

Sumotex™

JE Line

Sumcab Motion Textile

New



**The small change
that changes
everything**

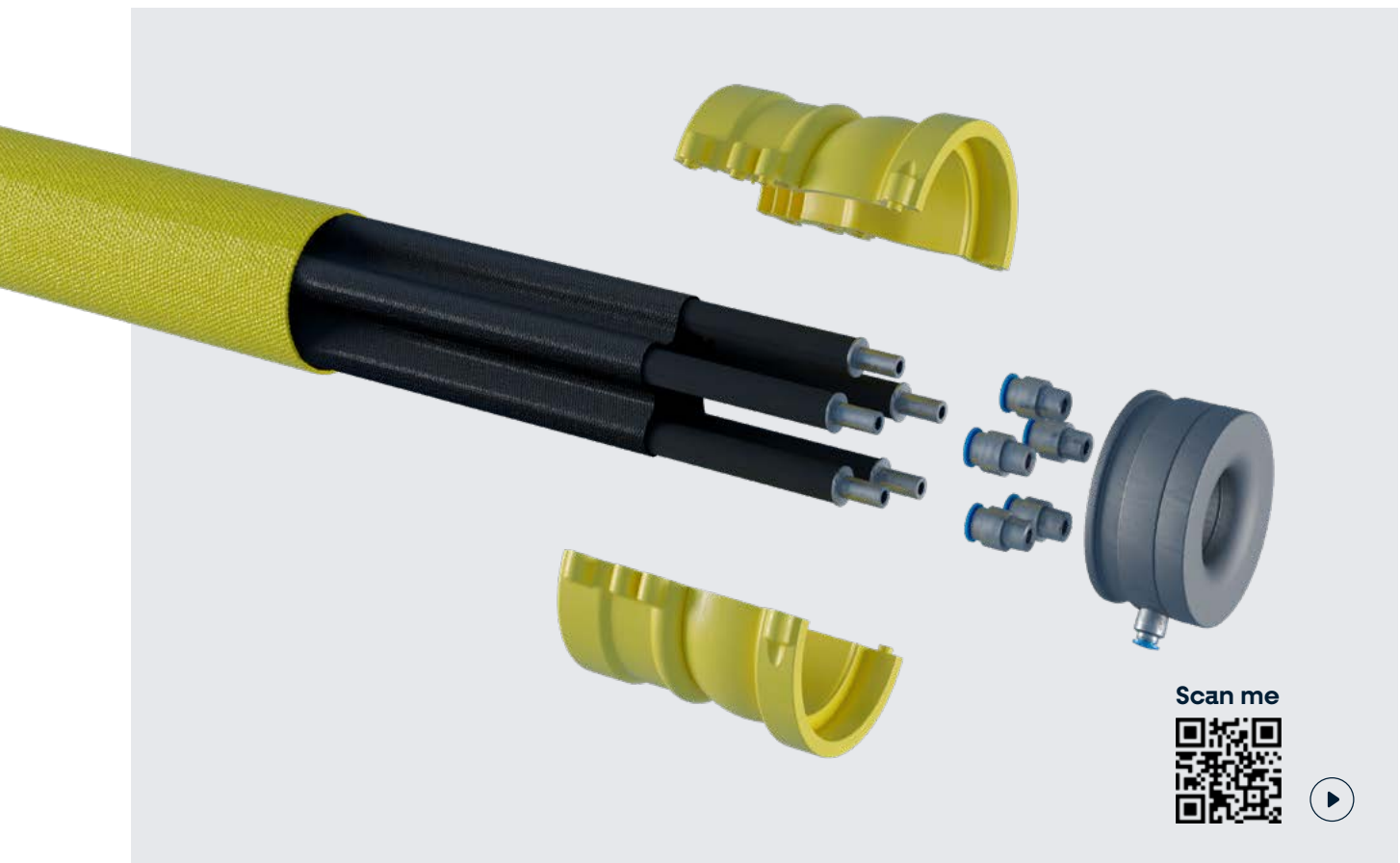
sumcab
ROBOTICS

Sumotex™

The power & media supply system – Whenever it counts

SUMOTEX offers lightweight, low-wear and reliable power and media supply, for all robot applications that require more than just standard line packs.

The technology is based on a patent of the Mercedes-Benz AG and is developed and marketed under exclusive license by Sumcab Robotics.



