixing as well as uniform distribution of all fibres in the card web are essential for the economical production of nonwovens.

Contents

The technology	2
Introduction to the carded nonwovens world	4
Description of wires	6
Steel grades	8
Finish makes the difference	9
Key wires	10
Example of a nonwoven card	12
Global service	14
A local service supported by global presence	15
Quality	16
App myGrozBeckert, Groz-Beckert Academy	17

Introduction to the carded nonwovens world

There are two main segments – spunlace and needle punch – which account for roughly 50 % of the total nonwoven market. From a batt of very different fibers fed into a carding machine, our customers are getting a web of fibers showing different features like parallel or disorientated fibers. Other specific segments like calendaring, chemical processes are also being taken care of with customized solutions.





Spunlace/thermobonding

This segment is mainly used for medical/hygiene products and shows the following main features:

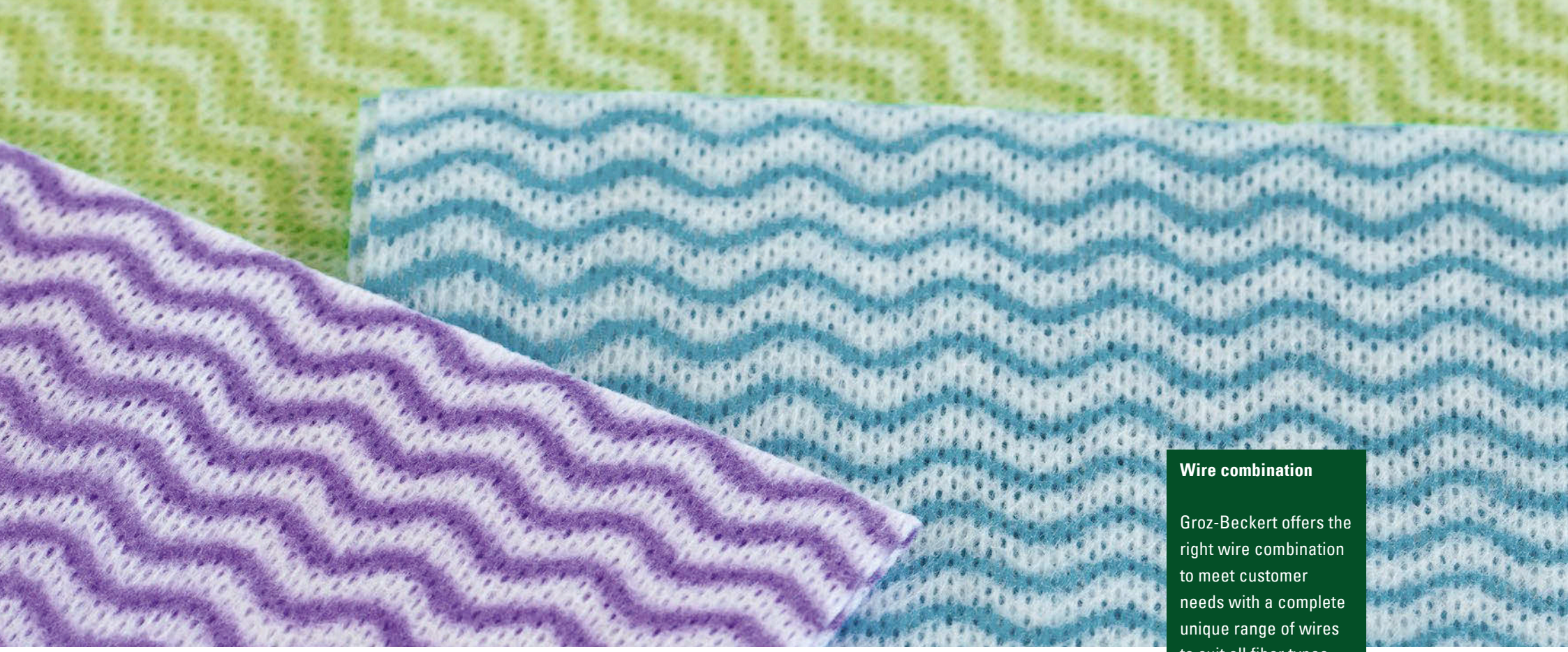
- Very high-speed cards: above 300 m/min. This is due to the fact that there is most of time no cross lapper. The main challenge is controlling fibers at ever increasing speed.
- Light webs: from 25 to above 40 gsm with usually 2 cards per line. Here the challenge is for spunlace nonwoven producer to make lighter and lighter products with same features. (strength, absorption etc.). Homogeneity (MD / CD) of web is key. The closer to 1 to 1 the better.
- Fine and short fibers usually below 2 denier and around 40 mm length are mostly used and the trend is going towards micro fibers, which must be nicely handled and controlled. Even natural fibers like cotton are added in various blends.

Groz-Beckert has the right wire combination to be able to help those customers to reach their high productivity targets and even more.

