



Role of Robotics in Textile Industry

This market need automation!

robotextile

Michael Fraede, Co-Founder & Prokurist, Robotextile

Michael Müller, Co-Founder & Managing Director, Robotextile

Content of Presentation

- Introduction of Robotextile GmbH, founded in June 2022
- Market Definition
- Robots
- Technology
- Applications
- Potentials



21 YEARS OF PROFESSIONAL EXPERIENCE IN SPECIAL-PURPOSE MACHINERY AND ROBOTICS

- **2000–2005** Degree in Mechanical Engineering (Dipl.-Ing. FH) with a specialization in Automation and Production Engineering
- **2005** Diploma Thesis on Roll-Out Kinematics in New York, USA at FESTO
- **2005–2009** Development Engineer, Goldfuß GmbH (Special-Purpose Machinery)
- **2009–2018** Sales Director and Authorized Officer (Prokurist), Goldfuß Engineering GmbH
- **Since 2018** Managing Director, family-owned company **erler gmbh automation . robotics**
- **Since 2022** Founder and Managing Partner, **robotextile gmbh**



Michael Müller

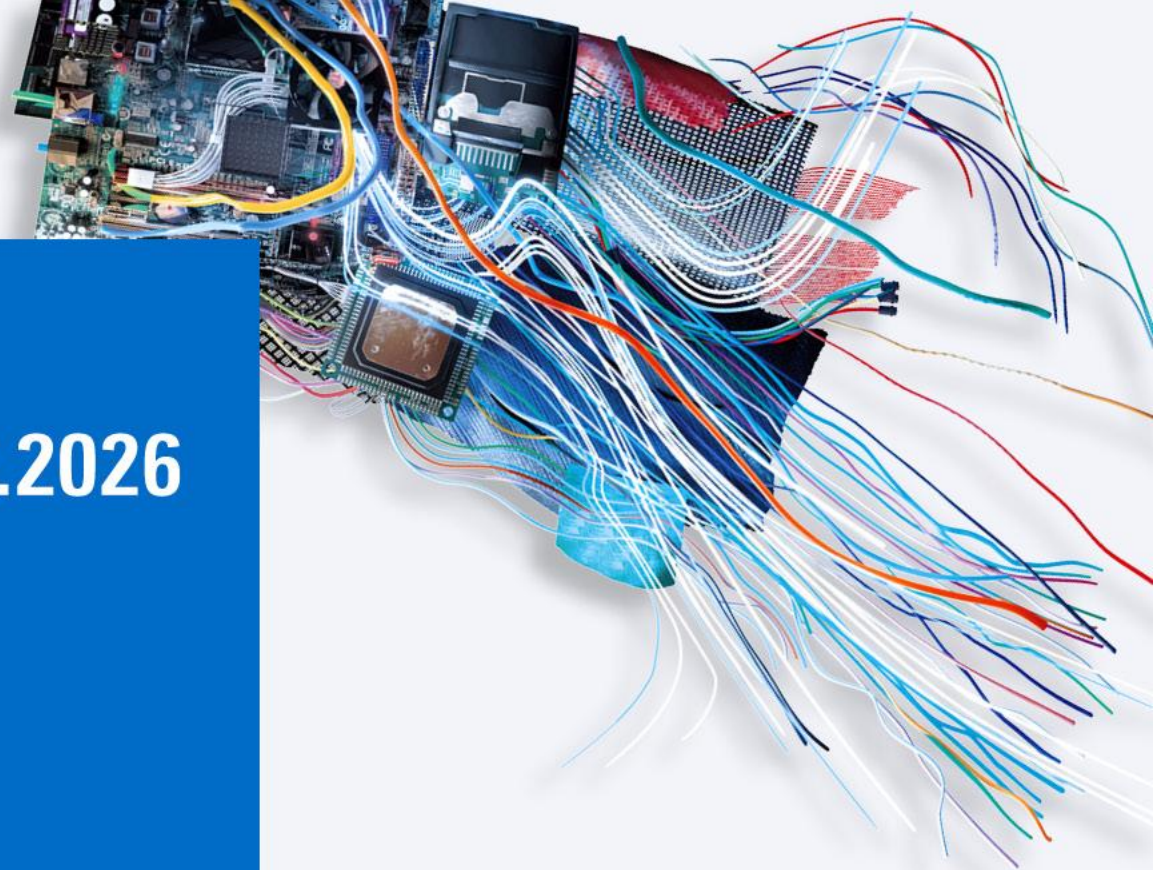


robotextile®

texprocess
innovationaward.2026

WINNER

Smart automation solution for
Textile Surfaces



The Founders Team in June 2022

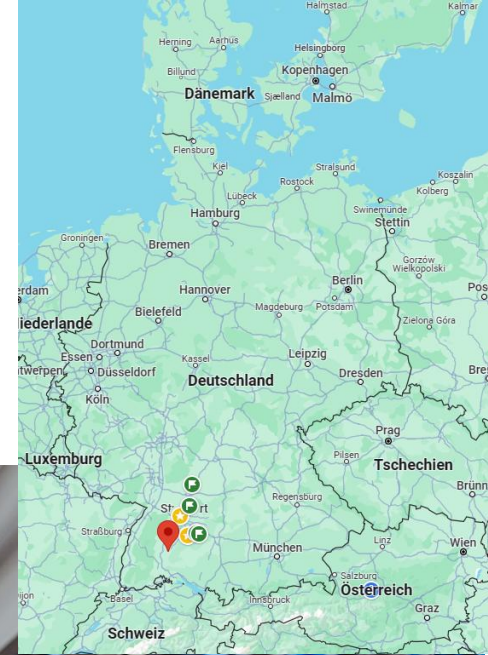


Michael Fraede and Michael Müller with ROBOTEXTILE are the winner of the Innovation Award TexProcess 2026
<https://www.suedwesttextil.de/news/robotextile-gewinnt-texprocess-innovation-award-2026>

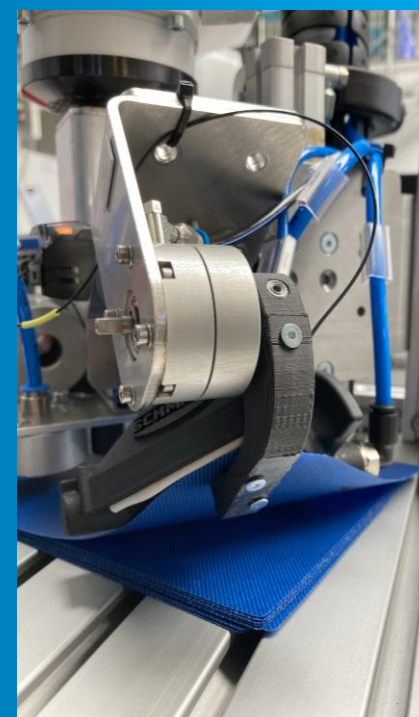
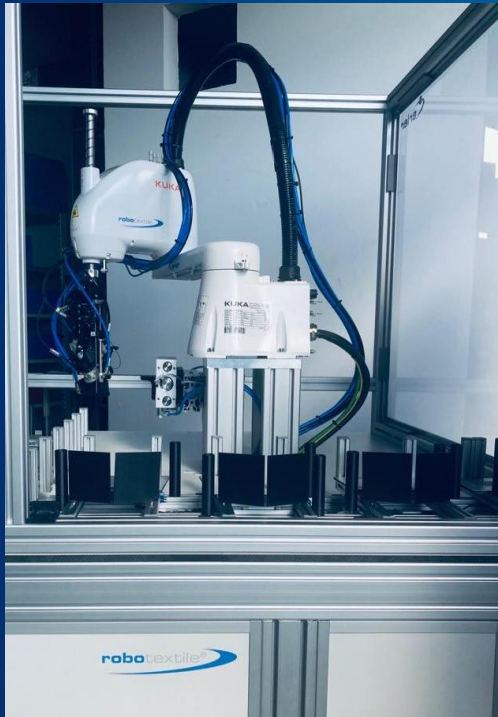
April 2026



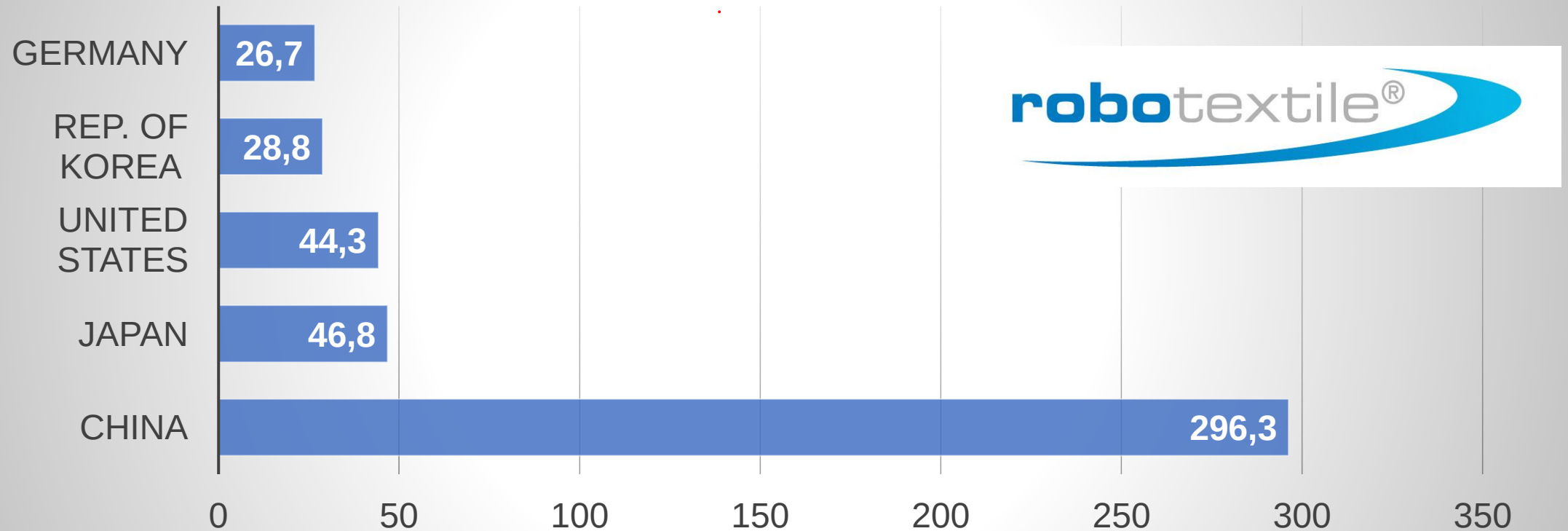
Michael Fraede and Michael Müller
 Dormettingen, Zollernalb, GERMANY
www.robotextile.com



Solutions for Handling of flexible parts:

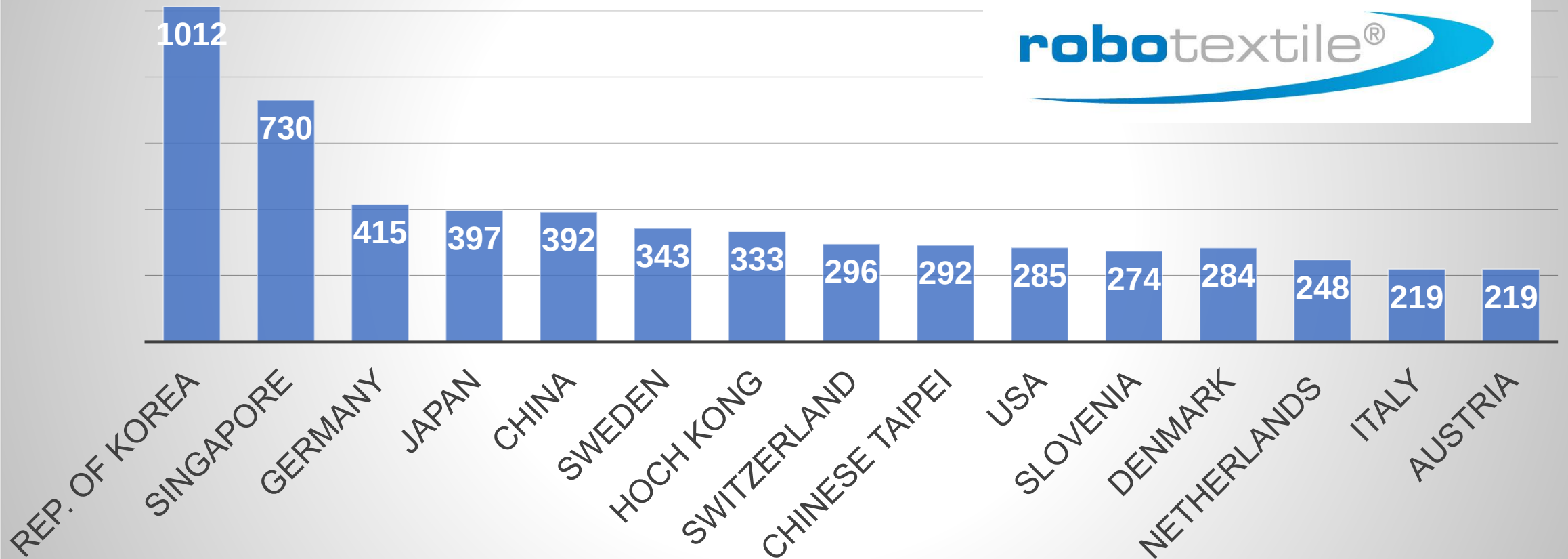


Installation of industrial robots / 5 largest markets 2023 -World



`000 of units Quelle IFR / international Federation of
Robotcs

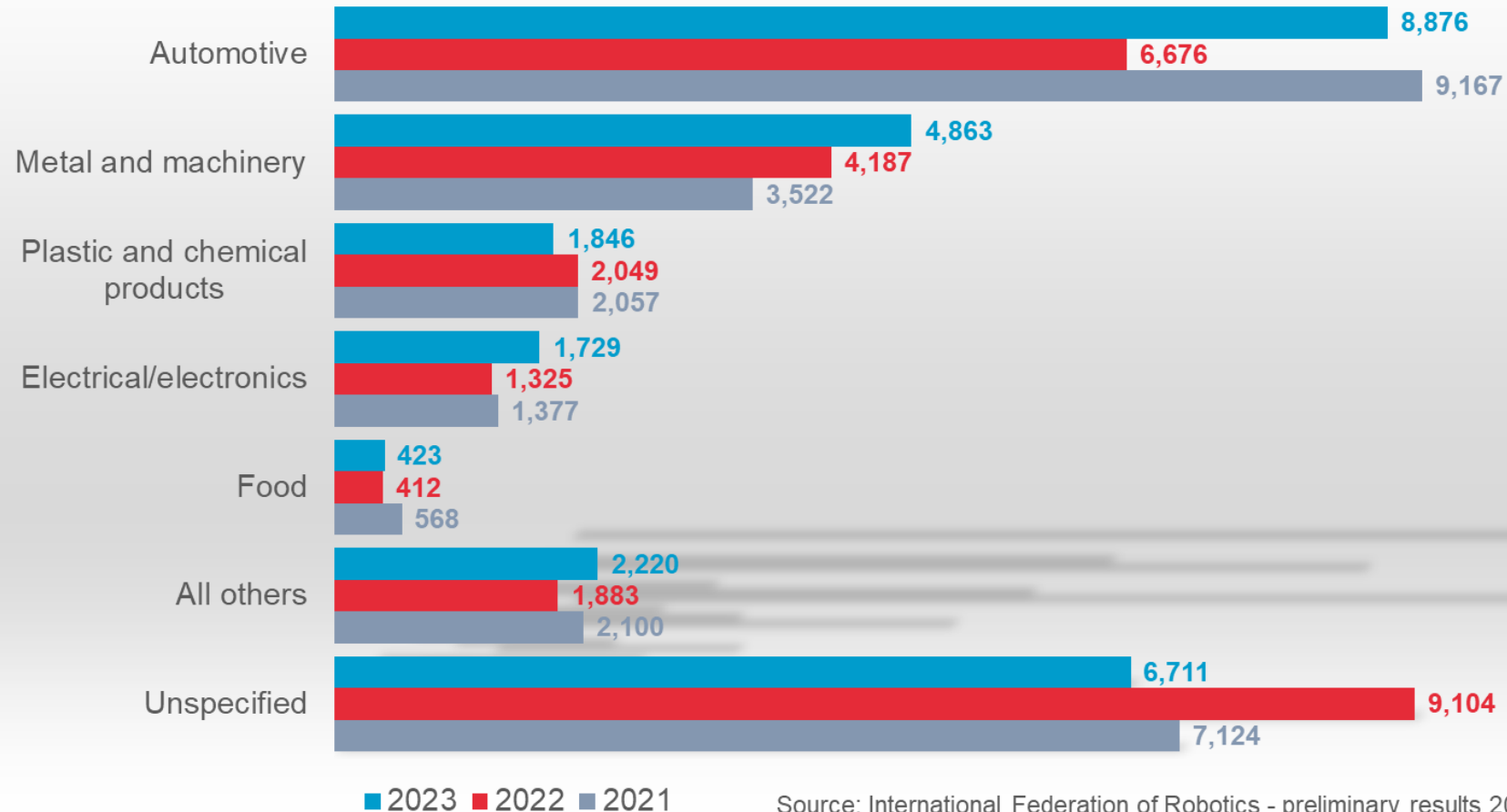
robot density per 10.000 empoyees



Source IFR / international Federation of Robotcs

Annual installations of industrial robots by customer industry - Germany

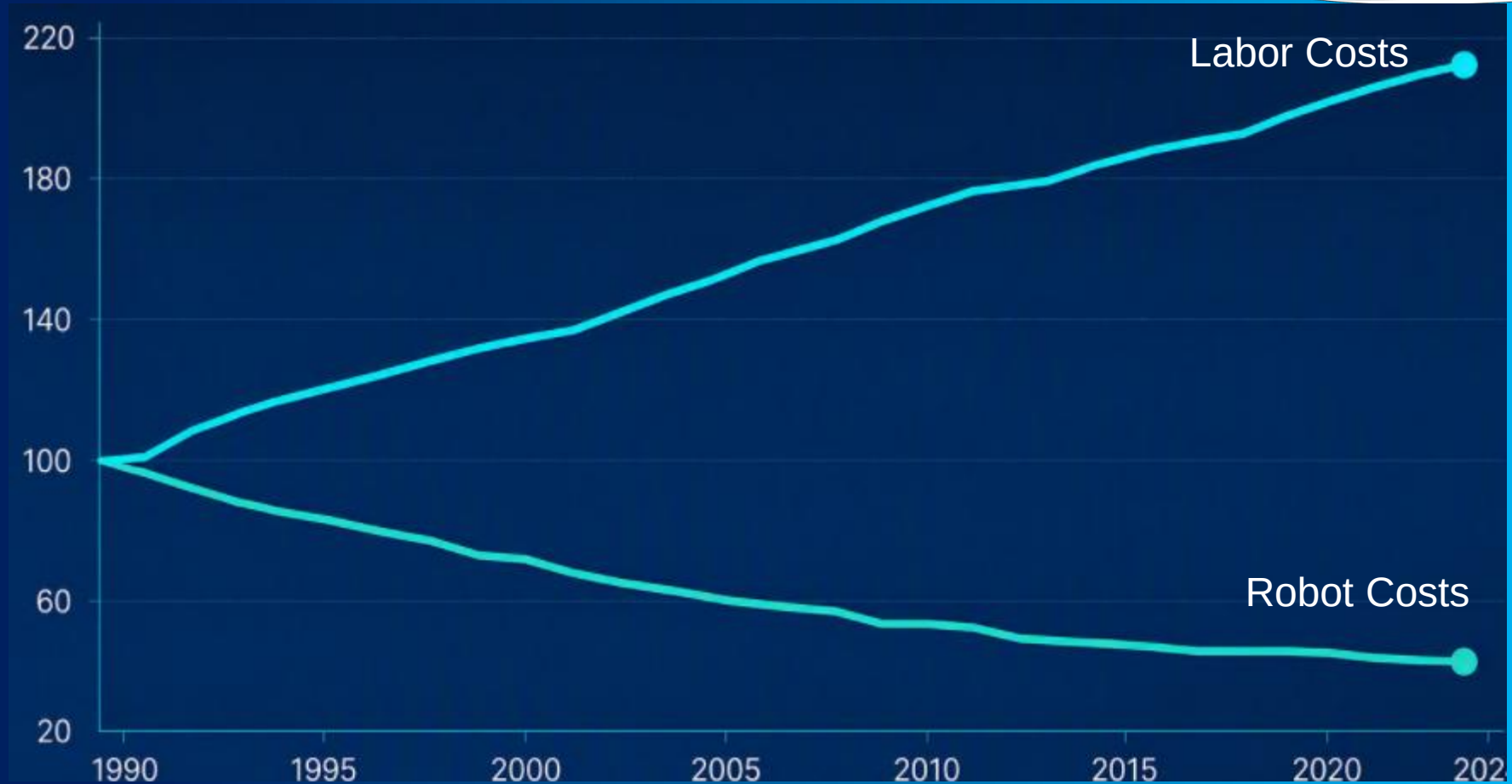
units



Source: International Federation of Robotics - preliminary results 2023

Robot Prices to Labor Costs

robotextile



Issues and Challenges:

Fast-Fashion over-capacity, rarely recycling, new due diligence obligations as of January 1st 2023

- › In **Chile's Atacama Desert**, huge mountains of worn. It is burned, with massive **environmental damage**.
- › It is estimated that **100,000 tons of clothes** end up in Chile every year, which cannot be sold in the USA or Europe.
- › The mountains of clothing now occupy a large part of the desert and cover huge areas with discarded textiles.
- › **75,000 tons of textiles end up in Germany's residual waste** each year, 26,000 tons of which are collected separately.
- › Global textile production causes greater **carbon dioxide emissions** than air and sea transport combined – **about 1.2 billion tons of CO2**.



Three Pillars in Textile Industry

Yarn Industry



Not labour intensive

Fabric Weaving



Not labour intensive

Textile Refinements

Textile Production



Very labour intensive

Issues: 40% Manual work without added value



Fabric layers are sepatated **manually**.

The **processes** are already **automated**.

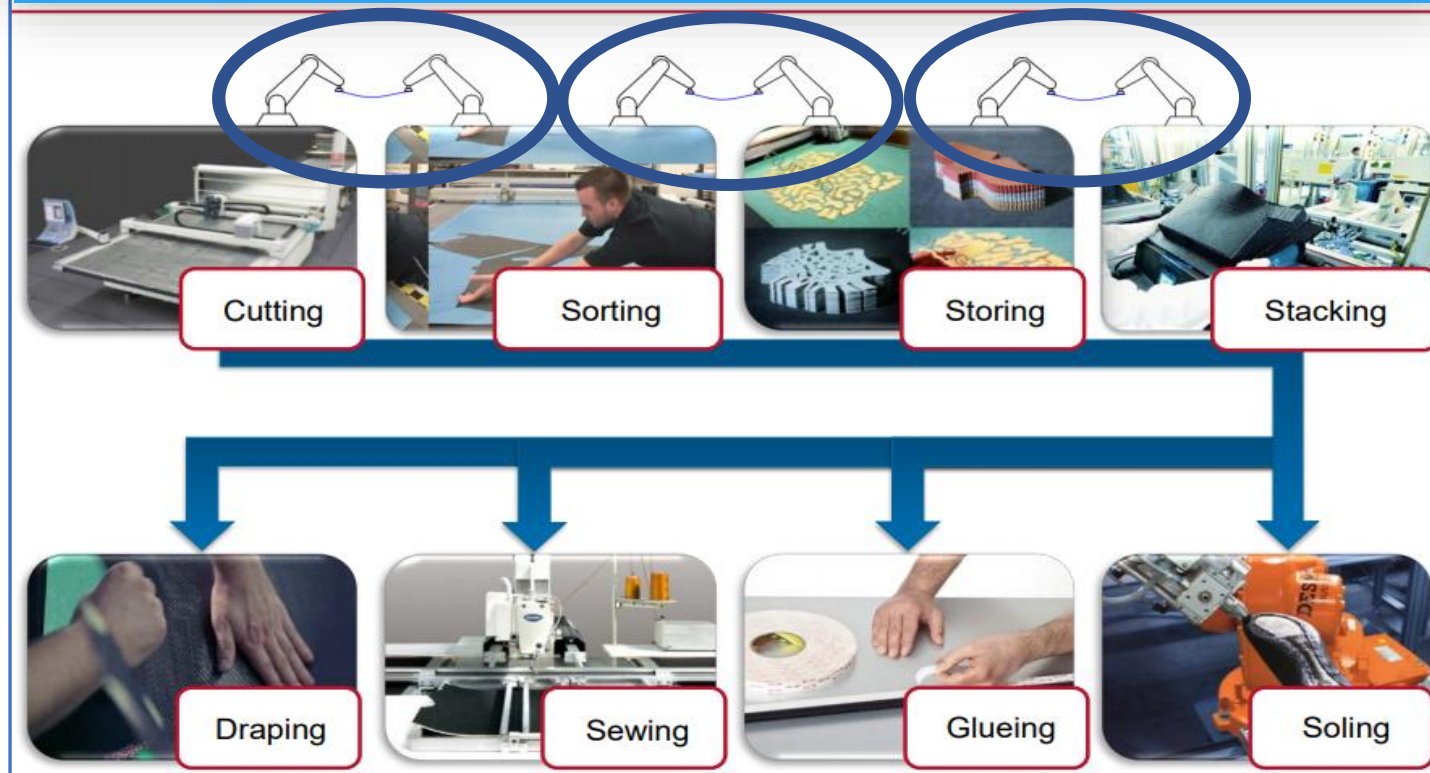
Side processes are **not value added**.