Operating principle

SUMOTEX guides the line package inside an air-filled high-tech textile hose. The air channels are pressurized with air once and create flexible stiffness along the entire length of the dresspack system. Thus, with SUMOTEX, no additional support, e.g. by a mechanical spring, is required for a dresspack retraction.

SUMOTEX's inherent recovery effect prevents the hose package system from sagging. This prevents disturbing loops that often occur during length compensation for the robot's movements.

The flexible stiffness also enables a particularly tight guidance of the dresspack system along the robot's arm and thus only adds a minimal interference contour.

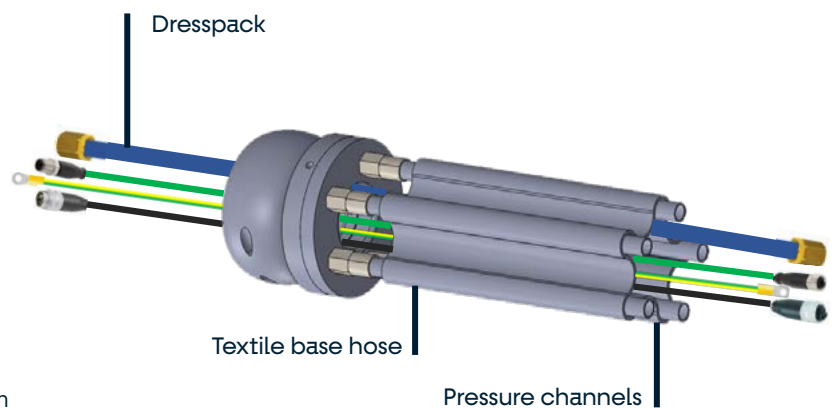
With SUMOTEX, collisions with the cable package and resulting damage of the robot now belong to the past.

Design and basic components

The Core of SUMOTEX

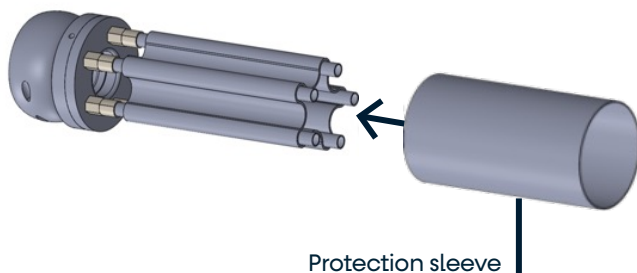
The core element of the SUMOTEX technology is a textile hose with internally sewn-in pressure channels. The components of the dresspack are routed inside this hose, evenly and protectively surrounded by it.

Once filled with compressed air, SUMOTEX's base hose constantly adapts to the robot's movement. Thanks to its inherent recovery effect caused by the compressed air, the system requires no additional mechanical support (by spring retraction or similar) for a length adaption on movements of the robot's arm.



Textile High-Tech Protection

On the outside, a protection sleeve made of high-tech textile surrounds the base hose. This additional sheathing serves as replaceable wear protection that saves the entire system from abrasion, dirt or chemicals. For this purpose, a particularly resistant textile was chosen, which shows improved durability compared to conventional corrugated tubes.



Free of halogens and cadmium / according to DIN 53474



High flexibility



Traction resistant



Resistant to welding spatter



Heat resistant



Low weight



Increased abrasion resistance



Resistant to chemicals

Operation principle & specific features

Flexible path planning

SUMOTEX constantly seeks to align itself straight again after a robot-induced bend. As a result, no loops occur on the hand axes (A5/A6). The risk for hits and abrasion is reduced to a minimum and the path planning can be optimally adapted to the process.

Without mechanical retraction unit

SUMOTEX does not require a mechanical retraction system. This enables particularly fast, simple and variable optimization options for the robot program. And it is less susceptible to failure and consequently, maintenance costs are significantly lower.

Minimum interference contour

The air-filled SUMOTEX follows movement of the robot arm without kinks or unnecessary loops. Therefore, SUMOTEX minimizes the interfering contour and allows operation even in confined spaces.

Low weight

With SUMOTEX there is no need for a mechanical retraction system nor mounting elements. Additionally, protectors, chafing rings and clamping rings are rendered unnecessary. Thus, the cable package weighs significantly less than standard solutions, which results in advantages in robot dynamics and maintainability.

