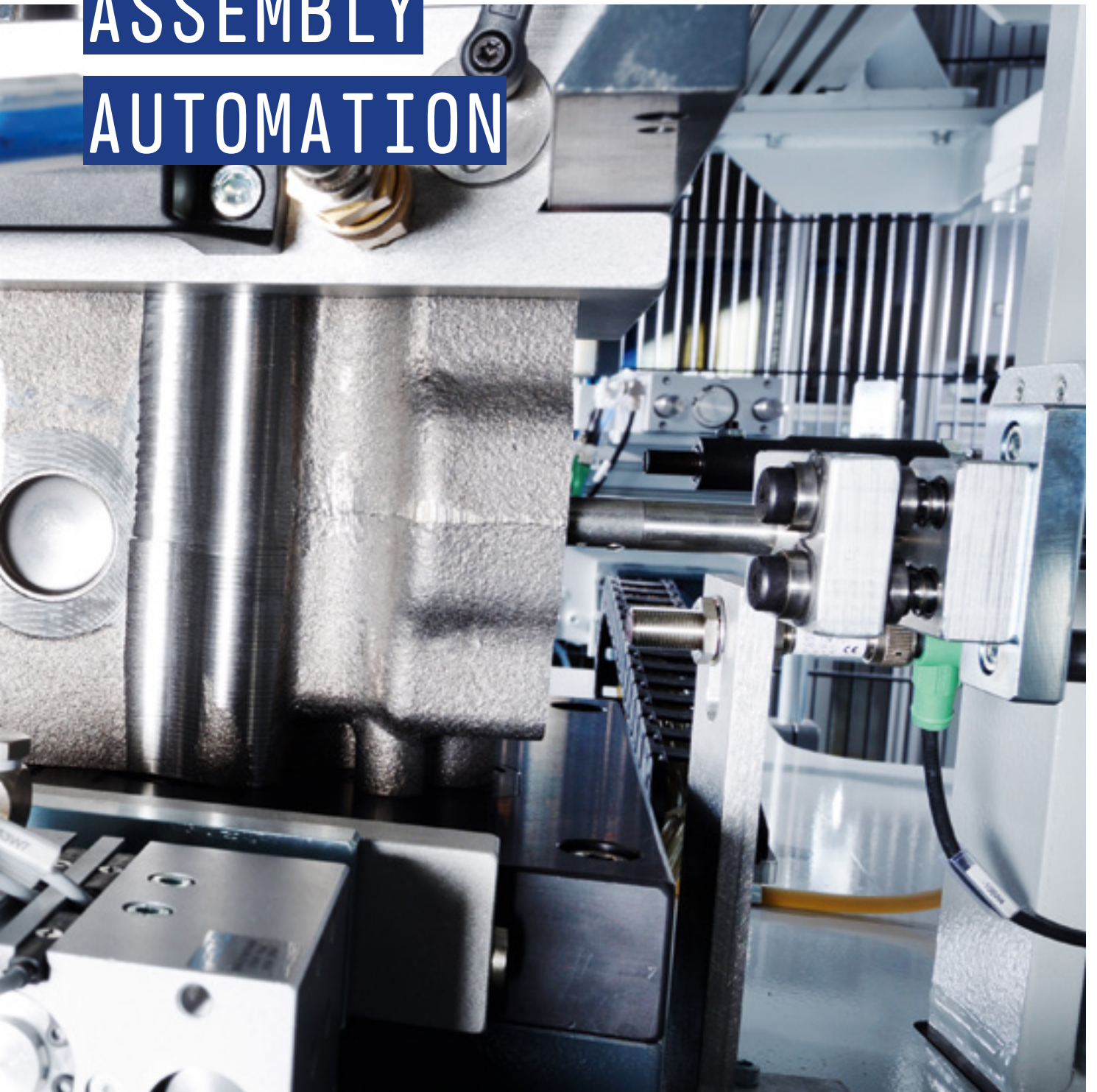


# LEAK TESTING ASSEMBLY AUTOMATION



**Paul Köster**

Medebach • Germany



# MORE THAN 40 YEARS OF SPECIAL MECHANICAL ENGINEERING EXPERIENCE



Welcome to Paul Köster GmbH. As a special mechanical engineering company, we are focused on leak testing, assembly technology, and automation for the automotive sector and other industries. With more than 40 years of mechanical engineering experience, we live our values and insist on quality in everything we do.



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## OVERVIEW

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100% PRECISION

200% ENTHUSIASM







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THE PK PRINCIPLE

# PRECISION IS OUR PASSION

**100%**

...precision is the measure of all things. A component is only used if it meets the highest standards. And the same applies to our testing machines, which must offer the highest levels of precision in all testing methods. We ensure both.

**200%**

...enthusiasm for our work comes naturally to us. We give 200% for every machine, process and task. Whether in design, production or service – we give it our all. Because our work is our passion.

QUALITY MANAGEMENT

## WE ARE CERTIFIED

Continuous quality assurance through process optimization is at the forefront of everything we do to meet our customer's requirements. Our TÜV Süd certification, which we first obtained in April 2003, is a testament to this. Our company continues to be annually certified in accordance with DIN EN ISO 9001 and VDA 6.4.