Shortage of workers.



Customer need: Automation in Textile Production

Repeat Steps, Process Chain in Textile Production

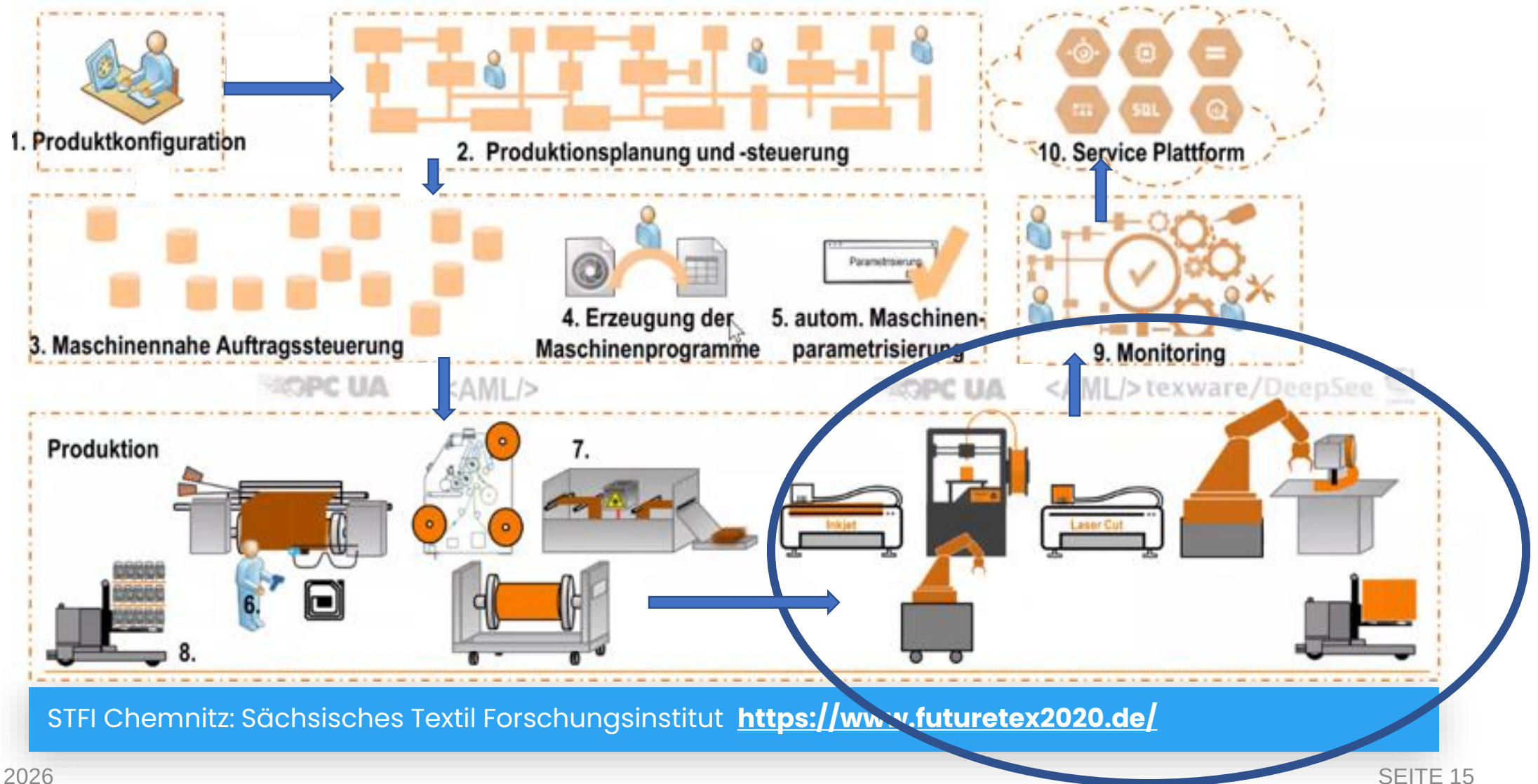


Recurring processes are basically suitable for automation. But textiles are not suitable yet, so almost everything is done by hand.

There are **30 – 50% non-value-added handicrafts** in textile manufacturing.

Massive issues by **labor workers shortage**.

Outlook: Local Production, digital Process Chains, small Lot Sizes



Market for Industrial Textiles, beside Fashion

Textiles in Automotive, Airplanes, Trains:

Seating, Belts, Carpets, Floor mats, Headliners, Dashboards, Filters, Interior Materials, Insolation Materials, **Airbags**

Medical Textiles:

Air Filters, Blood filter, textile stants, disinfection, protection

Industrial Textiles:

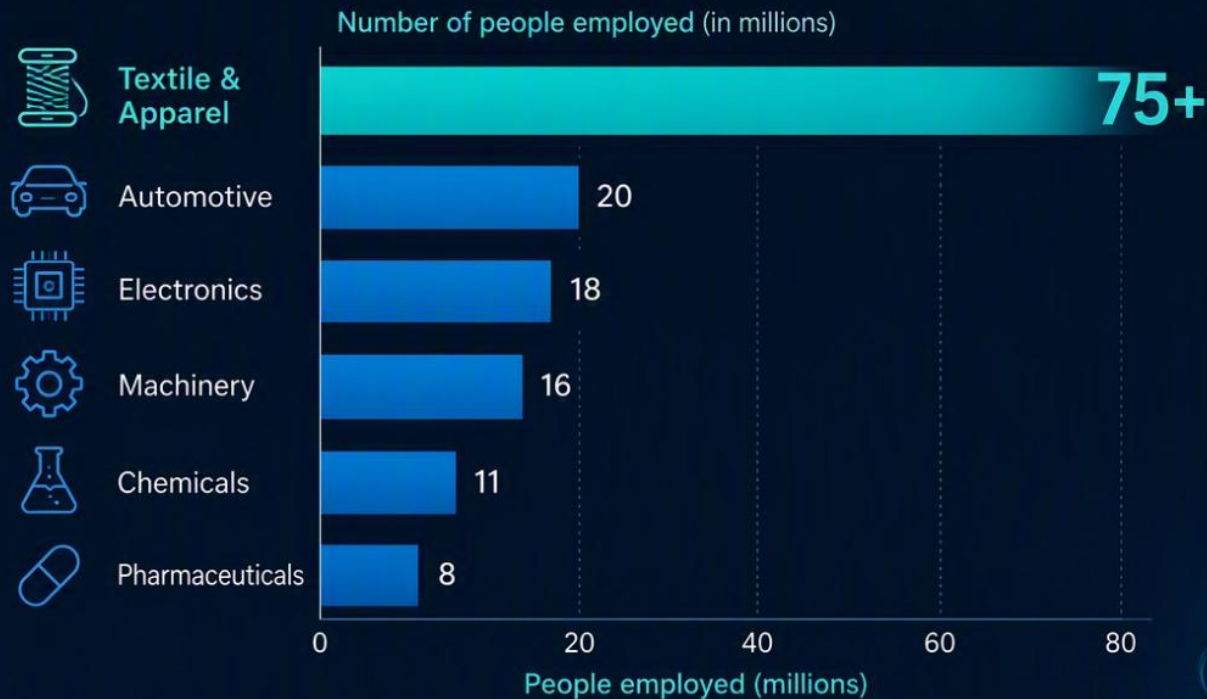
Filters, Insulation material, Construction material, Workwear, Protective equipment, CFRP mats, Foils, Gaskets, Composites

Home Textiles:

Curtains, Bedding, Covers, Carpets, Interior Decoration, Cleaning Textiles, Office furnitures.

TEXTILE INDUSTRY: THE MOST LABOR-INTENSIVE MANUFACTURING SECTOR

Employment in manufacturing industries worldwide



A SECTOR BUILT ON
MANUAL WORK



~ **8 OUT OF 10 TASKS**
in textile & apparel manufacturing
are still performed manually.



HIGH WORKFORCE
DEPENDENCY CREATES
STRONG AUTOMATION
POTENTIAL



The textile & apparel industry employs **more people worldwide**
than any other manufacturing sector.

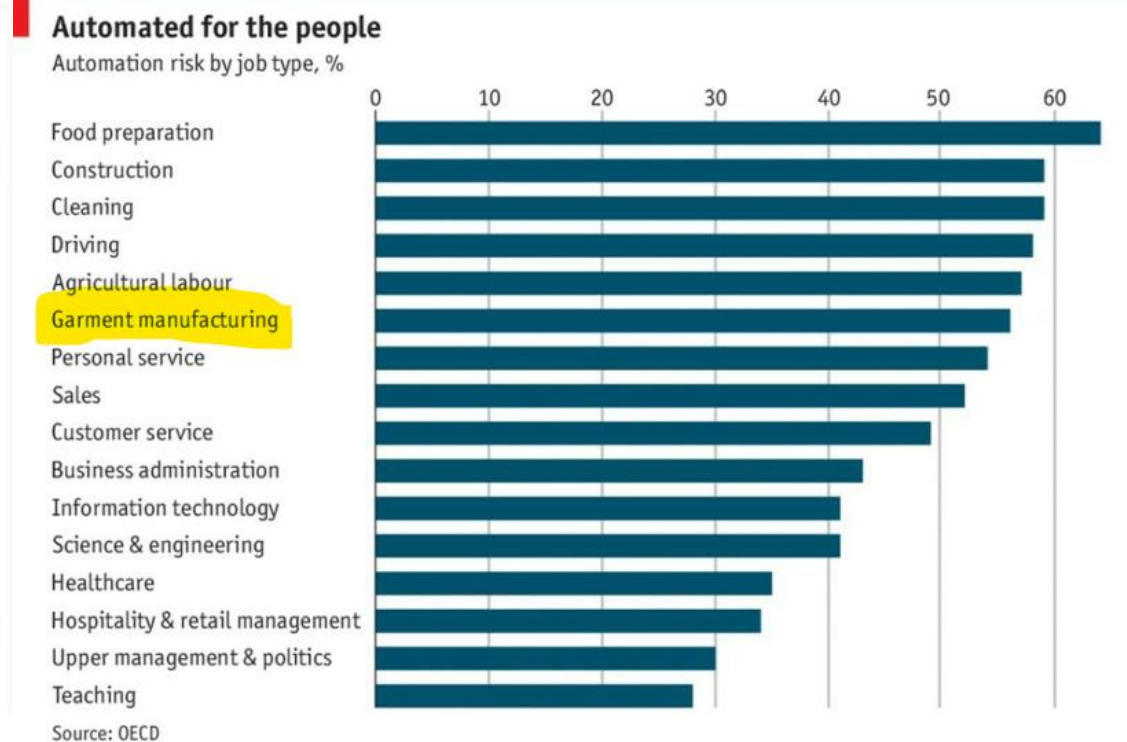
Source: ILOSTAT (2023) | Oxford Economics | Industry reports