Simple air filling

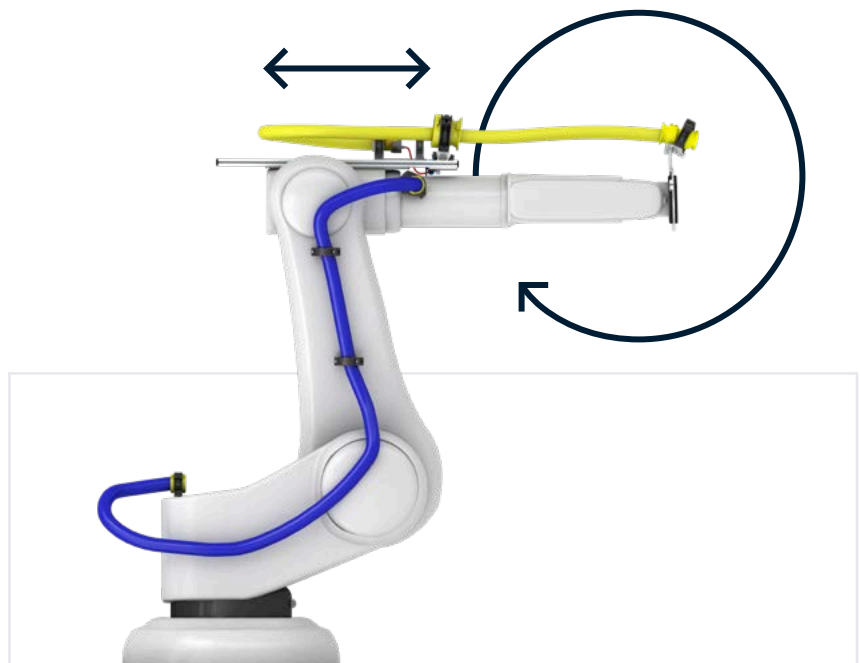
Quite analogous to a bicycle hose, the SUMOTEX system is filled with air once and then maintains the pressure permanently (typical with a maximum loss of compressed air of approx. 2% after 30 days of continuous operation).

Durable high-tech material

SUMOTEX protection sleeve is made of heat- and chemical-resistant materials. This makes it suitable for rough production environments and it is also resistant to welding spatters, for example.

Minimum abrasion

The innovative SUMOTEX concept significantly reduces contact of the dresspack with the robot arm. This prevents abrasion of paint and metal parts. In addition, the hose materials in use are highly abrasion-resistant and thus further reduces process contamination. This is important when used in clean rooms (according to VDA19).



The innovative dresspack system for



Challenging path planning

Due to the intrinsic recovery effect of the SUMOTEX technology, no additional dresspack length is necessary as compensation for movements of the robot arm. This means no loops must be considered during process planning and the user can reproducibly apply the motion sequences derived from offline simulations.



Narrow workpiece geometries

Due to the close dresspack guiding, a robot arm with SUMOTEX has a smaller interference contour than comparable systems. This allows complex motion sequences to be implemented even in confined spaces, and inside components can be approached more easily for machining.



Higher system availability

A smaller number of components for the dresspack guide and the avoidance of additional protection rings (protectors) result in fewer components and less wear on the robot. This leads to significantly reduced maintenance frequency and less maintenance work on the robot.



Energy-efficient operation

With its lightweight design of high-tech textile and the reduced amount of guide components, SUMOTEX adds significantly less weight to the robot arm. Since the dresspack is accelerated along with the robot movements, a weight reduction allows for higher dynamics or a saving in energy expenses.