Needle punch

This is a steady segment with the following main features:

- Great variety of fibers: from heavy recycled fibers to fine and special ones like glass, carbon, aramides and much more. Versatility of needle punch applications calls for customized solutions.
- Speed is limited to about 150 m/min due to the downstream cross-lapping process.
- According to the final product, the carded web is doubled by a cross lapper to increase the web weight. Depending on the final product, the web weight can range from 80 g/m² to more than 1.000 g/m².



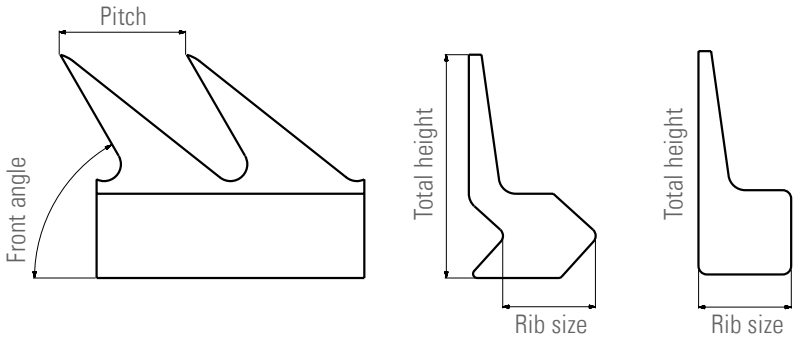
Wire combination

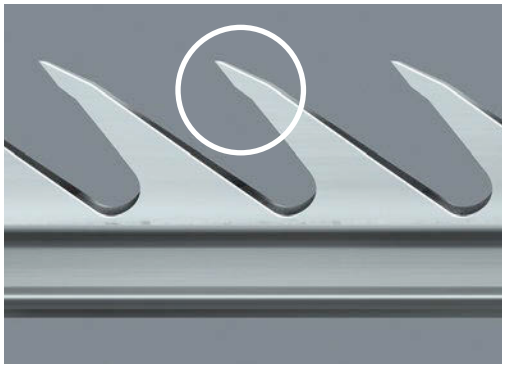
Groz-Beckert offers the right wire combination to meet customer needs with a complete unique range of wires to suit all fiber types.

Other segments

Nonwovens segments like thermobonding, chemical bonding, stitchbonding and segments with different bonding techniques require card clothing specifications adapted to the particular application. The full range of wires allows Groz-Beckert to offer customized solutions.

Description of wires: Standard, EvoStep®, SiroLock®







Standard

In general, standard wires are described with the following main features:

- Rib type: interlocking or plain rib
- Rib size in mm: from very fine rib 0.5 mm to very coarse one above 6 mm
- Pitch in mm, which is the distance between 2 teeth
- PPSI (points per square inch): this is giving an indication about how dense a wire is. This can be calculated as follow: (25.4/rib in mm) * (25.4/ pitch in mm)
- Total height in mm. from low main cylinder wires (2.5 mm) to high loft doffer wire (5.3 mm) and even more with feed roller/blow room wires.
- Front angle: from 45° up to pyramidal shape (130°)

EvoStep®

EvoStep® is a new range of worker and doffer wires that feature a unique undercut on the tooth front which is more pronounced compared to the angle of the overhang part below the tip. Thanks to this evolutionary step, the fiber taking and holding capacity of EvoStep® is up to 30 % better compared to conventional wires. The better fiber control significantly improves the transfer ratio, reducing flying fiber, fiber recycling, loading and melting. The combination of these features not only results in a more uniform web quality, it also reduces fiber consumption and waste.

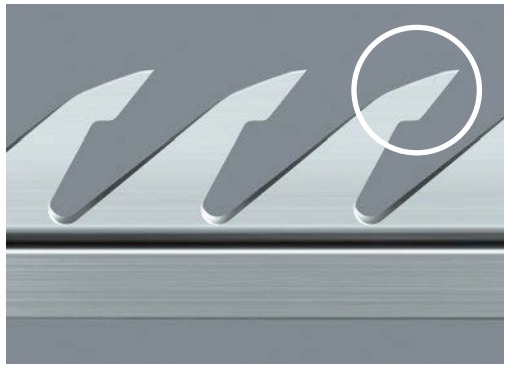
Benefits

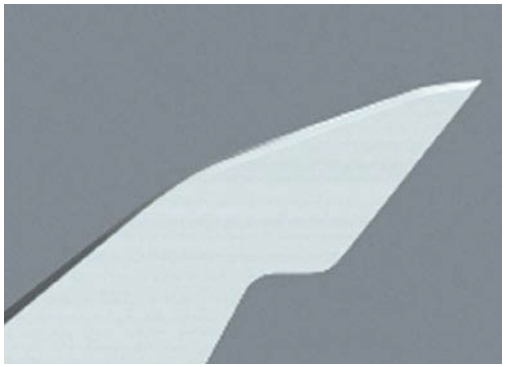
- Improved fiber control
- More uniform web quality
- Increased carding zone
- Higher transfer ratio
- Easy maintenance: facilitates a quick and smooth start-up of the card which limits downtime to an absolute minimum during cleaning and remounting

Applications

EvoStep® wires perfectly accommodate medium speed carding processes in indirect nonwoven manufacturing processes where cross lapping and needle punching are typically used as bonding technology:

- Needle carpets
- Needled / thermally bonded geotextiles
- Bedding (siliconized PES)
- Automotive textiles
- Carpet under-lay/mattress pad (shoddy)







SiroLock®

SiroLock® is a card wire with a unique step especially designed for doffers and workers. SiroLock® controls fibers at the step instead of at the front angle. This significantly improves its fiber retention, enabling it to take much more fibers than conventional wires. This wire is especially beneficial in the ever-demanding high-speed spunlace industry.

