

#emobilitymadebygrob



ELECTROMOBILITY.



This is who we are
GROB-WERKE.





Technology at its best
**STEP WITH US
INTO A GREEN
FUTURE.**

At GROB, we strive for continuous progress and improvement. Not only do we strive to develop outstanding solutions and products for our customers, but we also seek to make a contribution to our environment and future generations. This is firmly anchored in our corporate philosophy and lived every day.

We therefore utilize photovoltaics and geothermal energy in our locations and support a wide variety of social projects. We also value SUSTAINABILITY in our internal departments. Our products are based on the highest energy efficiency and regenerative drive systems. We integrate our supplier network in reducing CO2 footprint.



OUR PRODUCT RANGE.

*#machiningtechnology #universalmachiningcenters
#assemblyplants #electromobility #automation
#additivemanufacturing #digitalization
#usedmachines #service*

Concentrated competence worldwide

INTELLIGENT TECHNOLOGY IS HUMAN.

For generations, we at GROB have lived and experienced this principle by making our customer's requirements the focus of our work. The result is sophisticated technology creating more efficient production processes worldwide and delivering highest quality.



RESEARCH & DEVELOPMENT

With a high degree of creativity and technical intuition, as well as the best engineering expertise, our developers have worked hard to earn the reputation of being a technology leader.



ASSEMBLY

From pre-assembly to machine assembly to process commissioning – our employees demonstrate their expertise with optimally coordinated workflows.



ENGINEERING

With method development and structured problem solving, our employees in Engineering develop innovative concepts representing milestones for precision, dynamics, and reliability.



COMMISSIONING

With simulation techniques and virtual commissioning, we achieve the highest adherence to delivery dates and product quality.



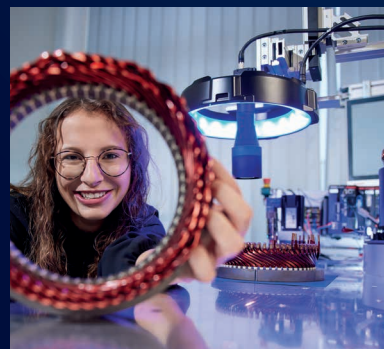
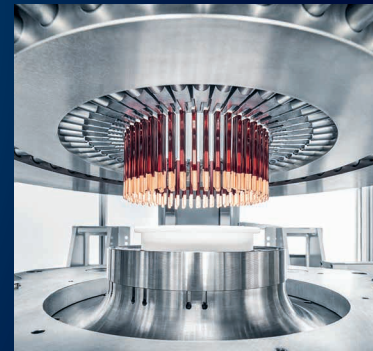
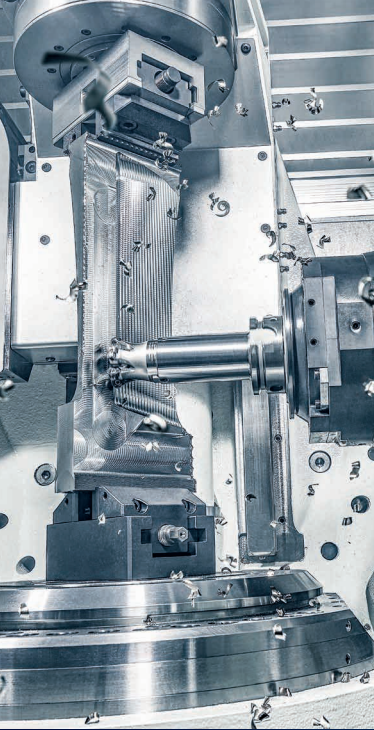
PRODUCTION

The high degree of vertical integration along the entire value creation chain, numerous machining technologies and our employees' distinctive specialist knowledge create the best conditions for state-of-the-art production.



TECHNICAL APPLICATION CENTERS

Our production plants in Germany, Brazil, the USA, China, Italy and India have technical application centers for the machining and electromobility sectors, where our customers can experience GROB technologies up close.



Focused on your needs

WE ARE YOUR CONTACT FOR THE ELECTRICAL FUTURE!

With modular, flexible and scalable electric powertrain solutions, we offer integrated concepts for the components of tomorrow.

Together, we will develop solutions tailored to your needs and requirements. Our product range spans from stand-alone, semi-automatic machines to fully automated turn-key systems.

We are your central contact for realizing your worldwide projects.

Our complete turn-key solutions mean you can bank on efficient, future-proof and sustainable plant engineering, tailored to your needs. Benefit from our long-standing experience and our extensive network.

DRIVE SYSTEMS.

Stator assembly

Rotor assembly

E-motor and E-axis assembly

ENERGY STORAGE SYSTEMS.

BATTERIES.

Battery cells

Battery modules

Battery packs

FUEL CELLS.