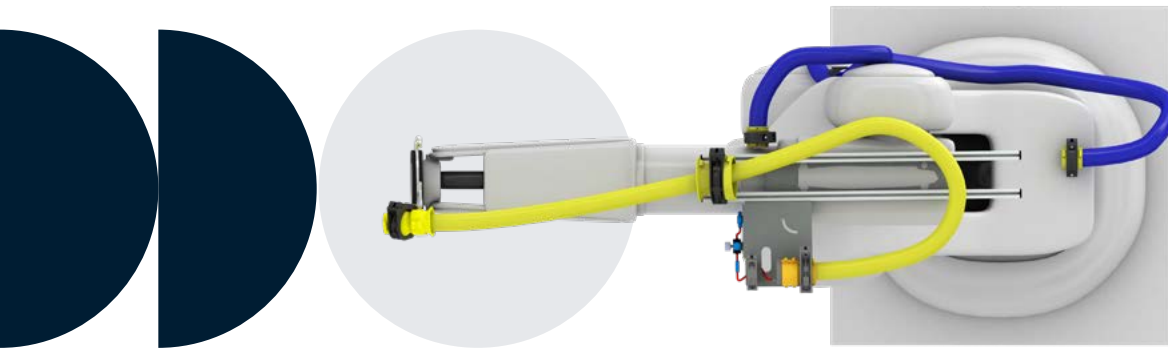
Clean processes

Since SUMOTEX adapts individually to the movement of the robot arm, impacts through the dresspack are prevented and rubbing on the arm is reduced. This results in significantly less abrasion during operation, and the system is well suited for use in clean rooms or other cleanliness-critical processes, e.g. coating processes.



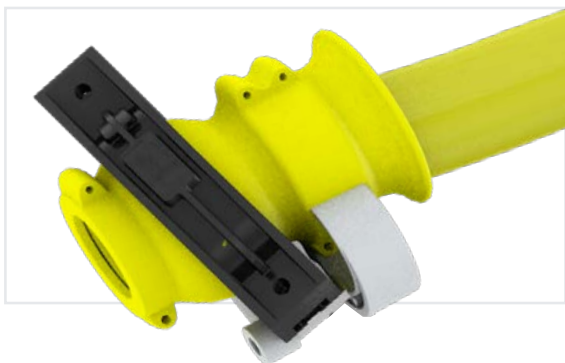
Demanding mounting situation

Due to its lightweight design, the SUMOTEX dresspack system is easy to dismantle and maintain. This is particularly important if the robot arm is difficult to access, for example, due to the mounting situation. In addition, no time-consuming re-optimization is necessary in case of replacement.



Use Case – Inline measurement

In the automotive industry, robots are used in many areas. And the profitability remains crucial for process automation. As the operating and maintenance expenses are an important factor in the cost structure, it pays off if expensive maintenance can be kept to a minimum.



Situation

In vehicle production inline measurements are an important tool for quality control. Since the measurements may be performed at various measurement points and production time should not increase too much due to inspection, many fast movements of the robot hand take place during the inline measurement. This can cause kinks and twists in the dresspack, that stress the material.

Challenge

Usually, dresspack systems with corrugated tubes and mechanical retraction are used for inline measurement. However, these do not completely prevent unpredictable oscillations during fast movements. Consequently, cables or the dresspack itself are regularly damaged and the dresspack systems require frequent maintenance. This leads to longer downtimes, high spare parts costs and, overall, lower profitability of the line.

Solution

During a test project, an inline measuring robot was switched to the SUMOTEX system. Due to the new system, kinks and twists in the dresspack no longer occur. The system now works without significant wear and has been in use malfunction-free since the change.

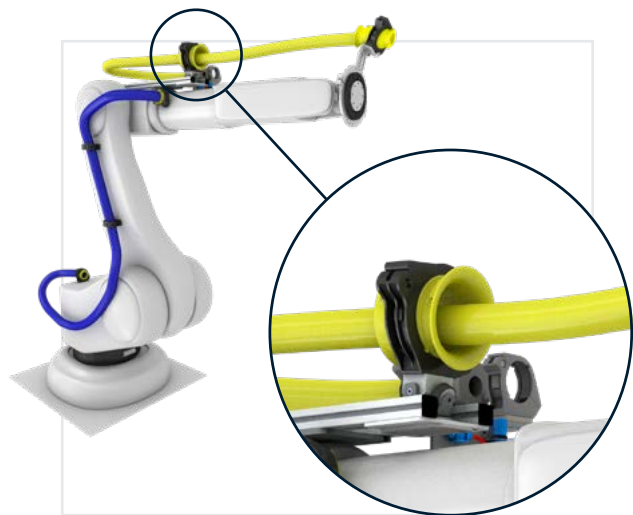


Maximum flexibility with lean accessories



Rod bracket

The rod bracket is used to mount the SUMOTEX system to the hand axis of the robot. The ball joint bracket ensures that SUMOTEX is not only kept at a distance, but also remains movable.



Guide trumpet

Due to the inherent recovery effect of SUMOTEX, no additional mechanical retraction elements are necessary. Therefore, only a freely rotating guide trumpet is required. This saves weight compared to conventional systems.