Benefits

- High carding productivity: increases production speeds and/or doffer web weights; reduces the risk of fiber melting, subsequently leading to less cleaning thanks to less fiber recycling and loading; leads to faster and smoother start-ups.
- More uniform web quality: leads to a more homogeneous web thanks to increased carding action; reduces fly
- Versatility in applications: enables the processing of a wide range of fibers, fiber blends and web weights

Applications

SiroLock® worker and doffer wires are required to exceed limits in high production and high speed carding. In direct high speed applications like spunlace lines or thermobonding lines a new level of doffer speeds can be achieved, whereas in speed limited lines a new level of web weight/doffer allows increased productivity.

- High-speed spunlace lines
- High-speed thermobonding lines
- Specific heavy-weight nonwovens applications

Steel grades: super, ultra

Wires in carding machines are subjected to high stresses. The wear is significantly greater at high material throughput rates than at a lower throughput. The processed raw material is selected according to the various end products with highly varied properties, which in turn affect the stresses to which the wires are subjected. Groz-Beckert addresses the different levels of stress by using an especially high grade of steel for certain wires, making them stronger and more durable.

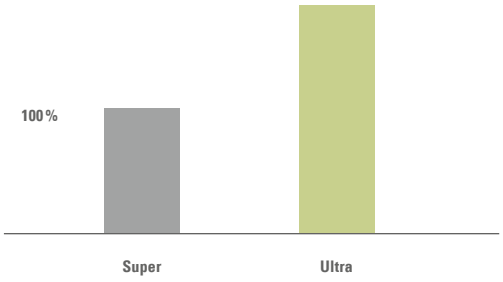
Super: high quality carbon steel

Standard wires are made of high quality carbon steel, which guarantees the best performance in almost all conditions.

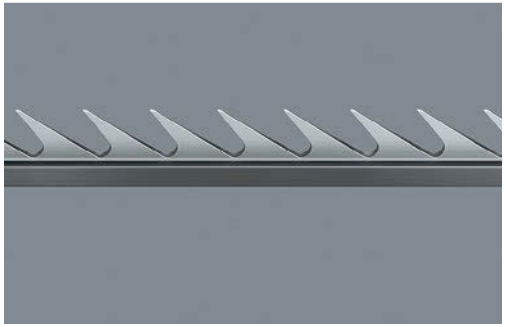
Ultra steel: high-end alloyed steel

- Special alloy composition
- Super fine (crypto-crystal) martensitic micro-structure embedded with very hard alloy carbides significantly improves toughness and wear resistance
- 20 % up to 60 % longer lifetime than standard steel grade for high-speed carding and applications with special requirements on lifetime & quality consistency
- Recommended in high-speed spunlace lines for cylinder and random rollers as well as for special applications (e.g., shoddy). Please ask our specialists who will advise you the best choice for your application.

Lifetime

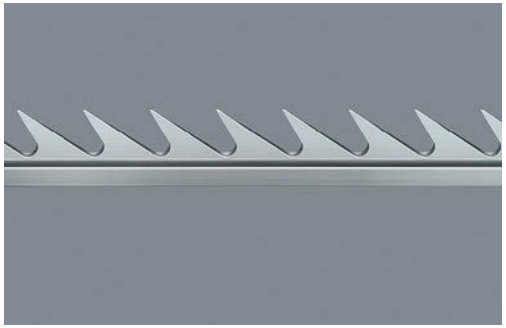


Finish makes the difference



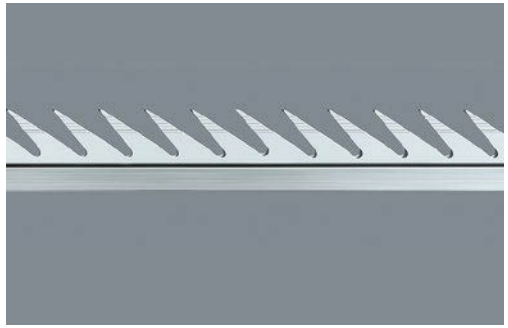
Standard brushed wires

As a standard feature all our wires are brushed during the manufacturing process to reduce black scales to a minimum.



Pearlech (F3)

Sand blasted finish for a clean burr-free and descaled surface. Sand blasting increases the friction between the wire surface and the fibers. This feature has a positive influence on high-speed processes with smooth fibers such as on workers and doffers. It gives an extra grip to better control fibers and can be used in combination with striations.



Plattinium (F4)

Deburred and polished finish. This mirror like finish prevents fibers from sticking to the wire and is mostly used for main cylinders, condensers and take-off rollers. The Plattinium finish is particularly suitable for processing fine fibers.