# WE THINK IN

# TERMS OF GENERATIONS



Paul Köster GmbH is a family company with a long history, based in Medebach in the Sauerland region of Germany. The company's history spans more than 100 years, and our focus is on consistency and outstanding quality. Special mechanical engineering is our area of expertise and our passion.

We take a long-term approach – not only when it comes to the generations that run the company, but also in the generations of machines we build. And, thanks to their modularity and solid construction, our machines are compatible with several generations of components and production processes.



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## THE MACHINE CONCEPT

# A MACHINE FOR GENERATIONS

Our machines are durable, precise and flexible. The modular construction of our testing systems, consisting of the base machine and fixture, allows for effective retooling and retrofitting for use in different testing processes, as well as adaptation to new components. The robust construction of all components ensures that our machines require little maintenance and operate reliably, even when in constant use in an industrial setting.

Along with the equipment mounts and frame, the base machine includes the control unit, the electrical cabinet and the hydraulic unit. It can be used to operate a variety of test fixtures, which can be flexibly installed as required.

Each test fixture is specially adapted to a specific component and process. Different fixtures can be used by setting-up in a single base machine as required.

## 1. Precision

From sealing concepts to mechanics and consumables, we offer consistent quality. Because a testing machine only fulfills its purpose if it constantly and reliably provides results of the highest precision. Our in-house production with high vertical integration ensures it.

## 2. Durability

Precision also depends on the materials used. It is important to us that our machines are long-lasting and robust, and keep running like they did when they left the factory, even after long periods of use.

## 3. Modularity

Our long-lasting base machines can be retooled and retrofitted with a variety of test fixtures. That allows the system to be easily adapted to changes in the production process, new components and different testing procedures.

## OUR RANGE OF SERVICES

# FROM INDIVIDUAL COMPONENTS TO TURNKEY SOLUTIONS

### From the single machine to the overall system

For us, everything started with the leak test. This specialized form of quality assurance is a critical part of the production of any kind of housings. But it is also clear that this is not just an isolated process, because testing procedures are often integrated into a comprehensive production line.

That is why we deliver turnkey solutions for leak testing, assembly technology and automation. We offer individual cells for integration into existing systems, as well as the construction and implementation of multi-unit assembly and test lines.

We go the extra mile so that you can deliver reliable components and assemblies.

#### New system

- > Prototype testing
- > Conceptualization
- > Project planning
- > Design – mechanical & electrical
- > Production
- > Assembly
- > Commissioning

#### Ongoing operation

- > Service
- > Process optimization
- > Modernization & extension

Look at our 3D animation showing a potential process flow:



## PROCESS KNOWLEDGE

# OUR FOCUS: YOUR PROCESS

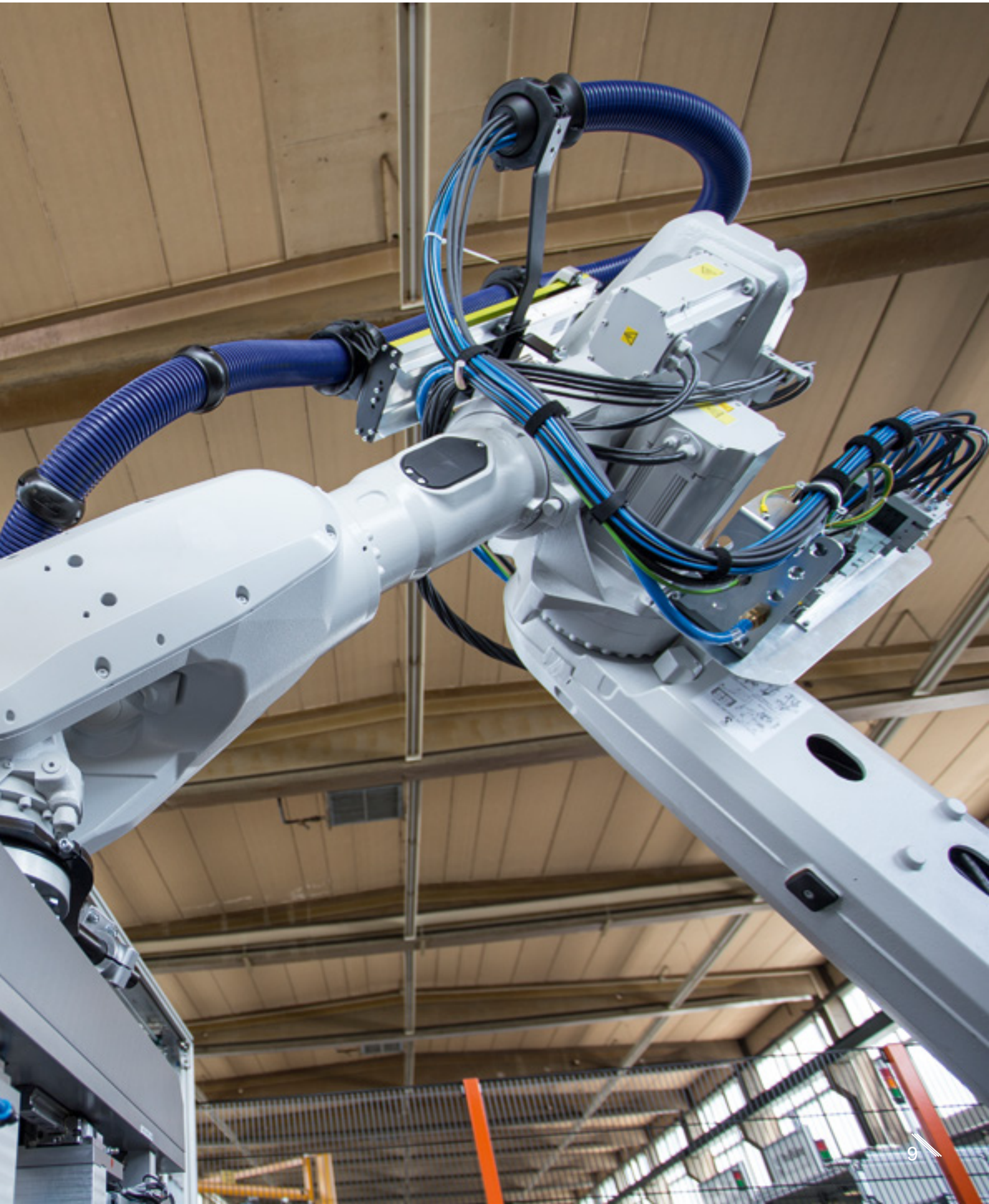
The preparation of machine concepts requires extensive technical expertise and deep process know-how in equal measures. Requirements for cycle times, production scope, redundancies and component assembly specifications are just a few key aspects that we take into account in all phases of development. We drill down on your processes to the last detail for our tailor-made systems.