Globale Textile Market Figures

Technical / Medical Textile Market APAC to grow 6,2%



Automation Substitution of Industry



Textile Market Apparel

- High of variants (textile workpieces, fashion based)
- Short run rate of months for products, often changes of design
- Focus on cheap countries (40% of labor cost for handling)
- Lack of sewing workers, demographic change
- Low degree of audit expectations by enduser customers
- Zero amount of automation / robotics experience
- No technical understanding in factory on shop floor level
- Low margin products in apparel industry, Asian competition
- Low Budget for Handling

Problem: How to grip a textile:

None of these gripper concepts has achieved widespread adoption or proven successful in high-volume applications

		Bauformen		Wirkflächen
Kraftschluss	Reibkräfte	Klemmen		variabel
		Haftsauger		klein
	Unterdruckkräfte	Flächensauger		groß
		Bernoulli		klein
	Elektrostatische Kräfte	Elektroadhäsion		klein
Stoffschluss	Molekulare Kräfte	Adhäsionsfolien		punktuell
		Gefriergreifer		punktuell
Formschluss	Paaren von Formelementen	negatives Abbild		klein
		flexibler Formgreifer		klein
	Oberflächenverhakung	Nadeln		punktuell
		Kratzen		klein
		Klettverschluss		groß

Abb. 2) Physikalische Wirkprinzipien und Bauformen von Textilgreifern



Abb. 3) Nadelgreifer



Abb. 4) Hyroadhäsionsgreifer

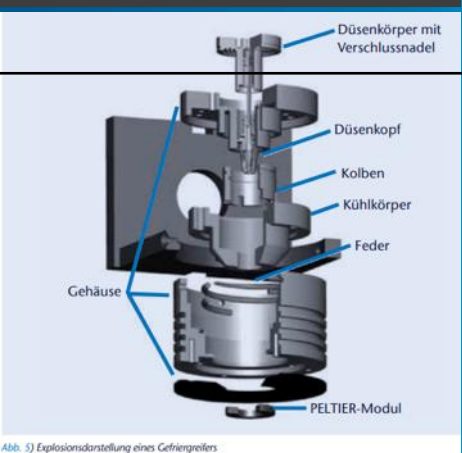


Abb. 5) Explosionsdarstellung eines Gefriergreifers



Flexibler Formgreifer Rochu

Innovation Product Textile Gripper

All textiles are evaluated and examined for the gripping method: Thickness, bending stiffness, hairiness, air permeability, weight, static charge, rolling edges...

Gripper A

Denim
Cotton
Shirts & suits



Gripper B

Stiff materials
Mixed fiber
Coated fabrics



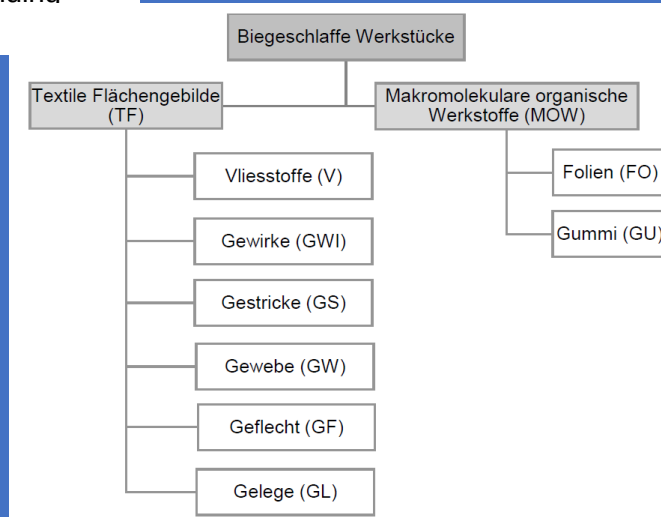
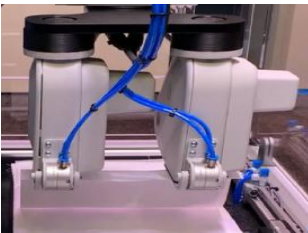
Gripper C

Woven fabrics
Knitted fabrics
Hairiness



Gripper D

Underwear
Statically charged fabrics
Rolling edges



Bestimmung der flächenbezogenen Masse

DIN EN 12127:1997

Bestimmung der Dicke

DIN EN ISO 5084:1996 und DIN EN ISO 9073-2:1997 (Vliesstoffe)

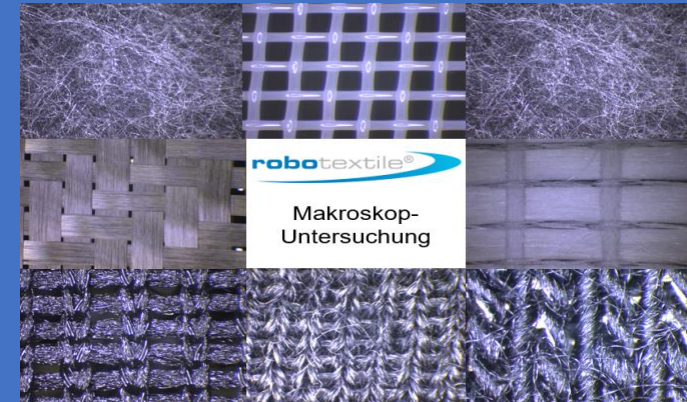
Bestimmung der Luftdurchlässigkeit

DIN EN ISO 9237:1995

Bestimmung der Biegesteifigkeit

DIN 53 362:2003

Makroskopische Untersuchungen zur Charakterisierung der Oberfläche



100 different textiles have been investigated for gripping

Innovation Product Textile Gripper

All textiles are evaluated and examined for the gripping method: Thickness, bending stiffness, hairiness, air permeability, weight, static charge, rolling edges...

Gripper A

Denim
Cotton
Shirts & suits



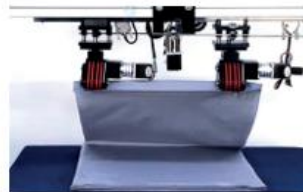
Gripper B

Stiff materials
Mixed fiber
Coated fabrics



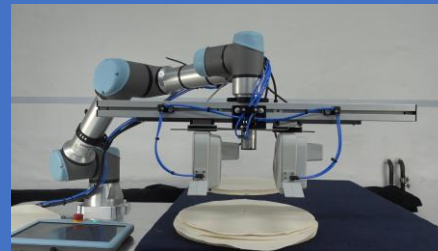
Gripper C

Woven fabrics
Knitted fabrics
Hairiness

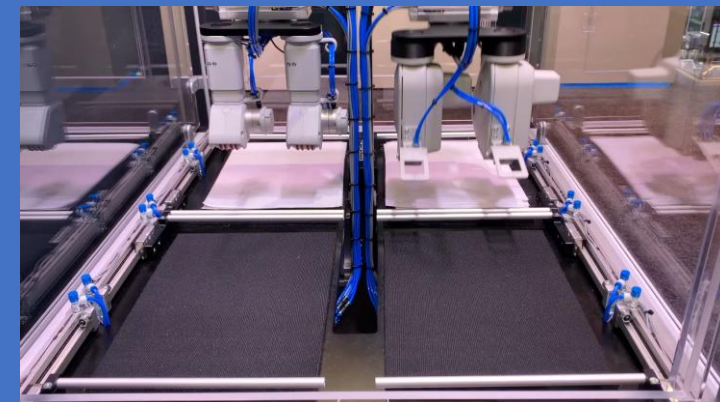


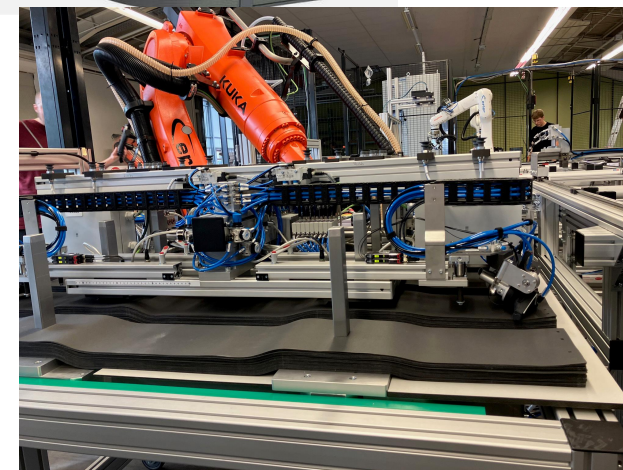
Gripper D

Underwear
Statically charged fabrics
Rolling edges



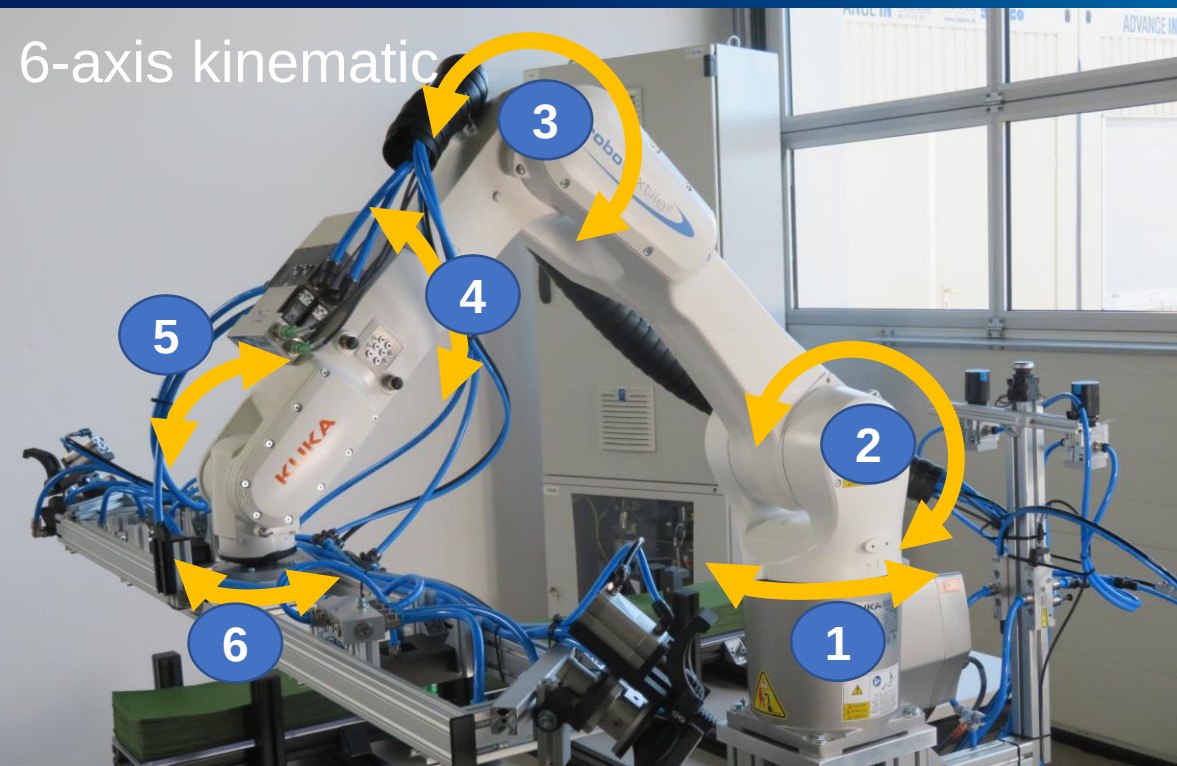
100 different textiles have been investigated for gripping





Robotik

DEFINITION: An industrial robot is an automatically controlled, programmable mechanical manipulator with at least three axes that can be programmed in three or more dimensions.



Industrial Robot vs. Service Robot

- **Industrial Robot**

Designed for handling, assembly, processing, and manufacturing tasks in production environments.

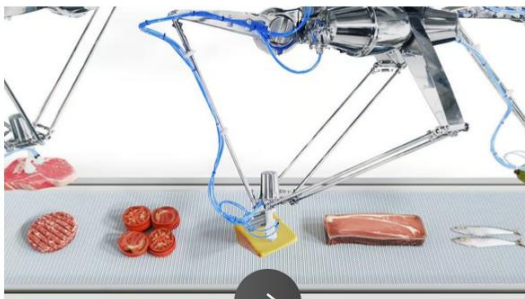
- **Service Robot**

A robot that performs useful tasks for humans or equipment outside industrial automation applications.