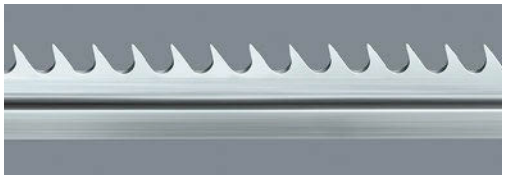
Combination of Pearlech on workers and doffers and Plattinium finish on main cylinder, condenser, take-off is in many cases highly recommended, for example with fine applications whether spunlace or needle punch. Thus you will have the main part of the carding machine completely covered with scale free high quality wires. The impact on web quality will be tremendously positive.

Key wires

High-speed fine spunlace applications

Groz-Beckert wire combinations will allow to fully utilize high-speed carding lines:

- Highly polished wires for the main section of the card (Platinum-F4 and Pearlech-F3) are key factors to web quality.
- Long-life ultra for increased lifetime is recommended for sensitive fine wires on cylinders and random rollers.
- Special low tooth wires control fibers on top of the teeth, therefore reduce fiber recirculation and allows more efficient fiber transfer to doffer or random roller.





Special fine shaped wires

Wires like SiroLock® and MSP control fibers at highest possible speeds on workers/doffers.

Special SiroLock®/MSP wire combinations avoid the “bubbling effect” on first condensers at speeds above 100 m/min.

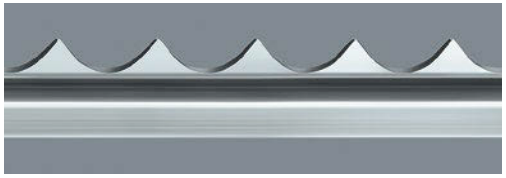
- First condenser can be fitted with MSP: front angle with 45° combined with the multistep design will allow to keep fibers under control.
- Second condenser with SiroLock: The step and high capacity tooth depth will clean the first condenser and avoid the bubbling effect.
- Special pyramidal shape take-off wire allows troublefree stripping of all fibers without loading problems.







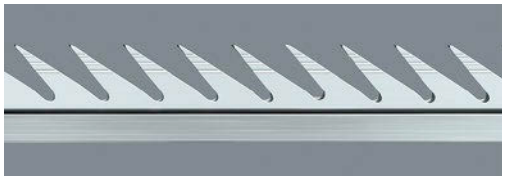




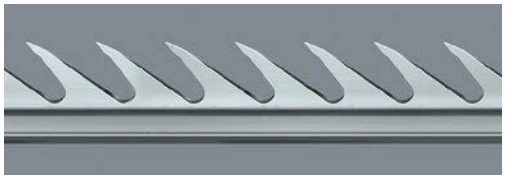
Needle punch applications

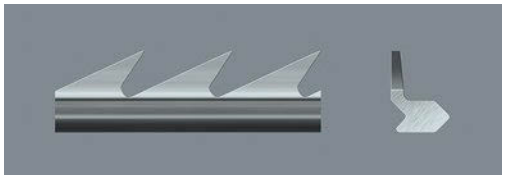
The wide range of needle punched products requires the entire portfolio of very coarse interlocking wires to very fine plain rib types.

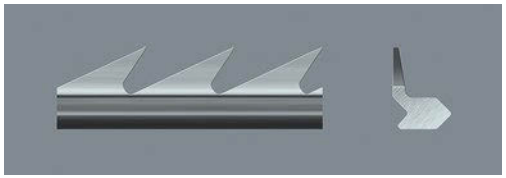
- To maintain perfect web quality, Groz-Beckert offers a solution with fine interlocking wires on main cylinder combined with high PPSI doffer wire for fine needle punched applications.
- For heavy weight needle punched products Groz-Beckert offers high loft EvoStep® doffer wires to reduce the number of layers on a cross lapper for higher production.
- For coarse natural fibers Groz-Beckert offers wires with extra thick blades to sustain high wear environment.