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LEAK TESTING

# AIRTIGHT COMPONENTS ARE CRITICAL TO PRODUCTION QUALITY







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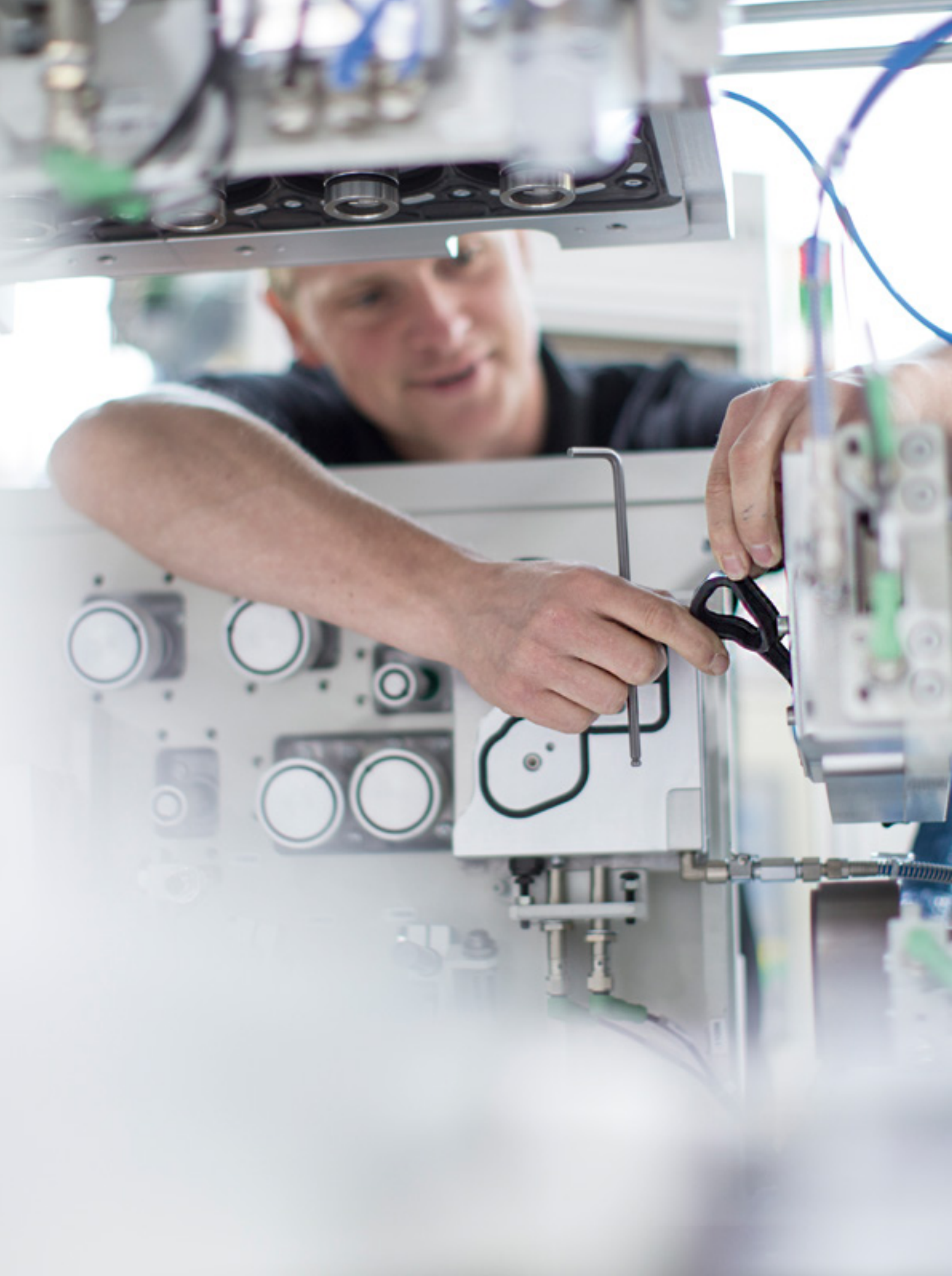
**What we build are machines. What we deliver is reliability.**

Leak testing is an important step in the validation of component quality in the automotive sector, medical technology, fittings technology and many other industries. Only through precise component testing can you be sure that your products are also functioning reliably. We build machines for leak testing, providing the sense of certainty that comes with outstanding quality assurance for your products.