KR DELTA im Hygienic Design

 **Traglast:** 3 kg

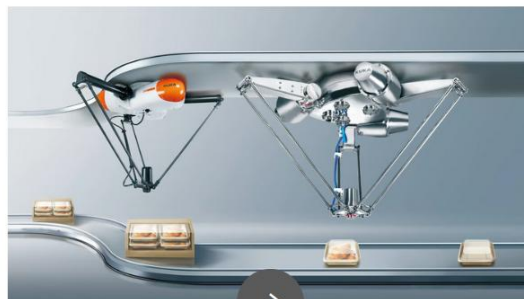
↔ **Max. Reichweite:** 1200 mm



KR DELTA

 **Traglast:** 3 kg

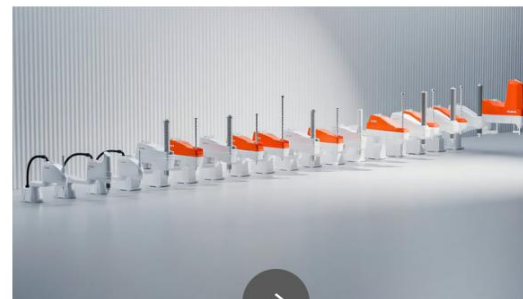
↔ **Max. Reichweite:** 1200 mm



KR SCARA

 **Traglast:** 6 - 60 kg

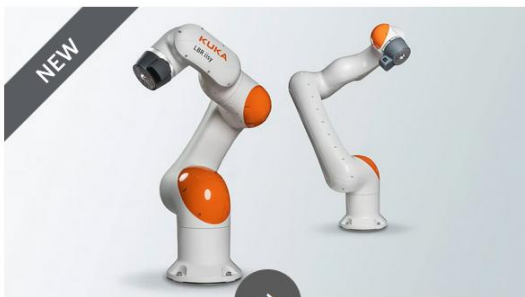
↔ **Max. Reichweite:** 500 - 1200 mm



LBR iisy

 **Traglast:** 3 - 15 kg

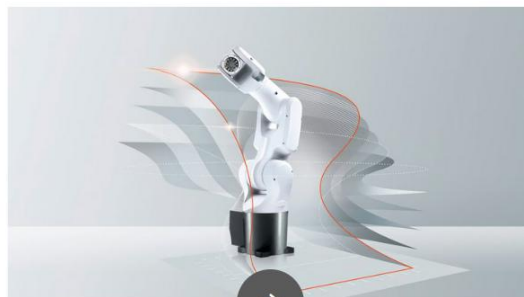
↔ **Max. Reichweite:** 760 - 1300 mm



KR 4 AGILUS

 **Traglast:** 4 kg

↔ **Max. Reichweite:** 601 mm



KR AGILUS

 **Traglast:** 6 - 11 kg

↔ **Max. Reichweite:** 706 - 1101 mm

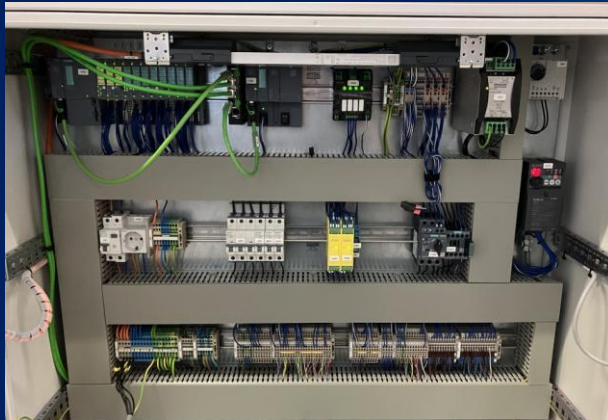


Robot brands:

- Yaskawa
- Fanuc
- ABB
- Stäubli
- EPSON
- KUKA
- DENSO
- UNIVERSAL
- ROBOT
- COMAU
- NACHI
- KAWASAKI
- :
- :
- :

Main Components of an Industrial Robot:

- ✓ Manipulator
- ✓ End Effector
- ✓ Robot Controller & Teach Pendant
- ✓ Sensors
- ✓ Peripheral Equipment (safety fencing, feeders, magazines, etc.)

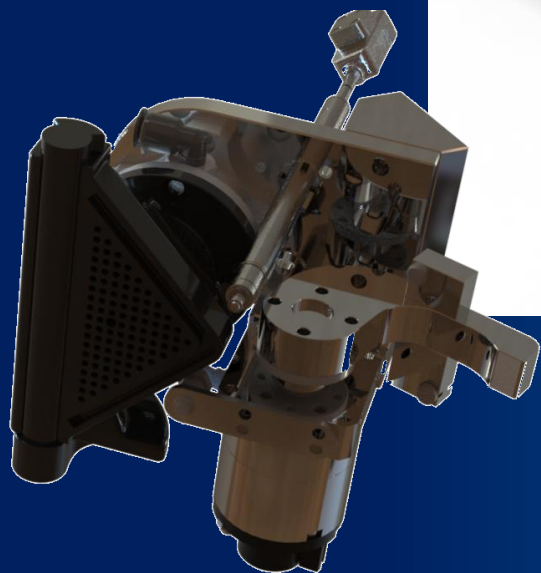
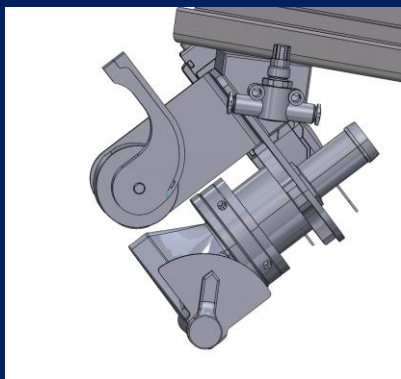


Textile Cell: C&A in operation, Re-Shoring Project Germany



Prinzip AIR STREAM GRIPPER

robotextile

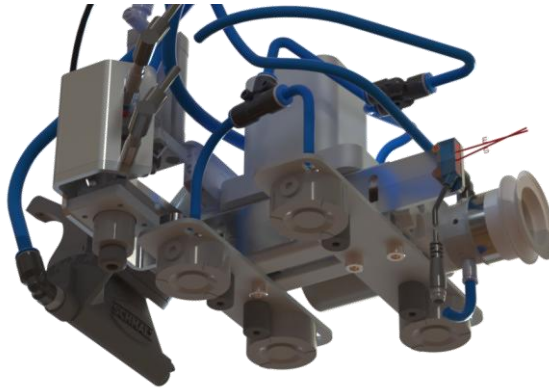


Positioning:

Magazine



Robot with EndOfArmTooling



Adjustment
(Camera)



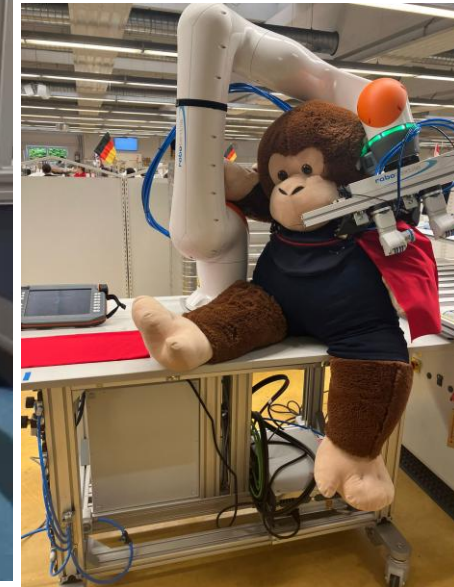
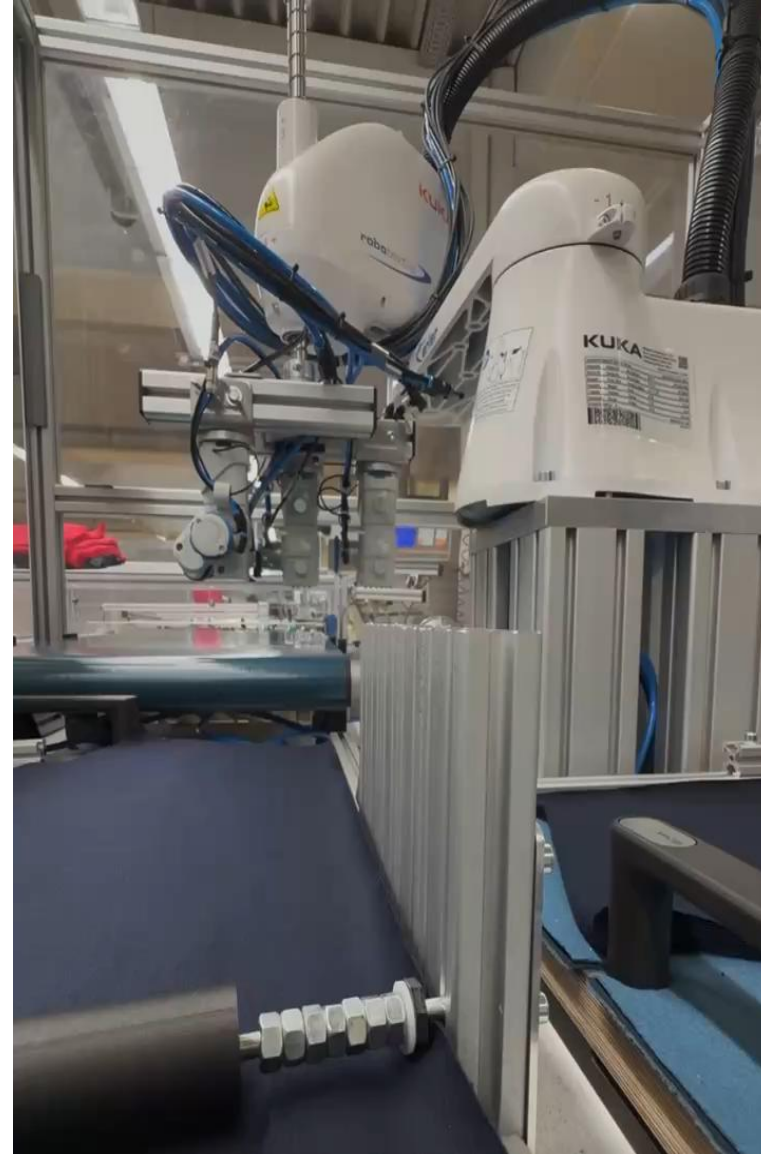
Positioning



Positioning without camera?