Adjustable guide elements

Adjustable fastening and guiding elements enable an optimal and process-reliable motion sequence in accordance with the programmed robot motion sequences.





“Too many cooks spoil the broth”? Not always. The innovative energy supply system SUMOTEX™ is the result of a creative and efficient development partnership, proving that sometimes the ideas of multiple partners fuel each other and lead to groundbreaking innovations.

The basic idea and prototype for the new robot energy supply were developed at Mercedes-Benz Group AG and then licensed to Sumcab. After three years of intensive development and collaboration, a lightweight and durable energy and media supply for robots was created that eliminates the need for additional guidance or retraction systems.

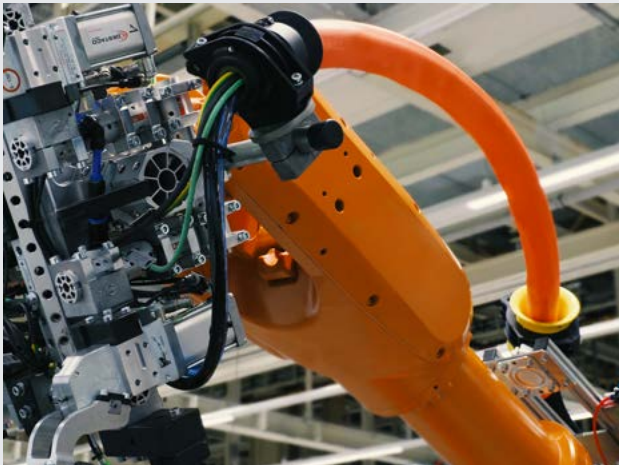


Figure 1: Source: Mercedes-Benz Plant Stuttgart/Mettingen

Jürgen Ehleiter, Robotics Expert at Mercedes-Benz Group AG, knows the problems of robot energy supplies all too well - such as abrasion on the wrist axis, particle contamination, sagging of the corrugated hoses, and loud noises when hitting the robot. The typical, sagging, swinging corrugated hoses for cable and media supply to the robot arms cause high wear and require regular maintenance or replacement of the energy supply.

From Idea to Prototype

Initially, a colleague of Ehleiter had the idea to wrap the corrugated hoses with high-tech fabric to reduce abrasion. However, the fabric did not withstand the rubbing on the corrugated hoses.

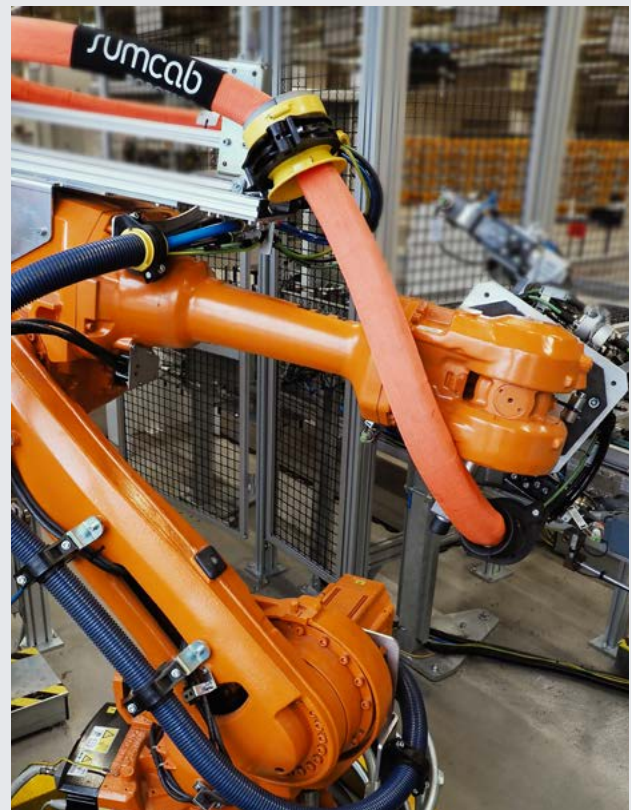


Figure 2: The first production model of the SUMOTEX attached to a robot at the Mercedes-Benz plant in Stuttgart/Mettingen.

Finally, Jürgen Ehleiter had the decisive idea in his spare time. As a passionate cyclist, he noticed that an inflated bicycle tube could bend flexibly and then return to its original shape. These were exactly the properties he was looking for in the energy supply.

“The inventor’s vision: A low-wear energy supply without additional retraction or guidance elements.”