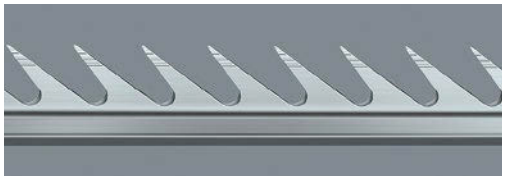






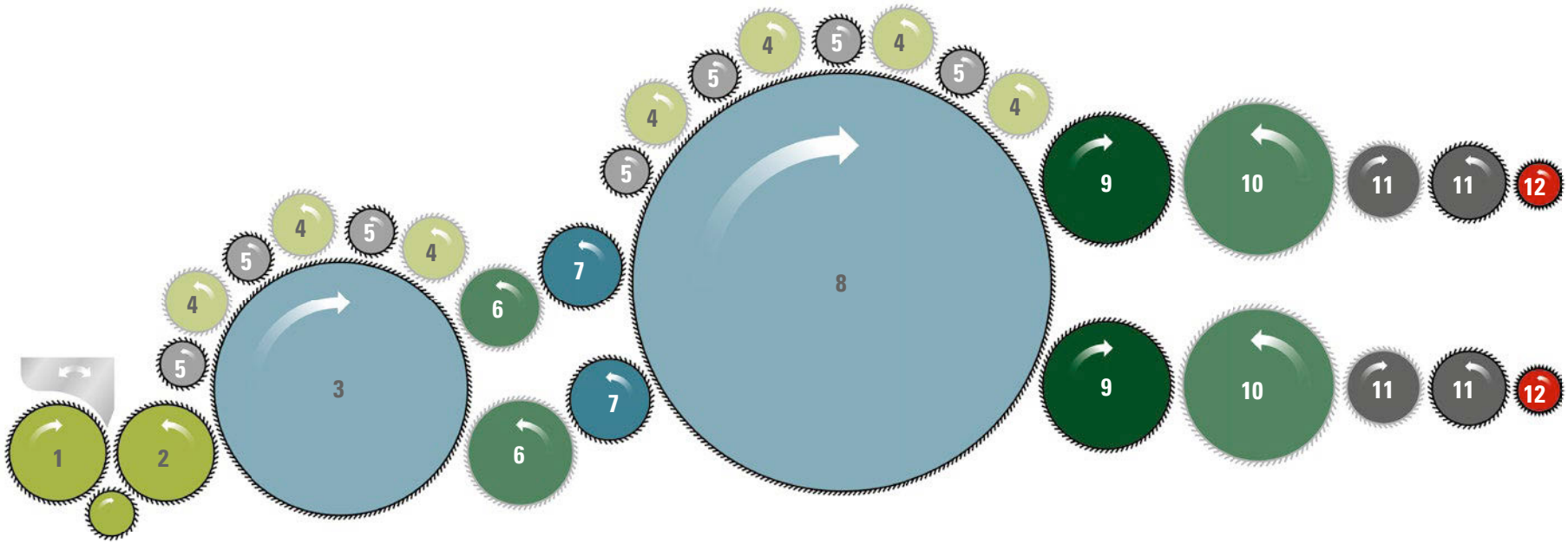
Specific segments like stitchbonding, thermobonding, bedding

Groz-Beckert offers customized wire solutions for specific segments, for example striated high loft wires for handling highly siliconized fibers as used in the bedding industry.



Example of a nonwoven card

Rollers and function



1 Feed rollers

Feed rollers transport the batt of fibers in an even way into the card. There are different feeding systems to help achieve this goal:

- Traditional feeding with 2 or 4 feed rollers with one cleaning roller. Usually a coarse interlocking wire type V6 or V8 with 60 to 70° angle is used. Sometimes those rollers are made with grooves or fitted with a plain rib type (and a space wire). Here the back angle is controlling fibers entry into the card.
- Traditional feed table with one roller: Here fibers are pressed and controlled onto a table equipped with a nose at the end. This system is used mostly for short fibers (40 mm or less). Here mostly 60° and interlocking type V6 or V8 are used.
- Feeding over the top of the feed roller. In this case fibers are fed gently over the top and controlled with a very open angle 80 to 95° wire. Usually 80° when a feed cleaning roller is available and 95° when there is no feed cleaning roller.

2 Licker-in

Roller taking still unopened tufts of fibers at a higher compared to feed rollers. The wire angle is varying between 70 to 80° and rib size from V8 to V12 depending upon fineness of fibres.This roller can rotate either clockwise or counter clockwise.

3 Breast cylinder

At the breast cylinder the first carding/opening of fibres action is taking place in combination with breast cylinder workers. Wire type is usually an interlocking one and should be coarser than main cylinder wire. Usually angle is around 70 to 80° with a tendency to go towards 70° especially if speed is high and diameter of breast small.

4 Workers

Worker rollers are positioned on breast cylinder and on main cylinder and are are of key importance as carding action is taking place between them and breast/main cylinder. Angle should be aggressive (45 to 60 °) and teeth depth high to be able to collect fibers and pull them out of breast/main cylinder. Special tooth shape like SiroLock® or EvoStep® are advised for certain applications.

5 Strippers

Stripper rollers perform a transfer action taking fibers from worker rollers to breast/main cylinder. Wire is usually an interlocking type with an angle that can vary from 50 to 75° depending upon the speed of the card. Nowadays, same front angle as worker wires are being used under high-speed conditions to have a better control of fibers.

- Breast workers are usually fitted with interlocking wires.
- Main workers can be fitted with either interlocking or plain rib wires depending upon fibers.

6 Intermediate doffers

Not existing on all carding machine:

- High-speed cards are showing 2 intermediate doffers which require very aggressive wire with 50° angle and striations as a minimum. Often EvoStep® and SiroLock® are required.
- Cards with one intermediate doffer are usually of lower speed and require 50° with or without striations depending upon speed and fibers.

7 Transfer roller

Fiber transfer from breast to main cylinder or from intermediate doffers to main cylinder without carding action. Differences in speed are the main factor explaining transfer from one roller to another. 60° angle is a must although we can see transfer rollers with 50° in some specific cases. Usually from V10 to V20 interlocking depending upon position on the card and fibers fineness.