Our work always starts with your component. You provide us with testing pressure and permissible leak rates, and we do the rest. We identify the optimal test procedures that will quickly, precisely and consistently determine whether your part fulfills the defined requirements. Various factors are taken into consideration in the selection of the testing procedure, such as pressure, volume, testing procedure time and the clamping forces that may affect a component.

We design and build machines and testing devices for various air and gas test procedures according to the general conditions.







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THE BASE OF LEAK TESTING

# THE SEALING CONCEPT FORMS THE FOUNDATION

A well-engineered sealing concept is the foundation of durably accurate leak testing. A large part of our expertise is in this very area. Answering crucial questions is of the essence: How and in what order are components sealed? How can various test spaces be measured using the right test procedure? What order are components tested in? What is the mechanical sequence? What kind of clamping forces are likely to act on the component? The design for these complex processes is developed and worked out by our engineers, master craftsmen and technicians, and coordinated in detail with our customers.


**We are in charge of production, from equipment to consumables.**

Rubber seals are of crucial importance in this process. They serve as the connection between testing device and component. Their quality determines the precise testing position and is essential to a reliable seal. Due to the elementary importance of these aspects, we produce seals in-house, providing significant advantages for our customers:

- > perfect matching of sealing device and component
- > consistent quality
- > quick, long-term availability



# THE RIGHT TESTING PROCEDURE FOR YOUR COMPONENT



Depending on the component and the desired leakage rate, different testing procedures are necessary to ensure the specific tightness according to the given parameters. Measurement procedures with air are common and cover many various requirements. Measurement procedures with gas cost more time, effort and money, but can detect even smaller leakage rates. If components do not meet the desired requirements, leak localization may be necessary in order to find the defects.





## AIR TESTING

# TEST PROCEDURES AND LEAK LOCALIZATION

### Pressure difference procedure

The pressure difference procedure is inexpensive and is especially suitable for small testing volumes. A pressure difference transmitter detects drops in pressure. The system can calculate the leakage rate based on the configured testing volume.

### Mass flow procedure

The mass flow test is suitable for larger testing volumes in order to achieve shorter cycle times. The test air is siphoned from an external solid volume into the component. After pressure equalization, the air flow escaping from the component is measured. As a result, a stable measurement result is achieved.

### Flow testing/Flowtest

Flow testing is used to determine whether openings, such as bore holes, provide the required permeability. It is possible to determine closures of  $\geq 30\%$  with this procedure. The back pressure test can identify bottlenecks precisely by means of possible air back pressure.

### Vacuum testing

As with pressure difference testing, vacuum testing uses negative pressure to test a component. This procedure is especially useful for components that cannot put up with high clamping forces.

### Leak localization

For parts or prototypes whose leak testing results fall outside the standard range, the site of the problem can be precisely determined using leak localization. In a submersion test, the component is filled with air in a transparent water tank. Leaks can be precisely located through the formation of bubbles. Alternatively, the sealed and helium-filled component can be checked using a leak sniffer.

GAS TESTING

HELIUM-

ACCUMULATION TEST





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By comparison to measurements using air, the helium accumulation test helps to identify significantly lower leakage rates due to the usage of a mass spectrometer. This method requires a separate test chamber where the component needs to be clamped.

### **Step 1**

First, the component is checked in a measurement procedure using air. This is to ensure that no helium contamination of the environment occurs if gas testing reveals large leaks.

### **Step 2**

Provided that the values of the air testing are within the standard range, the testing device is sealed off, and the component is filled with helium. Using a fan, potentially escaping helium is evenly distributed within the test chamber.



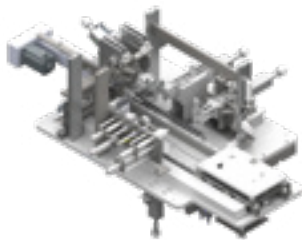
# THE RIGHT MACHINE FOR EACH PROCESS

## Process understanding meets creativity

Assembly lines are always very specific systems. As complex as assemblies and their associated components are, so are the machines, assembly steps and logistics behind them.

That's why our assembly cells are as individual as your component assemblies. With creative approaches, which are based on in-depth process understanding and decades of experience, we develop and build custom tailored assembly machinery. We develop micro- and macro-processes, program robots or linear servo axes, construct individual operations and redundancies, and ultimately bring everything together based on your requirements.