TRIGEMA PROJECT

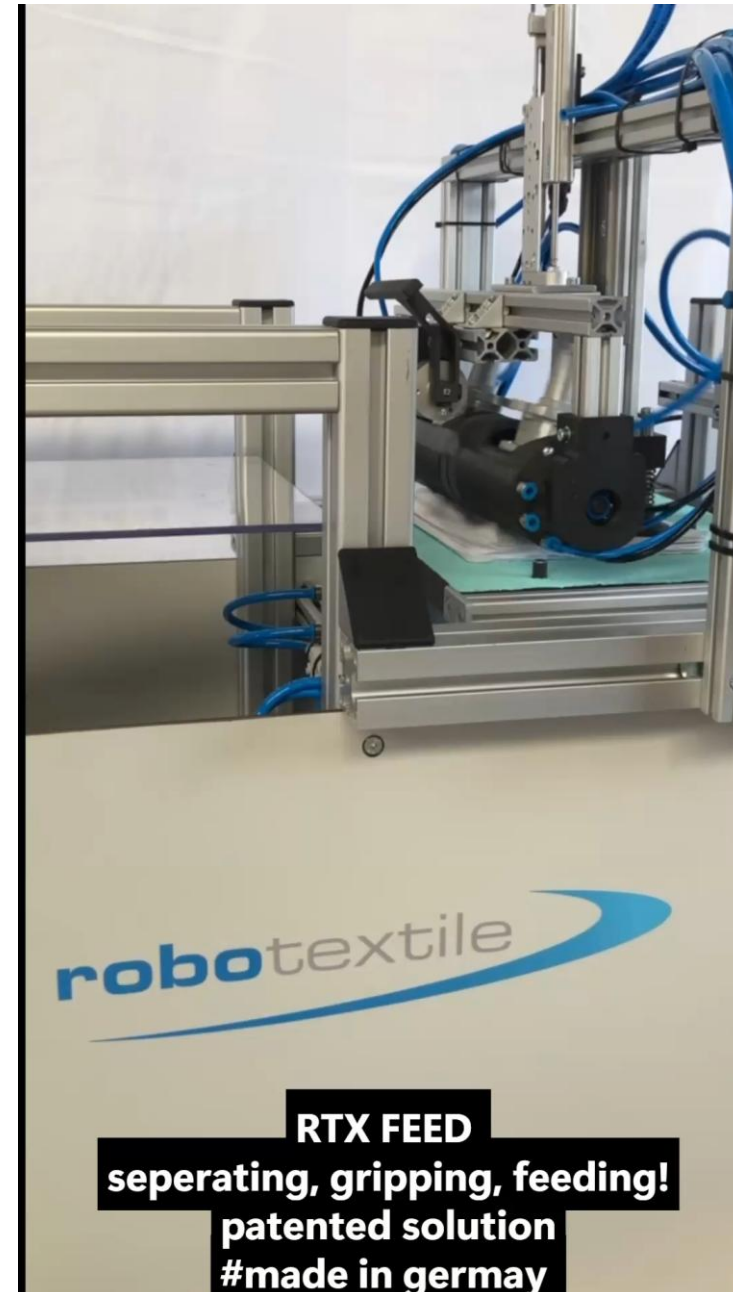
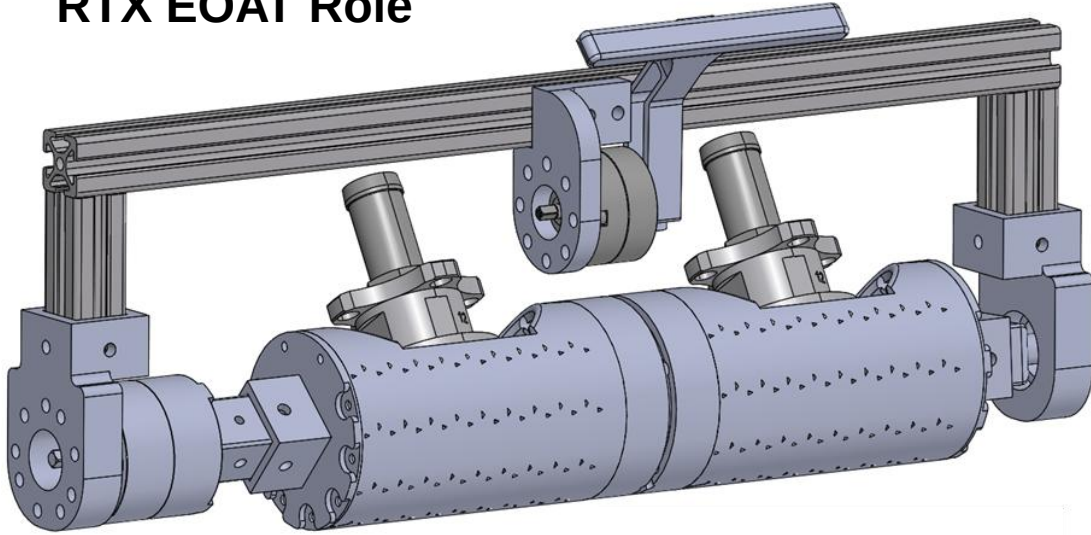


UNLOADING CUTTING MACHINE



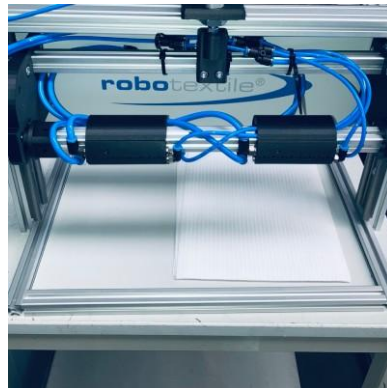
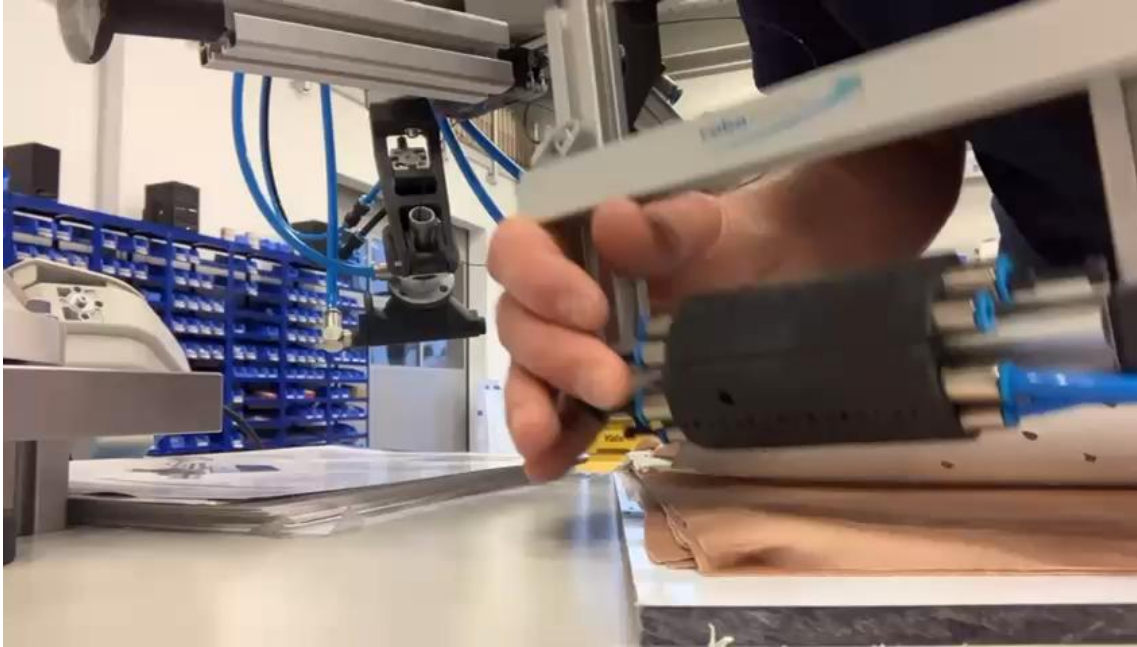
SOLUTIONS WITHOUT ROBOT`? RTX FEEDER

RTX EOAT Role



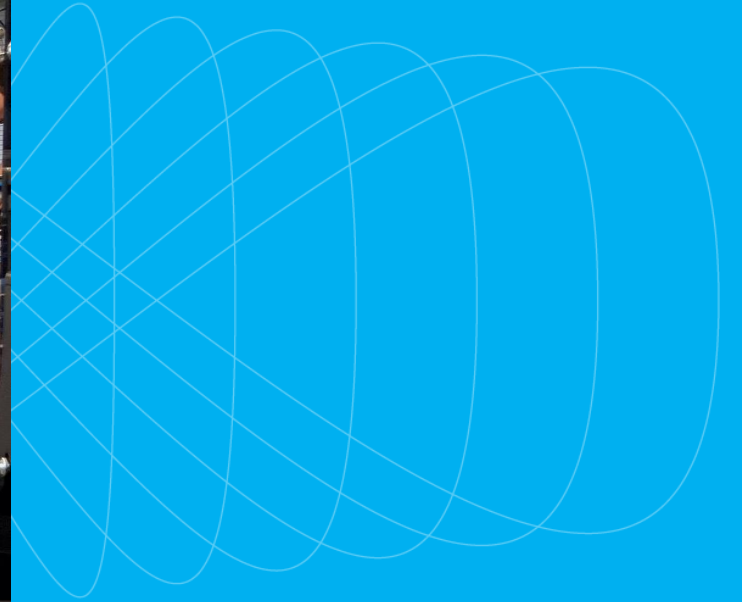
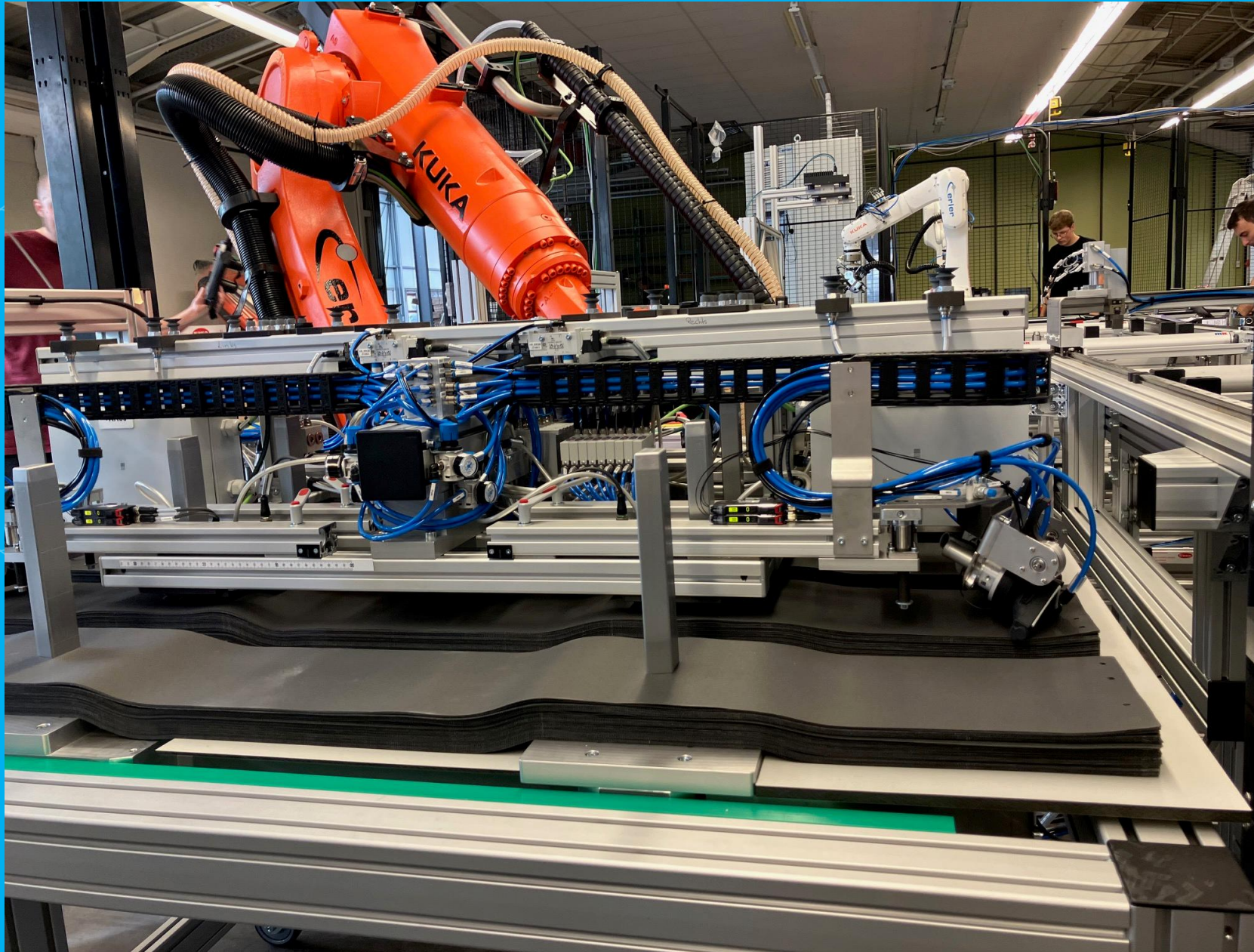
RTX FEED
seperating, gripping, feeding!
patented solution
#made in germany

Some new Applications. Patent approved 2026.