8 Main cylinder

The main cylinder is the most imprtant roller of a card performing the main carding action. Angle is varying from 70 to 80° depending upon speed and diameters. The higher the speed, the more aggressive the angle. Coarse to very fine wires can be used here depending upon fiber fineness. (From 50 to 500 PPSI). A special polished finish (Plattinium F4) can be used to remove all micro burrs and avoid fiber loading on main cylinder.

9 Random

Not all cards are equipped with this carding element. The aim of this roller (sometimes only one) is to randomize fibers (get a better MD / CD ratio) and it is working point to point with the main cylinder. Usually used on cards for spunlace applications and fitted with fine wires: around 500 PPSI and the angle is varying from 70 to 80°.

10 Final doffers

One or 2, sometimes 3. Very important as they care for the card production and quality. Angle can vary from 45 to 60° with as option striations. Special polished wire can be used as well. PPSI is varying from 60 to 350 according to fiber types. High ends wires like SiroLock® and EvoStep® are advisable under very high-speed conditions and or heavy web weights.

11 Condensers / randomizers

Located after final doffers: one or two depending upon card type. The aim is to increase MD/CD ratio to get as close as possible to 1/1. This is achieved through speed difference with doffer and much lower PPSI wire than doffer. (From 90 to 170 PPSI only). Angle is usually 50° and those wires are polished as standard. On 2 condenser system, the second one can be equipped with SiroLock® for fighting against bubbling effect on first condenser.

12 Take-off

A special pyramidal shape, which takes the fibers out of the carding machine without sticking to it. To avoid fiber loading highly polished wire is absolutely necessary in combination with low teeth density of 50 to 120 PPSI. This final roller of a nonwoven card is key as any disturbance leads to unnecessary production stops.

The right choice of metallic wire for each roller of a card is crucial for a perfect carding result. Upon receipt of information on card configuration, fibers to be processed and required speeds/web weights, Groz-Beckert will select the best possible wire combination for your application. Just ask our technical team!

Global service

Whether you need our full support in terms of stripping the old wires, mounting, refitting the rolls and calibrating the settings on your machine or just quick professional on-site service, our experienced service teams will help you out on the spot. Groz-Beckert has also local workshops where your rollers can be fitted or (re)mounted to be (re)installed later. In all main nonwoven markets Groz-Beckert offers full service and support with qualified engineers.

Our service capabilities are also backed up by sufficient stock of wires at key locations throughout the world. Our policy is to keep in stock key wires that will allow our engineers to react very quickly in case of a crash. This safety stock is being replenished automatically and regularly readjusted according to market requirements. Our technical staff is also able to recommend suitable types so that your card can be restarted as soon as possible. We will fix your equipment in the shortest possible time with teams of 1, 2, 3 or even more qualified and highly experienced engineers.