Because an energy supply should also adapt to the movement of the robot arm without sagging, and according to Ehleiter’s vision, without additional retraction or guidance elements. The combination of the two ideas - the air-filled tube and the high-tech fabric cover - is the basis of today’s SUMOTEX™. Only in combination, the system has the required flexible rigidity and durability in the harsh production environment.

Many trials and further ideas followed until Ehleiter was able to demonstrate the basic principle of his vision in a prototype. Subsequently, the Stuttgart-based automaker decided on extensive patent applications.

The groundbreaking nature of the SUMOTEX™ patent was also evident in 2020 at the Mercedes-Benz internal Innovation Award. There, Jürgen Ehleiter and his colleague Marc Graewer were honored for one of the non-vehicle-related patents.

Innovation thanks to successful development partnership

“But a prototype is still not a product,” Jürgen Ehleiter humbly points out. Because from proof of concept to series production is a long and often arduous journey. For the next steps, the company decided to rely on development partner Sumcab – from Ehleiter’s perspective, a fortunate choice. As a medium-sized company with short decision-making processes and a focus on energy supply systems, Sumcab is an innovation-driven development partner that is also open to unconventional solutions.

For example, the sheathing of the novel energy supply system was still unresolved. While Ehleiter’s colleague had suggested the high-tech textile, all attempts with a sewn fabric had failed. At Sumcab, the idea was taken up once again and tried with a seamless circular knit. With success – SUMOTEX™

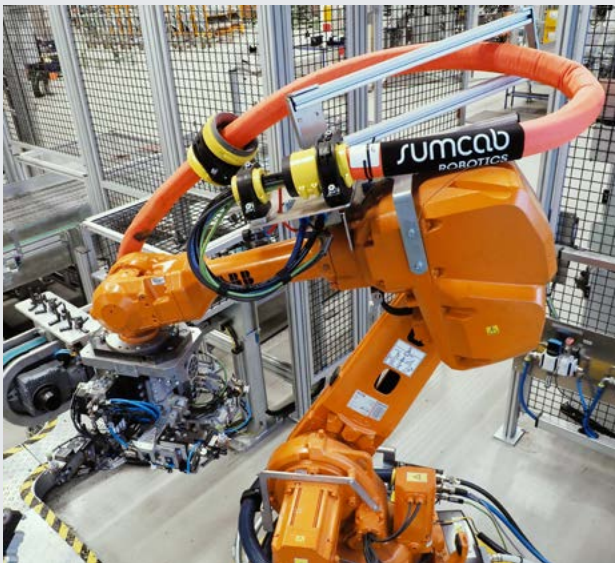


Figure 3: Source: Mercedes-Benz plant in Stuttgart/Mettingen

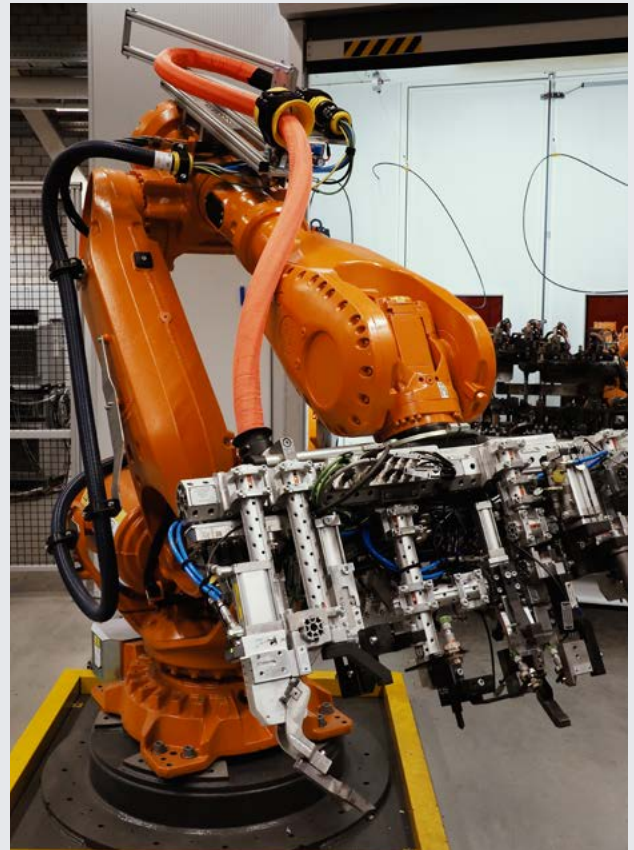


Figure 4: The new technology is now being transferred to further robotic applications and other plants within the group.

now uses a high-performance fabric that can withstand strong stresses and high pressures in other applications, such as fire hoses.