SERVICE.



E-MOTOR AND E-AXIS ASSEMBLY

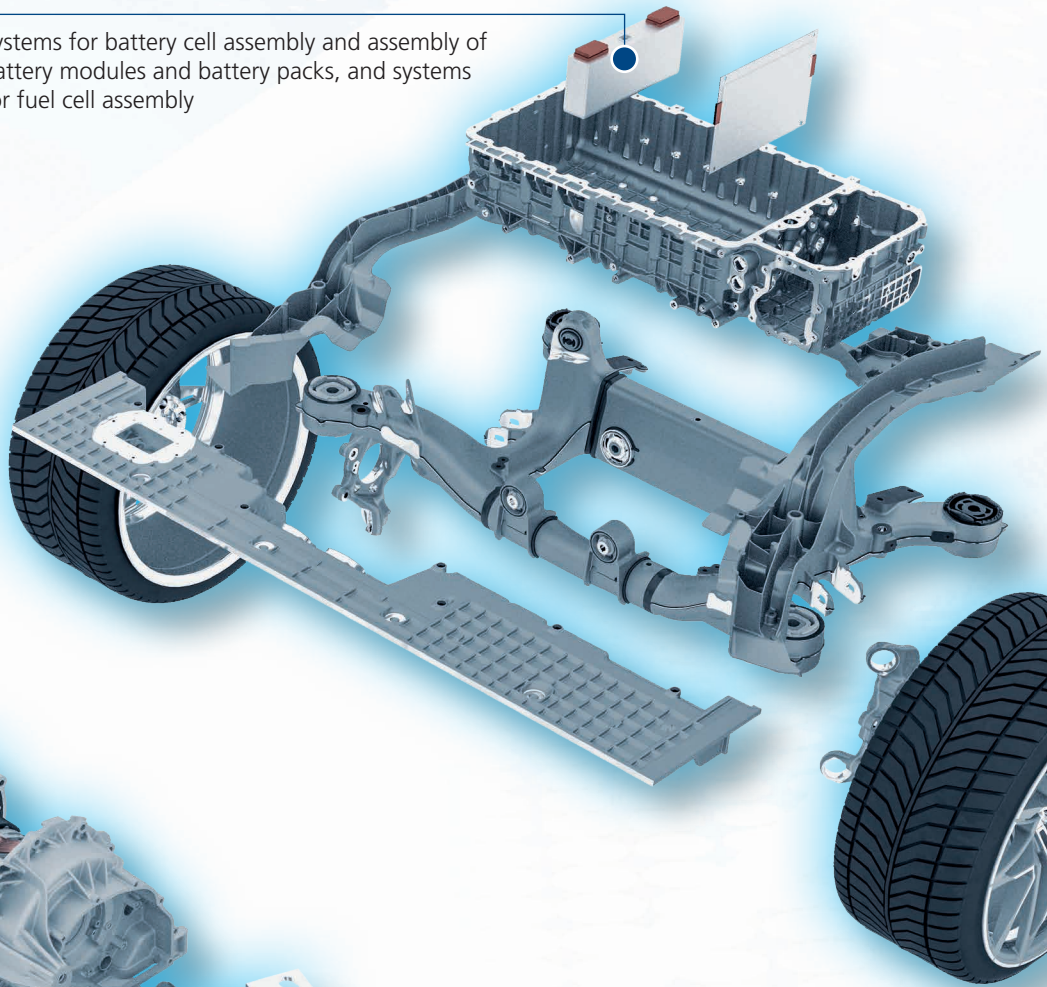
- ⊕ Fully automated turn-key systems, tailored to your specific needs