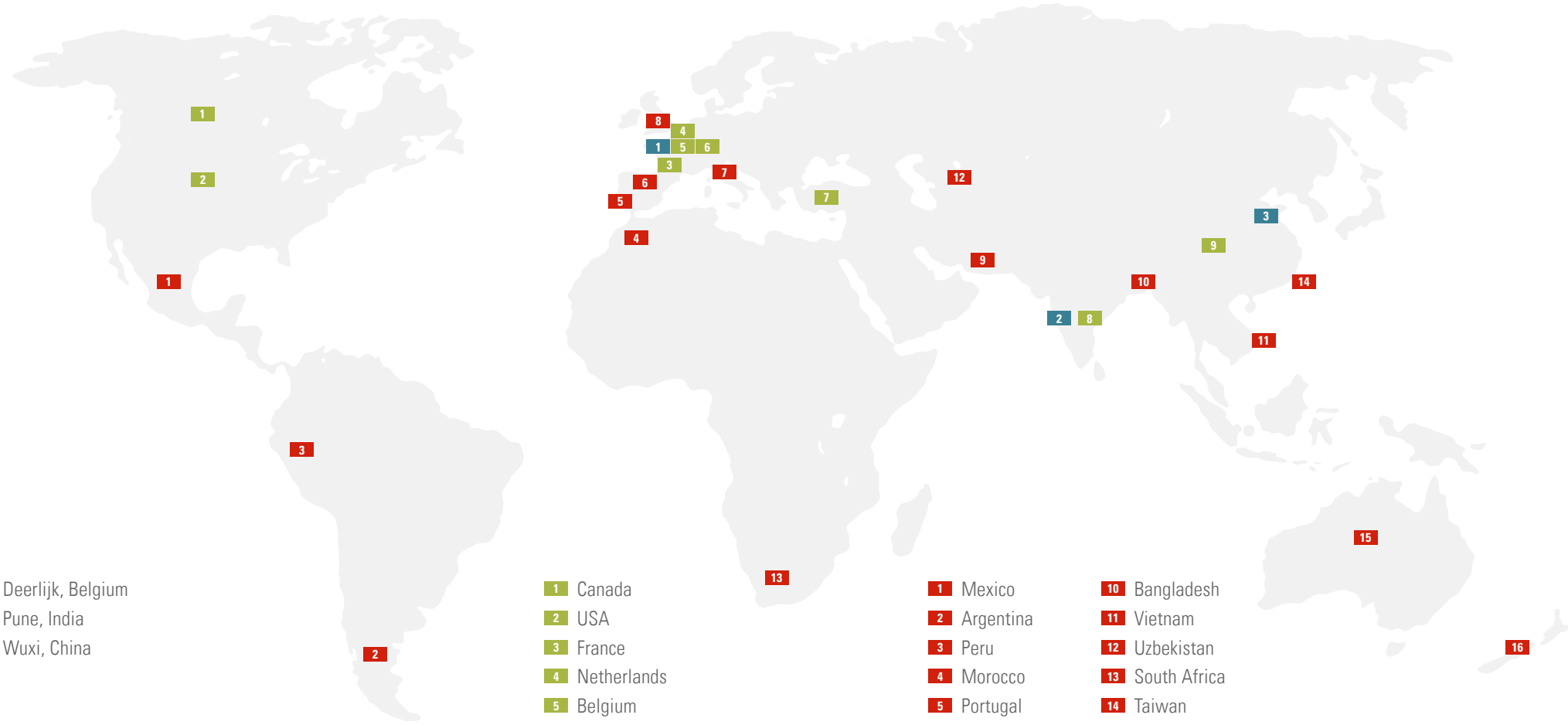


Groz-Beckert developed one further step of service and offers comprehensive full maintenance program on site, which can include:

- Evaluation of wires by our technical staff with special microscope
- Set up of a coordinated reclothing program
- Complete dismantling of card through our highly skilled engineers
- Check of bearings, belts, and rollers concentricity (change/rectify if necessary)
- Stripping of old wires and fitting of new ones
- Rebuilding of the complete card including undercover
- Resetting of all rollers
- Restart of the card
- Detailed service record to complete card maintenance history

A local service supported by global presence

Benefit from our commitment to local service supported by our global presence. You can rely on our worldwide network of sales offices, plants and service stations to meet your needs quickly and effectively.



1 Deerlijk, Belgium
2 Pune, India
3 Wuxi, China

1 Canada
2 USA
3 France
4 Netherlands
5 Belgium
6 Germany
7 Turkey
8 India
9 China

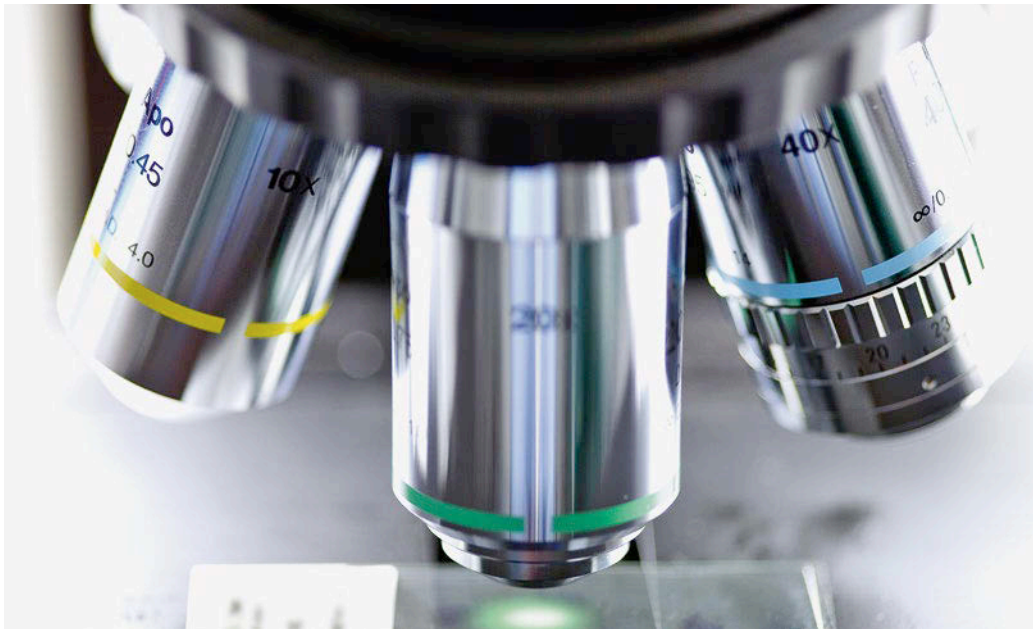
1 Mexico
2 Argentina
3 Peru
4 Morocco
5 Portugal
6 Spain
7 Italy
8 UK & Ireland
9 Pakistan

10 Bangladesh
11 Vietnam
12 Uzbekistan
13 South Africa
14 Taiwan
15 Australia
16 New Zealand

Production sites | Groz-Beckert service facilities | Third party service facilities

Quality





Constant innovation while to meet highest quality requirements

Groz-Beckert developed specific wires to cope with the ever increasing carding speed. The main breakthrough came with the launch of the SiroLock® revolutionary step which completely changed the way fibers are carded. Since then customers have plenty of opportunities to improve carding productivity.

Thanks to this platform Groz-Beckert was able to make developments towards EvoStep® and MSP to fine-tune customer's, applications even more and will continue developing closely with customer's, specific shapes, coatings or steel grades. Experience, tools and the lab line in Albstadt allow tests with specific wires/fibers.