## COMMON ASSEMBLY PROCESSES



**Pressing**



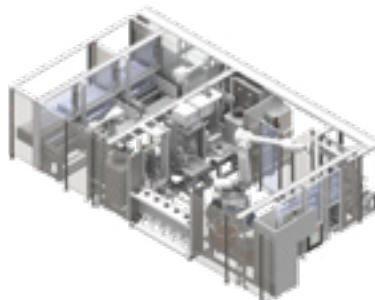
**Tightening**  
(manual/automated)



**Bonding**  
(Rotary adhesive wetting/  
sealant application)



**Valve key assembly**



**Joining**  
(without supercooling/with oiling/  
nitrogen-cooled components/  
components in induction-heated parts)



**Force/stroke monitoring**



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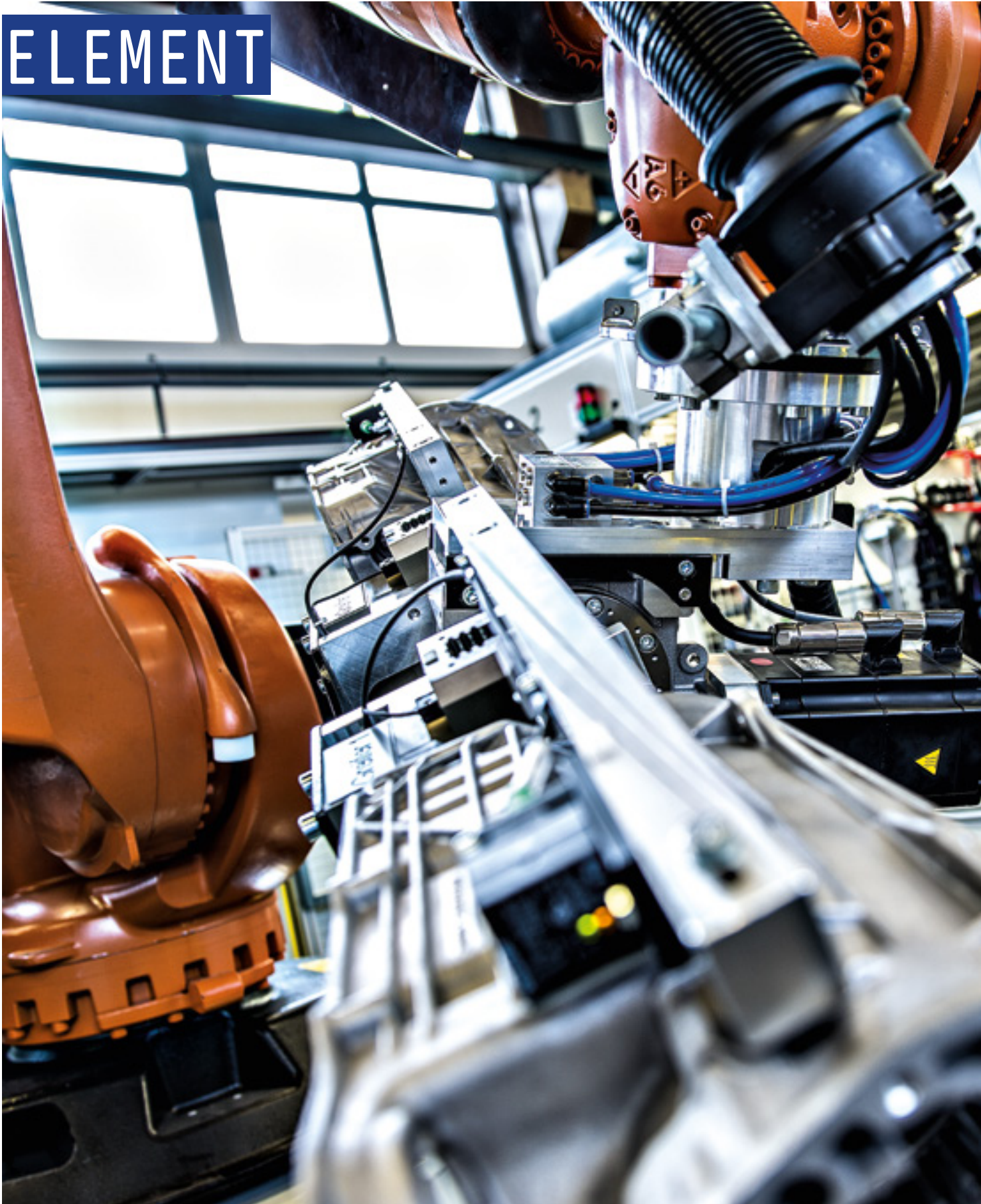
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AUTOMATION

# THE CONNECTING ELEMENT







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## TECHNOLOGIES

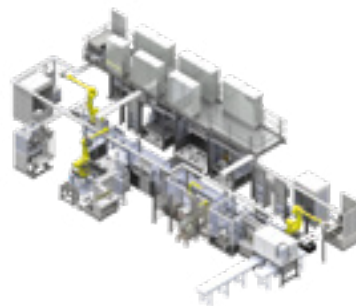
# AUTOMATED MATERIAL FLOW

Our automation systems connect all cells of a production line using robotics, conveyor technology, gantry technology or other material transport options. Integrated and coordinated automation is crucial for continuous material flow, constant cycle times and ongoing logistics. Production, assembly, leak testing and other operations are merged and function as one system.

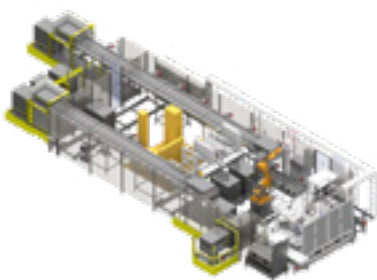
The individual interfaces of the cells play an essential role in the merging, combination and series circuits of various production steps. These should be reliable, low-maintenance and functional. With our turnkey solutions, we connect diverse operations into uniform overall systems.