Placing parts with small tolerance





Cutting Table off-loading by GUNNAR

SINGLE LAYERED PICKING



April 2026



GUNNAR AG

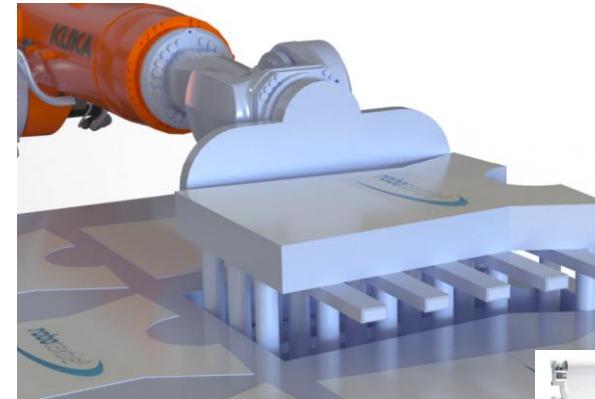
Bafflesstrasse 17A
CH-9450 Altstätten
Switzerland
phone +41 71 775 82 20
info@gunnar-int.com
www.gunnar-int.com



SEITE 37

Cutting Table off-loading by Robotextile

SINGLE LAYERED PICKING X MULTI LAYERED PICKING



<https://www.youtube.com/watch?v=9HScvqbCUnU>

April 2026

Busche Sewing Automation since 1950, 11 Locations worldwide

www.busche-online.de



Sources of Market Potential, Memberships of Robotextile

GERMANY

- textil & mode stands for 23 textile associations in Germany. 800 members
- südwest textil has 220 members companies
- AFBW has 170 members companies



[Mitglieder - Südwesttextil e. V. \(suedwesttextil.de\)](http://suedwesttextil.de)



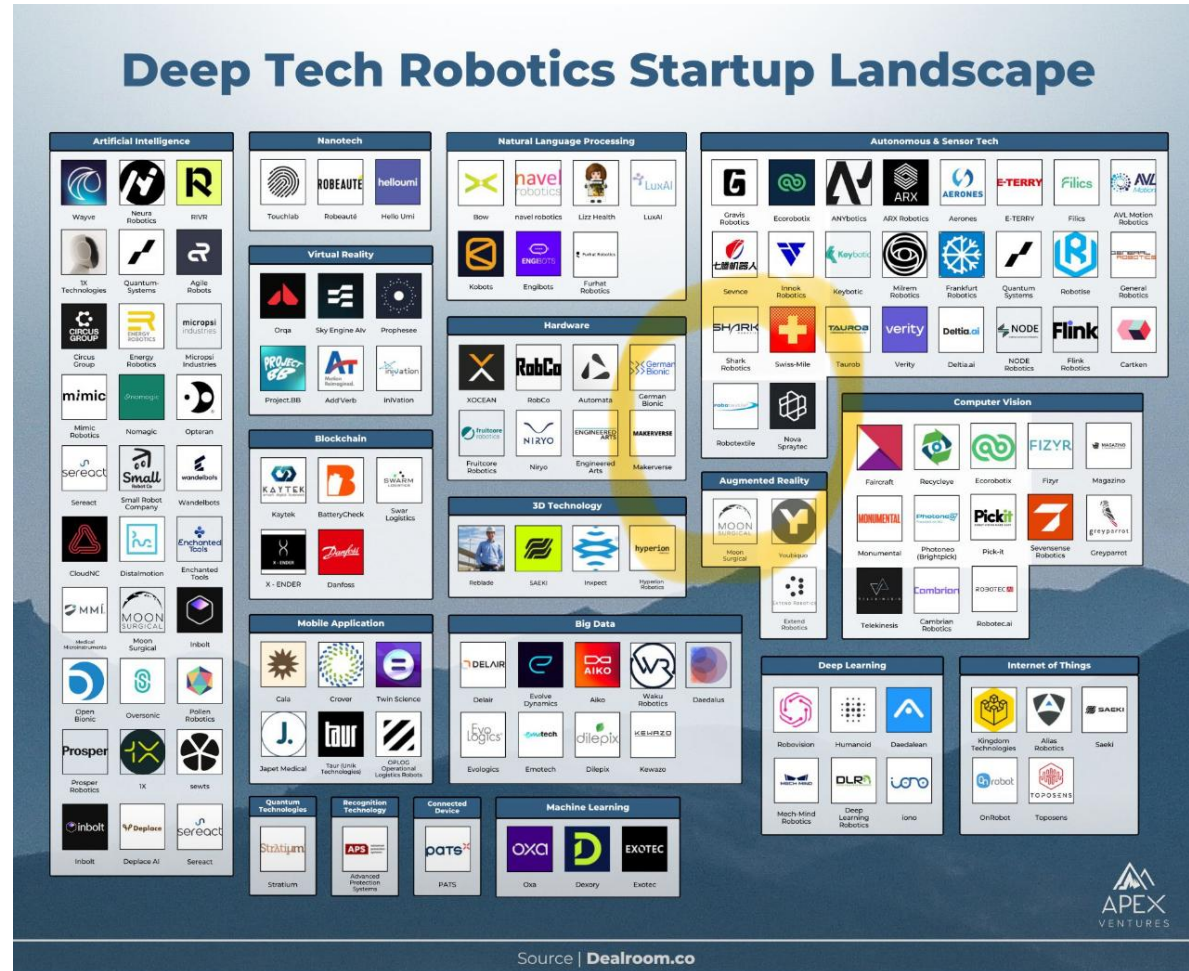
[Mitglieder Liste - Allianz Faserbasierter Werkstoffe Baden-Württemberg e.V. \(afb.eu\)](http://afb.eu)



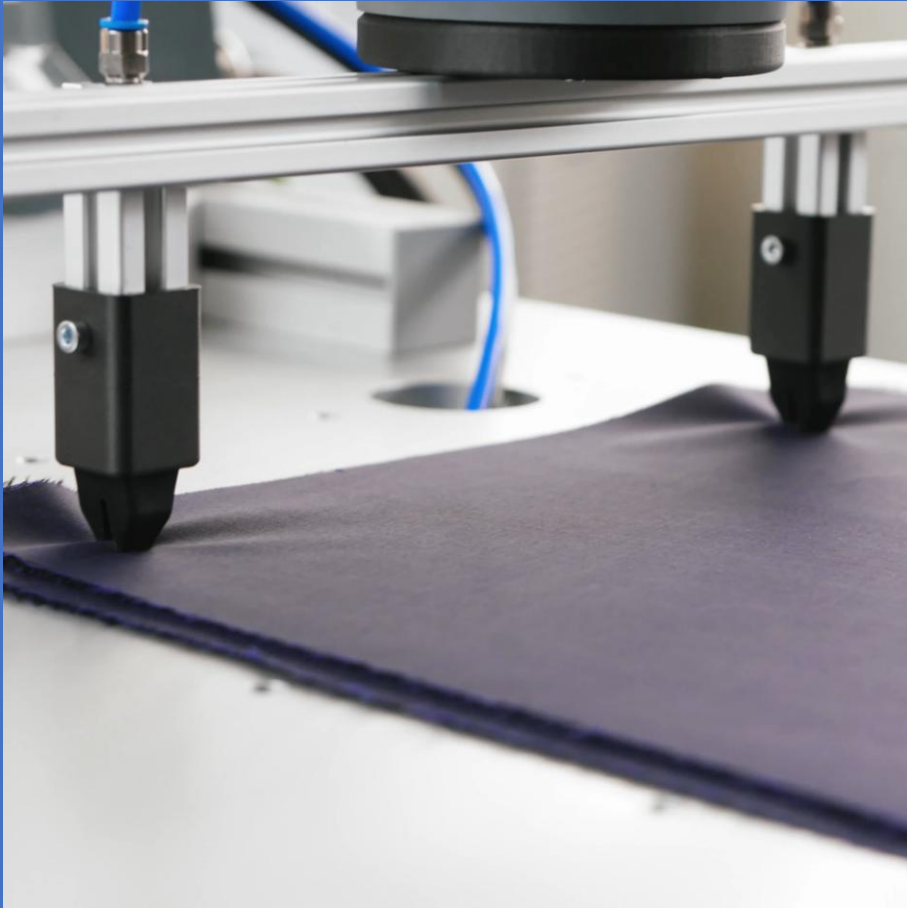
[Mitgliedsverbände - Textil+Mode \(textil-mode.de\)](http://textil-mode.de)