Through close communication between the project partners and the ability to test the further developments not only on the “lab system” at Sumcab, but also under factory conditions, a rapid evolution towards a mature product could take place.

“The development always went hand in hand,” says Lothar Schütz, Managing Director of Sumcab Robotics and an expert in the field of robot energy supply systems. “We have repeatedly used the feedback of Mercedes-Benz Group AG to improve and further develop SUMOTEX™. For us, this regular exchange is extremely valuable.”

And even partner Mercedes-Benz benefits from the cooperation: Robots that could fail due to high wear on the energy supply system are simply equipped with a SUMOTEX™ by Sumcab, improving the service life immensely. “During the collaboration, it became

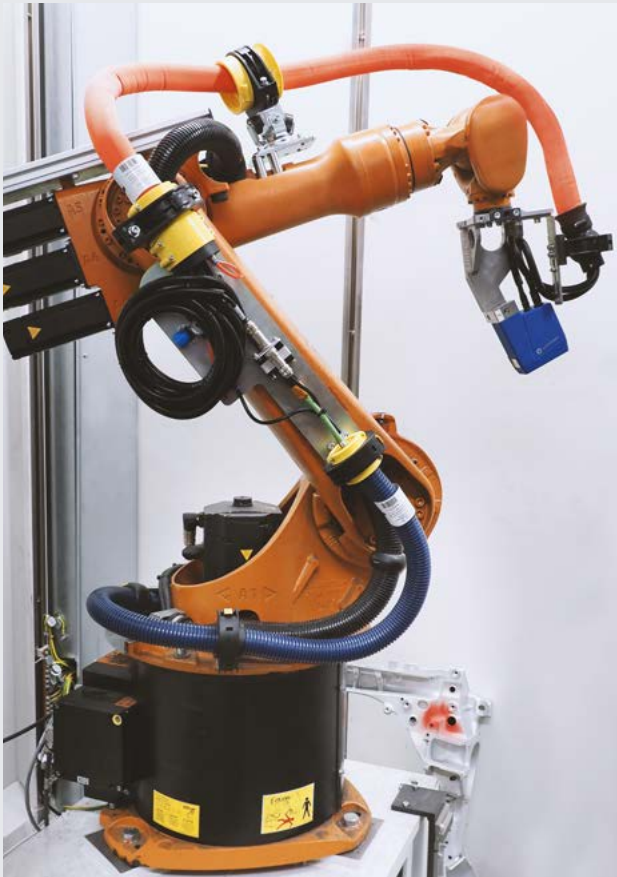


Figure 5: Source: Mercedes-Benz plant in Stuttgart/Mettingen.

clear time and again that Sumcab not only convinces with its products, but above all with its competent service employees who always have a good solution on site,” says Mr. Ehleiter.”

SUMOTEX™ in action

Recently, the new SUMOTEX™ JE line was introduced, which now fulfills Ehleiter’s original vision and no longer requires additional guiding elements. “With our prototype, three years ago, we were still far from this goal,” recalls Jürgen Ehleiter. “Sumcab has done a lot of pioneering work, here.”

Ehleiter is particularly pleased that Mercedes-Benz is embracing his idea and plans to use SUMOTEX™ on a larger scale. The first projects with new robot systems have already been equipped with SUMOTEX™, and the next step will be to deploy it in additional complete production lines at various facilities.



“For Sumcab Robotics, it is a great honor to preserve the memory of Mr. Jürgen Ehleiter and to keep him in our memory thanks to his invention. We will bring this innovative concept of the Mercedes-Benz Group AG to maturity and develop it further in his name.”

Lothar Schütz, CEO of Sumcab Robotics, December 2022 (unfortunately, Mr. Jürgen Ehleiter passed away far too early on 02.12.2022).

And, new fields of application are opening up for SUMOTEX™ all the time, sometimes even surprising the inventor himself. For example, Ehleiter did not expect at the beginning of the development that SUMOTEX™ could reduce foreign particle contamination to such an extent that it is now certified for cleanroom applications.





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