**Conveyor technology**



**Robotics**



**Palletizing and foiling**



**Visual inspection**



**Gantry technology**

# LONG-TIME COLLABORATION

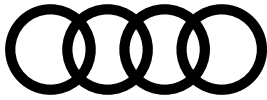


We serve countless customers from the automotive sector and other industries. A small representative selection is presented on the following page.



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**Audi**

**BORBET®**  
LEICHTMETALLRÄDER

**Continental**



**+GF+**

**GRÜNER**

**handtmann**  
*Ideen mit Zukunft.*

**HELLER**

**HUAYU AluTech**

**JENAK**  
CNC-TECHNIK



Nemak Europe GmbH

**SCHABMÜLLER**  
AUTOMOBILTECHNIK

**Schlote®**

**VOLKSWAGEN**  
AKTIENGESELLSCHAFT



Weber Automotive





# PAUL KÖSTER IS NOT JUST A NAME

**“Paul Köster GmbH is a family company through and through. That is not only reflected by the company’s name, but throughout the entire company. We know that each individual makes a contribution to the success of the company, and, of course, as Managing Directors we have a lot to live up to. While that may be considered special at other companies, it is absolutely self-evident for us.”**

*– Friedrich Köster*

The brothers Paul, Friedrich and Ernst Köster have been the Managing Directors of Paul Köster GmbH since 1991. Together, their enthusiasm, passion and total commitment have made the Medebach-based company, which is steeped in tradition, an international success story.