Top Ranking of Global Robotics StartUps

Robotextile is acknowledged and accepted in the Deep Tech Robotics World

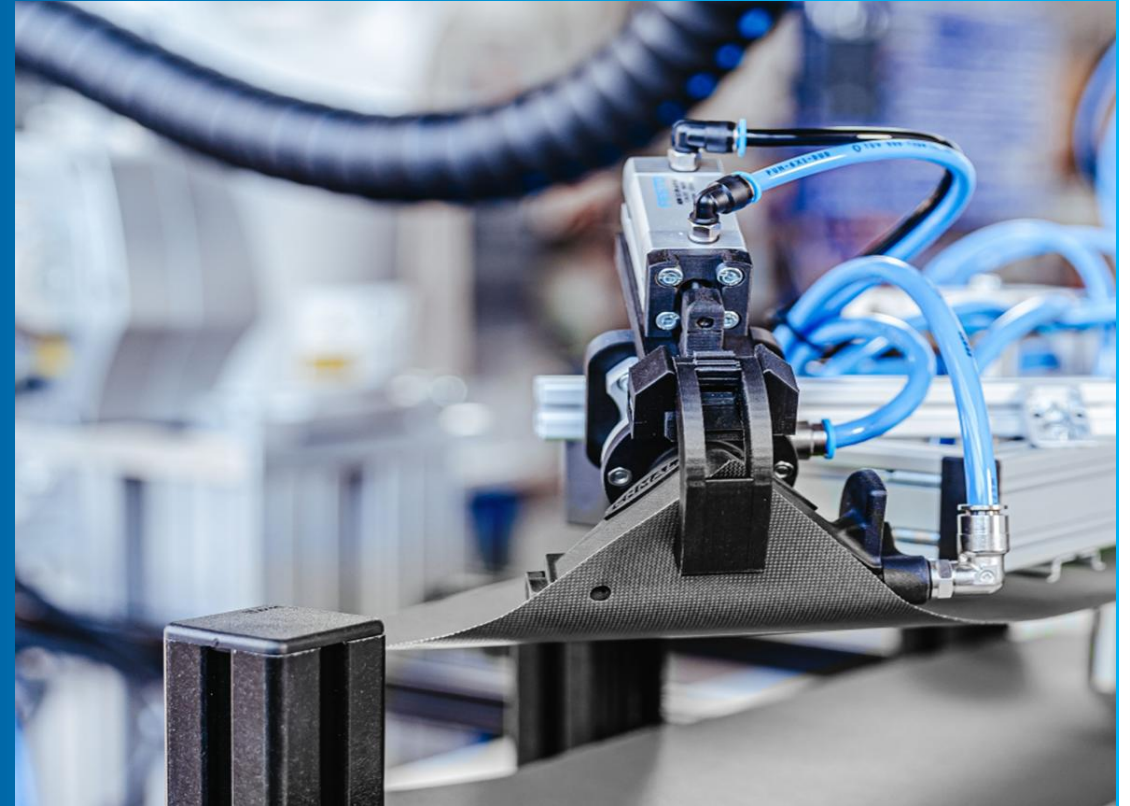


Robots and Textile Industry



Automation Applications in Textile Manufacturing

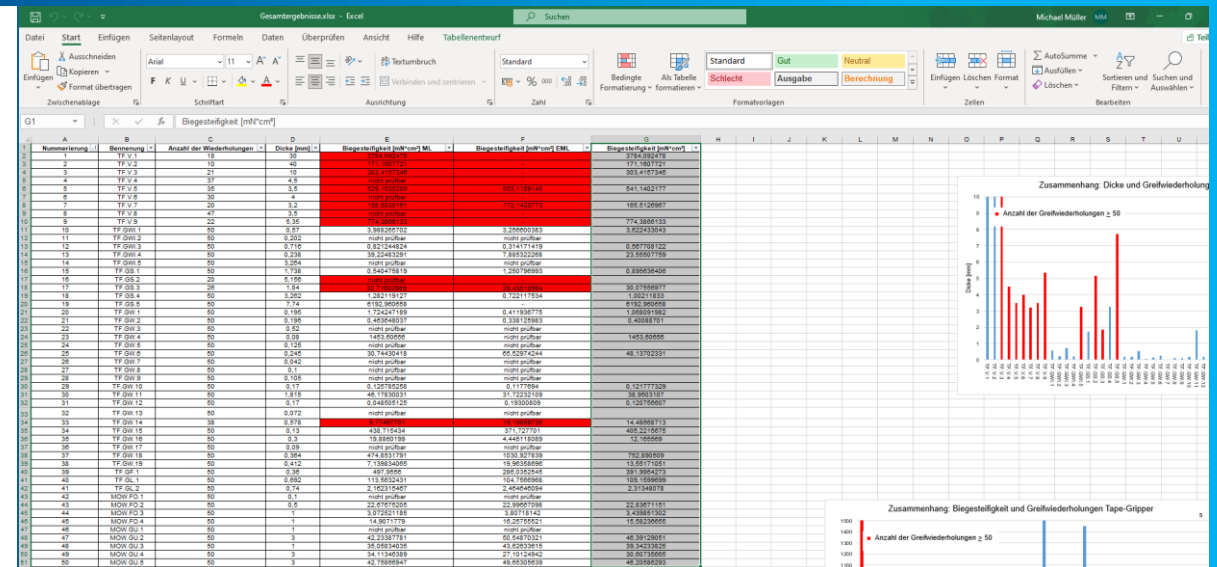
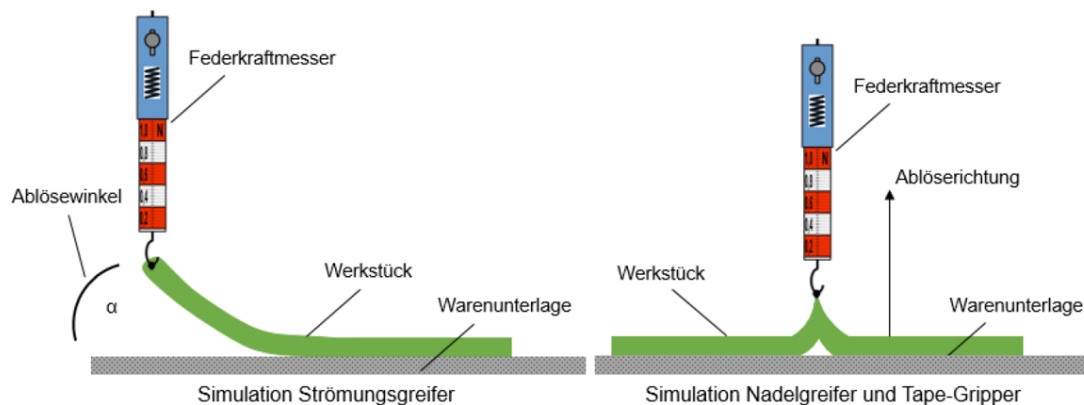
- Fabric loading for injection molding and overmolding
- Textile and membrane insertion into housings
- Layer stacking and positioning for HF and ultrasonic welding
- Automated sewing and embroidery
- Unloading of single layer and multilayer cutting tables
- Part separation and loading of molding and pressing machines
- Packaging and intralogistics
- Vision-guided automation systems (camera applications)



Physics: Database > 100 materials

Property	Unit	Minimum	Maximum
Mass per Unit Area	g/m ²	28	4,562
Thickness	mm	0.04	40
Air Permeability	mm/s	0	14,560
Bending Stiffness	mN·cm ²	0.05	6,193

METHODIK DER TRENNVERSUCHE



Robotic Trends

robotextile

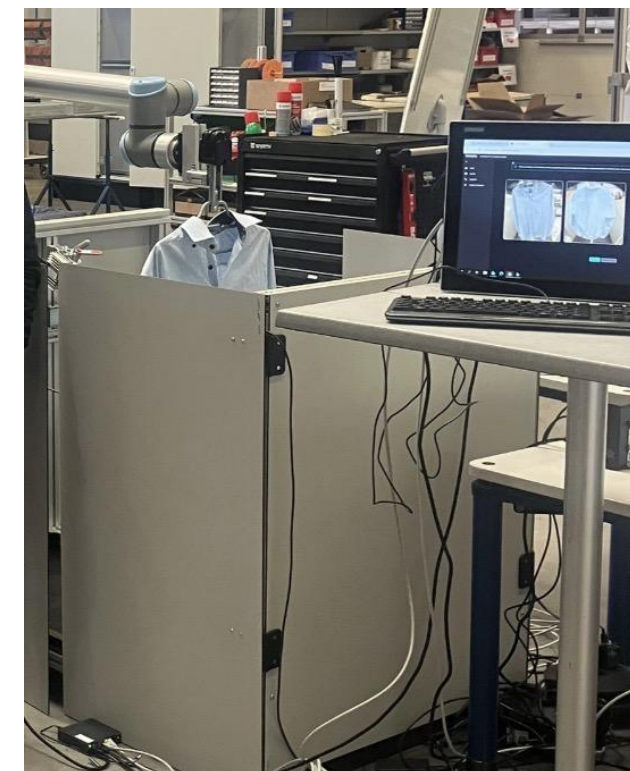
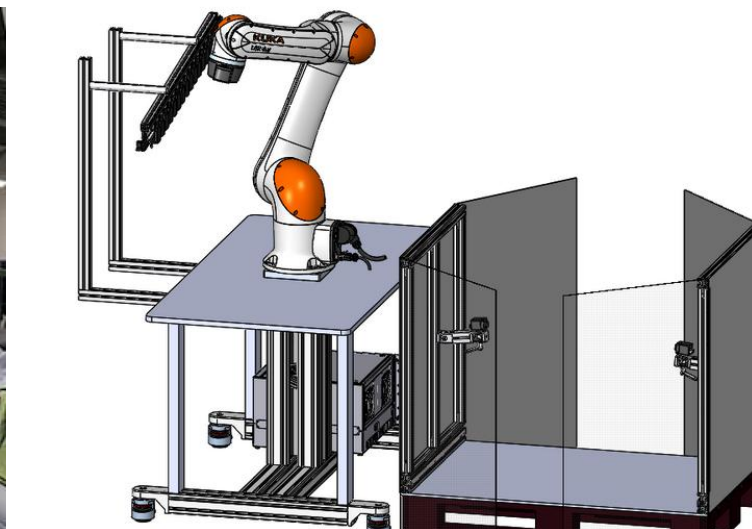
TEXTILE AUTOMATION



Trends for automation:

- Robotics:
 - Easy to use (No-Code-Robotik)
 - Low cost Robotic
 - Cobots
 - Digitale twins
- New application....
 - ...Artificial Intelligence
 - ...mobile robots
 - ...humanoid
- New markets:
 - Skilled trade
 - Retail
 - Services

Textile SORTING- Projects with AI



SORTING CHALLENGES

The Hidden Hurdle in Textile Recycling



A single T-shirt can contain:

- Cotton + polyester + elastane blend
- Multiple dyes and finishes
- A printed logo made from PVC or ink



The good news: technology is stepping in

- AI-powered scanners can now detect fiber composition in seconds
- NIR (Near-Infrared) sensors help automate sorting at recycling plants

AI SOLUTION WITH
ROBOTEXTILE

Textile automation, how to get started

Do not start with the highly sophisticated task:

Not too many variants:

Try to find repetitive handling jobs in 2-3 shifts:

Start in small steps, but start:

Find simple repetitive handling task, feeding a process machine

Try to stay with 1-5 variants on your first automation task

Extremely high variants in one shift do not pay off

Automotive industry has learned robotics in 40 years time!

VAUDE PROJECT

AUTOMATION TEXTILE INDUSTRY



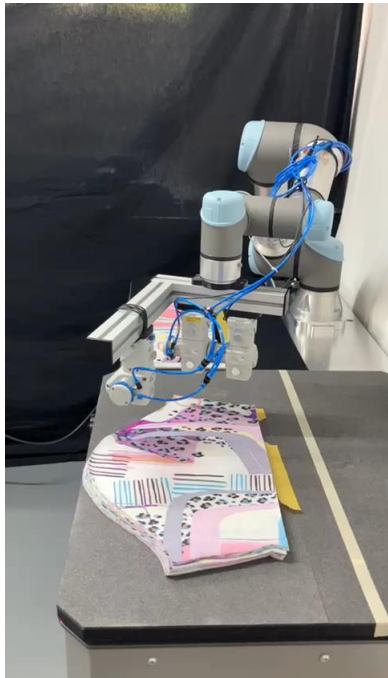
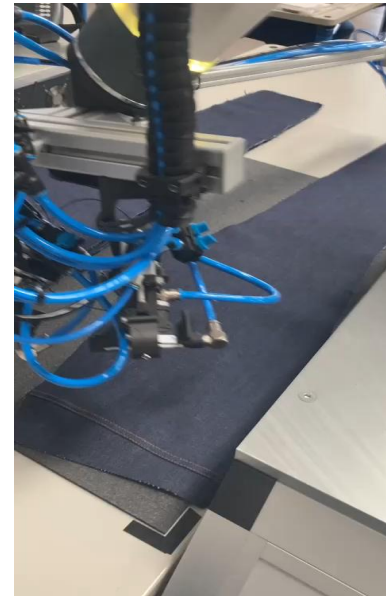
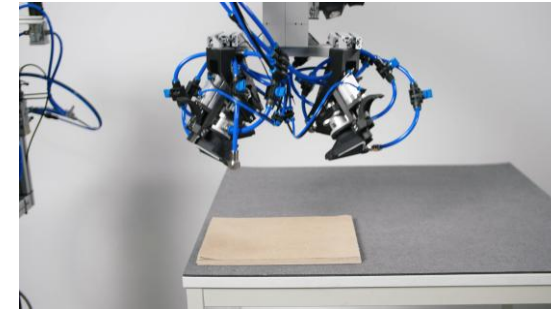
→ PRODUCTION

limp parts - separate gripping
heat press function - transfer print



erler (X) VAUDE (X) automation (X)

Some applications



www.youtube.com/@robotextile/videos

<https://youtu.be/CTk5cUNH1cE?si=Me-hT4iwSAHwUPJ8>

Thank you for your attention!

Gripping and separating
systems



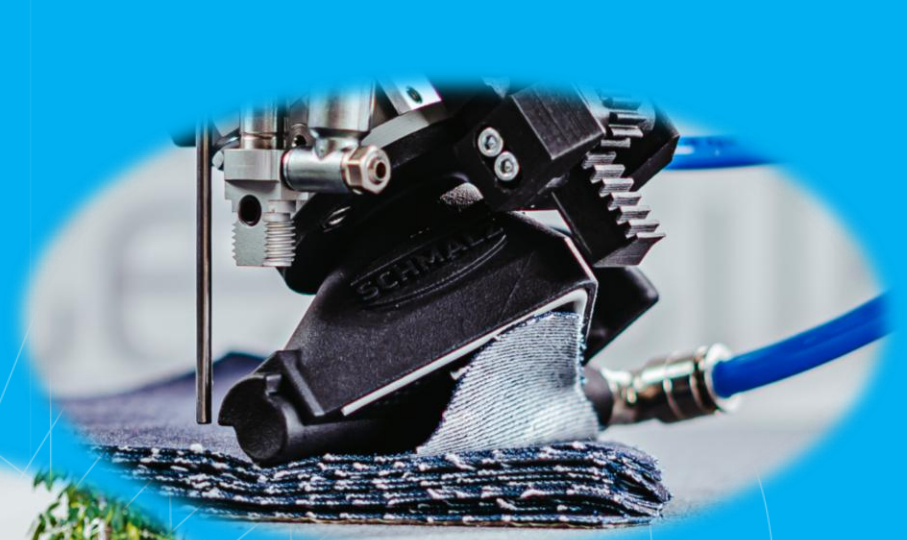
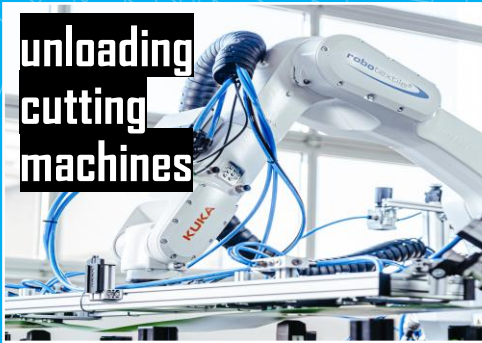
robot sewing



high-frequency
welding
experience



unloading
cutting
machines



info@robotextile.com www.robotextile.com

Robotextile GmbH / Bubensulz 6 / 72358 Dormettingen, GERMANY /
michael.mueller@robotextile.com





Thank you for your attention!

The Fabrics **Seperator**!

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Bubensulz 6
72358 Dormettingen, GERMANY
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A 3D rendering of a white and black robotic hand holding a white rectangular sign. The sign has the text "FIT FOR FUTURE!" in blue capital letters. The background is a light blue gradient with a large white circle and a blue swoosh.

**FIT FOR
FUTURE!**