Uncompromised quality

Anyone who has worked with Groz-Beckert knows how committed we are to total quality. That is why we have spent many decades refining our quality management system up to finest precision tools. All wires are being checked all through the process from the profile up to the finished wire on the spool:

- Profile measurements controls
- Punching quality controls
- Inline vision system
- Hardening tests
- Spooling consistency

App myGrozBeckert and Groz-Beckert Academy

Android

ANDROID APP ON Google play

iOS

Download on the App Store

Knowledge everywhere and at any time

The "myGrozBeckert" App has made textiles knowledge available on the go since 2011. In addition to comprehensive information about the company and our products, the App also features the so-called Toolbox with useful conversion and calculation tools for the textile industry.

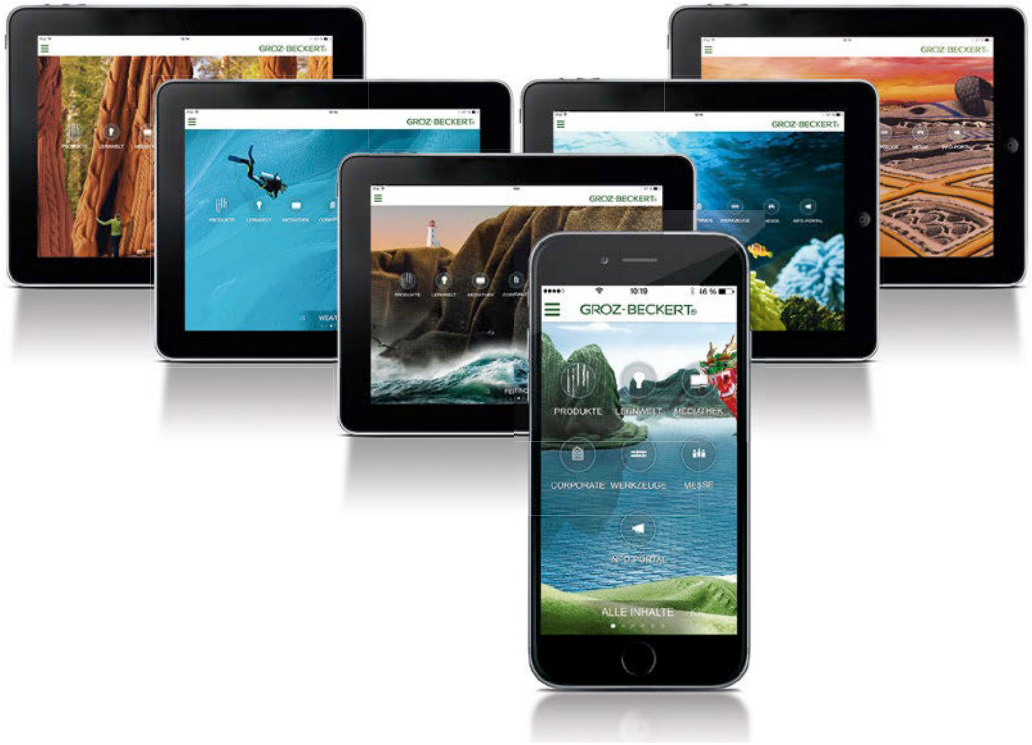
A new version of the App was introduced to the App stores in 2014, with an updated design, more content and additional functions. Since then "myGrozBeckert" also includes a trade show calendar and an info portal with current news, among other things.

The "myGrozBeckert" App is available for all smartphones and tablets running the iOS and Android operating systems. The App is free and available in German, English, and Chinese language versions.

The knowledge base

Groz-Beckert supports its customers and partners with full service support within the textile value chain. This also includes developing knowledge as well as conveying and passing this knowledge on – across generations.

The company offers a comprehensive training program through the Groz-Beckert Academy, covering the most important textile manufacturing and joining processes. In addition to numerous basic, advanced and special training courses which are all held in the Technology and Development Center (TEZ) in Albstadt, custom training sessions on-site at the customer are available as well.



Groz-Beckert Carding Belgium NV
Kleine Tapuitstraat 12,
8540 Deerlijk, Belgien
Phone +32 56 65 19 20
Fax +32 56 75 42 36
contact-carding@groz-beckert.com
www.groz-beckert.com



Groz-Beckert has received the exclusive license for the SiroLock® technology from CSIRO. SiroLock® is a registered trademark of CSIRO in Australia, the European Community and the USA.

The other words and characters marked ® are registered trademarks of the Groz-Beckert company group. | © = This publication is copyrighted. All rights reserved, in particular the right of duplication, distribution and translation. This publication or any parts thereof may not be reproduced or stored, processed, duplicated or distributed using electronic systems in any form or by any means whatsoever without the express written consent of Groz-Beckert.

The depictions provided of our products are not to scale and are intended for illustrative purposes only. Consequently they make no claim to be an accurate representation of the original.

GROZ-BECKERT®

KNITTING | WEAVING | FELTING | TUFTING | CARDING | SEWING

EN | 11.2016