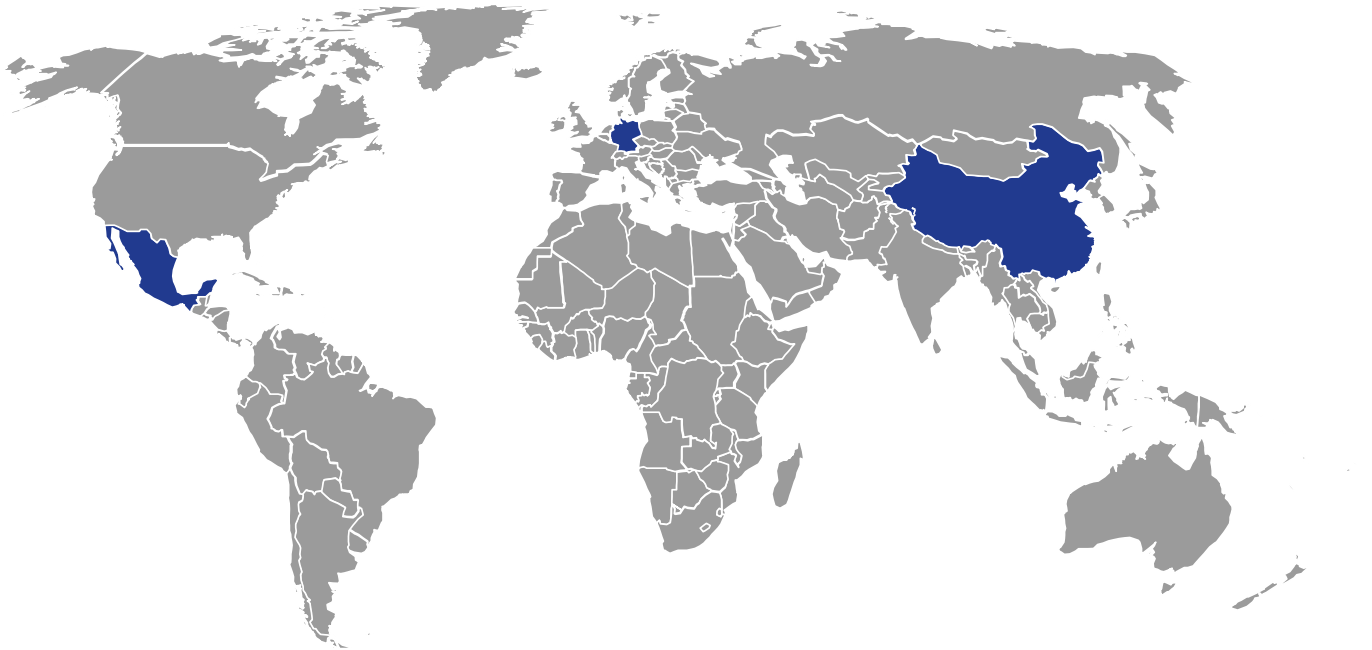
**Paul Köster**

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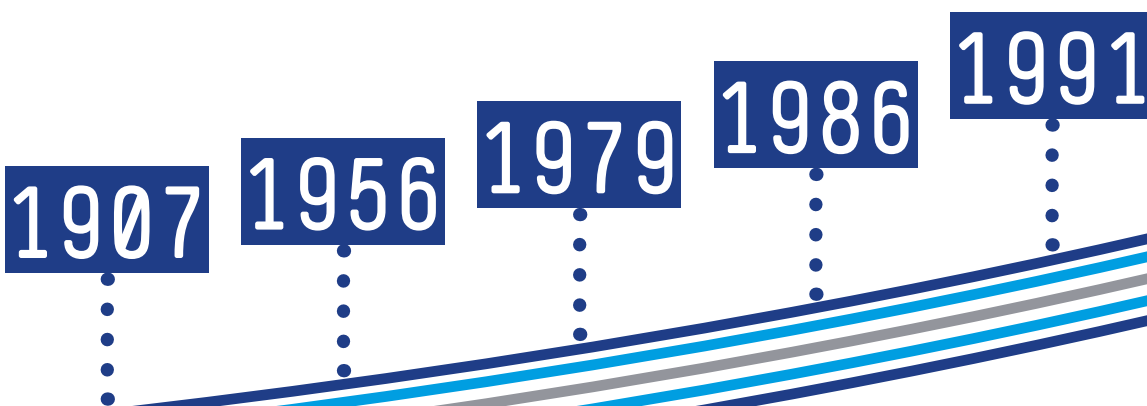


# MILESTONES

# KÖSTER GROUP



- 1907** Family company established when an old forge was taken over by Wilhelm Studen and his wife Wilhelmine, née Köster.
- 1956** Company was taken over by Paul Köster, Sr. and his wife Elfriede.
- 1979** Initial activities in the field of general mechanical engineering for Continental in Korbach, Germany.
- 1986** First entry into the field of leak testing with the construction of a leak testing machine for cylinder heads.
- 1991** Paul, Friedrich and Ernst Köster take the reins at the company.

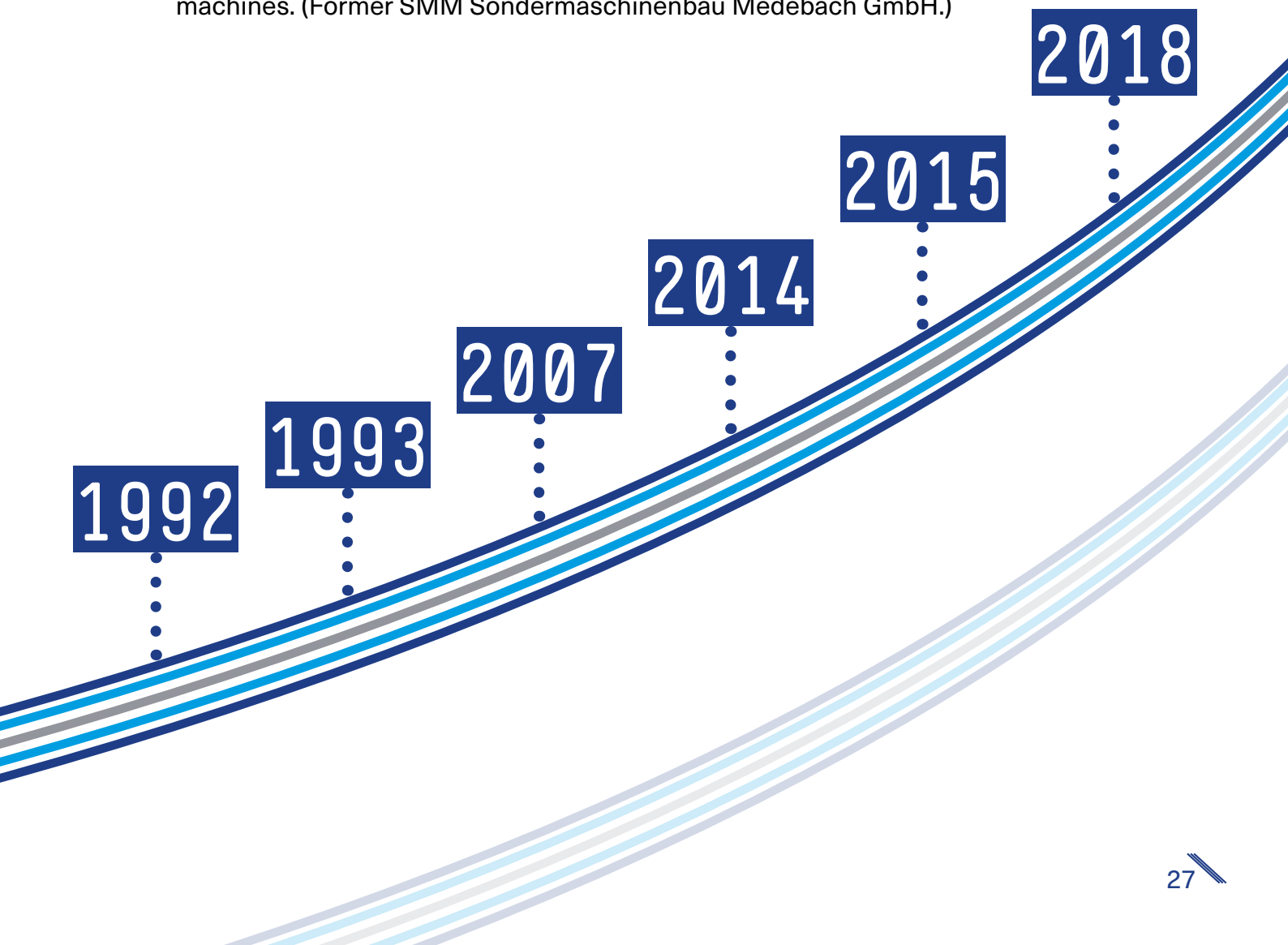






**Paul Köster**  
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- 1992** Construction of the new premises on an industrial estate in the town of Medebach, Germany. At the time the company had 35 employees.
- 1993** Foundation of the company SMM Sondermaschinenbau Medebach GmbH in the field of woodworking machines.
- 2007** Subsidiary LK Special Automation Equipments Ltd. established in Suzhou (China).
- 2014** Cooperation begins with DMV Sondermaschinenbau in Bad Arolsen, Germany.
- 2015** Foundation of the company Albrecht Sondermaschinen GmbH in Nordhausen, Germany.
- 2018** Formation of the company BETH Sondermaschinen GmbH in the field of woodworking machines. (Former SMM Sondermaschinenbau Medebach GmbH.)



# OUR PARTNERS



## SUZHOU LK SPECIAL AUTOMATION EQUIPMENTS LTD. (SUZHOU, CHINA)

Suzhou LK Special Automation Equipments Ltd. is an independent subsidiary of Paul Köster GmbH and serves the demand from the rapidly growing Asian market.

[www.lk-automation.com](http://www.lk-automation.com)



## BETH SONDERMASCHINEN GMBH (MEDEBACH, GERMANY)

BETH Sondermaschinen GmbH is a competent, reliable partner in the field of special mechanical engineering particularly for wood machining and aluminum processing.

[www.beth-germany.com](http://www.beth-germany.com)



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## DMV SONDERMASCHINENBAU GMBH (BAD AROLSEN, GERMANY)

DMV Sondermaschinenbau GmbH is your partner with roots in the medical technology industry and particular expertise in the area of special mechanical engineering, with a focus on automation and assembly technology.

[www.dmv-sondermaschinenbau.de](http://www.dmv-sondermaschinenbau.de)



## ALBRECHT SONDERMASCHINEN GMBH (NORDHAUSEN, GERMANY)

Albrecht Sondermaschinen GmbH offers support in all areas of special mechanical engineering, from construction to maintenance, with tailored solutions for your specific needs.

[www.albrecht-sondermaschinen.de](http://www.albrecht-sondermaschinen.de)



# YOUR CAREER

# AT PAUL KÖSTER GMBH

## **Everyone contributes to our company.**

As a family business, we are committed to our workforce. Good working conditions, part-time work, accessible workplaces, integration programs, versatile education and training opportunities - these go without saying as far as we are concerned.

Our company is supported by over 300 employees who are ambitious, ready to help and show initiative. These people come from different generations and bring together many years of experience and fresh ideas. Motivation, passion and teamwork drive us to become better in all areas, to go new ways and to shape the future of Paul Köster GmbH together.





# Paul Köster

Medebach • Germany



# WELCOME TO THE 200 PERCENTERS

We are proud that a small forge in Medebach has become an internationally successful mechanical engineering firm. But we also know that every company is only as good as the people behind it.

## **That is why we attach such great importance to optimal working conditions:**

- > attractive salaries
- > large social benefits package
- > a modern working environment
- > flat hierarchies with short decision-making processes
- > a familiiy atmosphere
- > open doors and a cooperative management style at all levels
- > exciting projects and interesting customers
- > permanent employment contracts
- > wide range of training and continuing education opportunities
- > employee events
- > attractive living environment with a high standard of living and recreational value in the region

Beside exciting [job offers for skilled employees](#) we additionally offer a wide range of [apprenticeship opportunities](#), internships for pupils or students as well as [combined vocational training with degree courses and mentoring for degree theses](#).



Precision Machinist, specializing in mechanical engineering (m/f/o)



Technical Product Designer, specializing in machinery and plant design (m/f/o)



Cutting Machine Operator (m/f/o)



Metalworker, specializing in design technology (m/f/o)



Industrial Engineering Electrical Technician (m/f/o)



Office Manager (m/f/o)



Systems Integration IT Specialist (m/f/o)



Application Development IT Specialist (m/f/o)



Combined vocational training and degree in mechanical engineering (Bachelor)



Combined vocational training and degree in electrical engineering (Bachelor)



Internships & mentoring for degree theses





# Paul Köster

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## We knuckle down to the job.

We give 200% commitment to achieve 100% precision – because our work determines whether or not our customers can use their components. That is why we are looking for professionals who not only know what they are doing, but who enjoy it.

As a family business in Medebach, we are as deeply rooted in the region as we are with our colleagues. Yes, we are a business. But we are also a community. Therefore, although we value résumés, we are also interested in the characters behind them.

And that is exactly why we are looking forward to getting to know you.

APPLICATION MADE EASY

APPLY NOW –

IT'S EASY!

We are interested in you as a human being and that is why we attach great importance to a personal conversation with you. At the same time, we would like to make things as easy as possible for you as an applicant, which is why we offer you the opportunity to introduce yourself to us through our **online application** without a cover letter. Simply send us your résumé and all relevant documents using the form, and answer a selection of questions openly and honestly. Then we can get an idea of who you are and contact you promptly.

Of course, you can still send us your application documents and cover letters by e-mail or through the mail as usual – all application methods are treated equally.



**Hildegard Köster**  
Personnel Management  
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We are happy to help with questions about job listings and the application process.

[www.paul-koester.com/career](http://www.paul-koester.com/career)







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