STATOR ASSEMBLY

- ⊕ Systems for stator production with different winding technologies

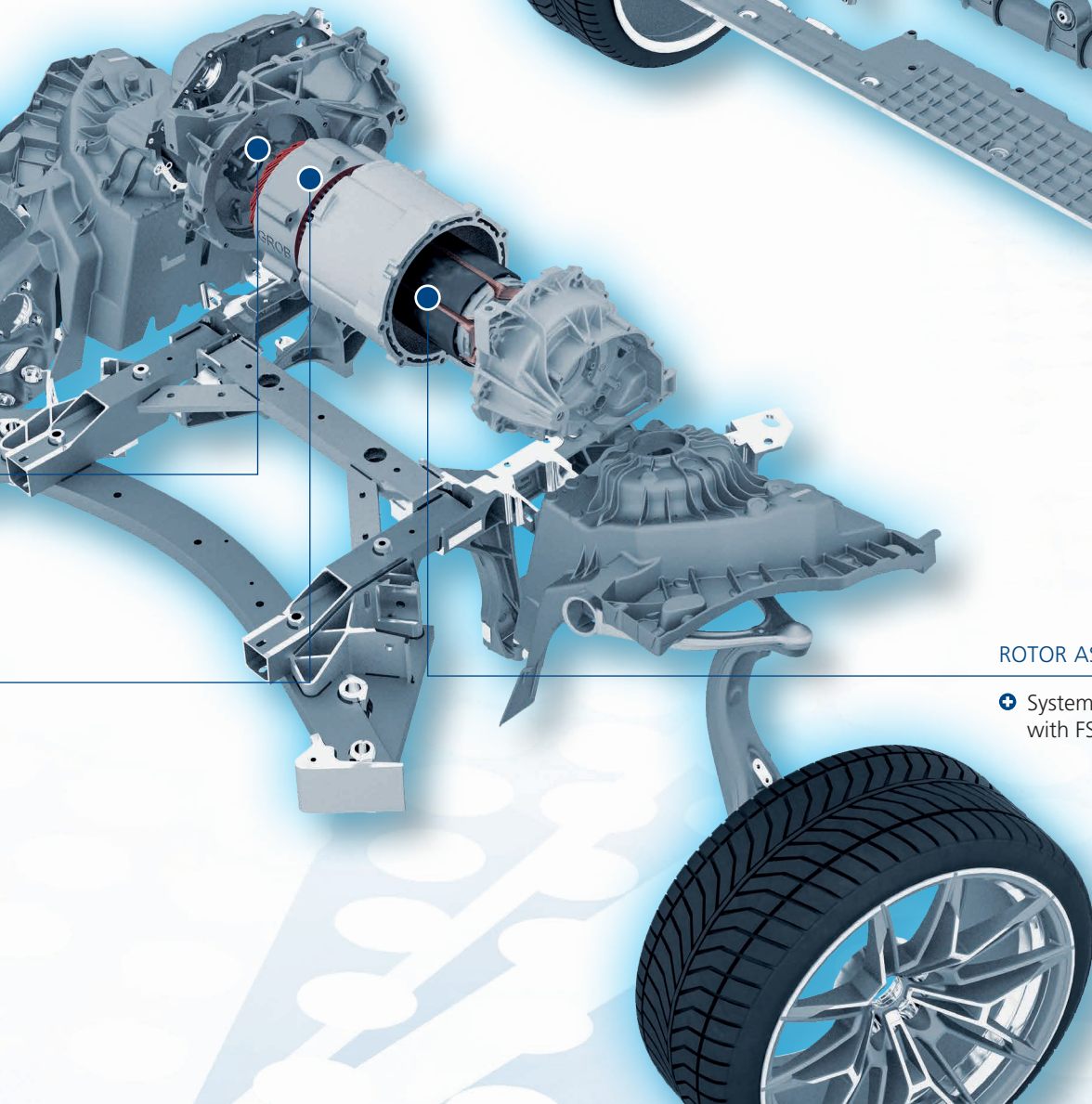
ENERGY STORAGE SYSTEMS

- ⊕ Systems for battery cell assembly and assembly of battery modules and battery packs, and systems for fuel cell assembly



ROTOR ASSEMBLY

- ⊕ Systems for rotor technology with FSM and PSM technology







*Partnership,
efficiency & flexibility*

TOGETHER WITH YOU, WE DEVELOP THE DRIVES OF THE FUTURE!

We support you in each phase of the product development process – from simultaneous engineering and construction of the first prototypes to series production and the corresponding assembly line. Our production plants in Mindelheim, Bluffton, Dalian, and Turin feature technical application centers for electromobility equipped with state-of-the-art plant engineering and test technology. We can therefore map the individual process steps close to series production in every phase of product design, verify them by building prototypes and small series, and make them pre-series ready for you – you will benefit from our process and system knowledge.

- ⊕ Integrated, sophisticated production processes
- ⊕ Specific systems for various winding technologies
- ⊕ Modular and near-series plant engineering
- ⊕ Expert knowledge in prototype construction
- ⊕ Development and verification of all production processes



OUR ELECTRIC MOTOR AND
E-MACHINES PORTFOLIO.

#emotor #axisassembly #statorassembly
#rotorassembly

Partnership, efficiency & flexibility

STATOR AND ROTOR PRODUCTION SYSTEMS.

Our machine and system concepts cover all winding and assembly technologies for stator and rotor production. Continuous further development guarantees you state-of-the-art production solutions.

STATOR PRODUCTION WITH CONTINUOUS HAIRPIN TECHNOLOGY

U-shaped, alternating wire mats are produced from solid flat copper wires. These are then rolled up, compressed, and press-fit into the laminated core. The winding head only has wire ends that are open relative to a hairpin stator and need to be welded only in the area of the connecting wires and star points. We rely on flat winding technology for continuous hairpins.

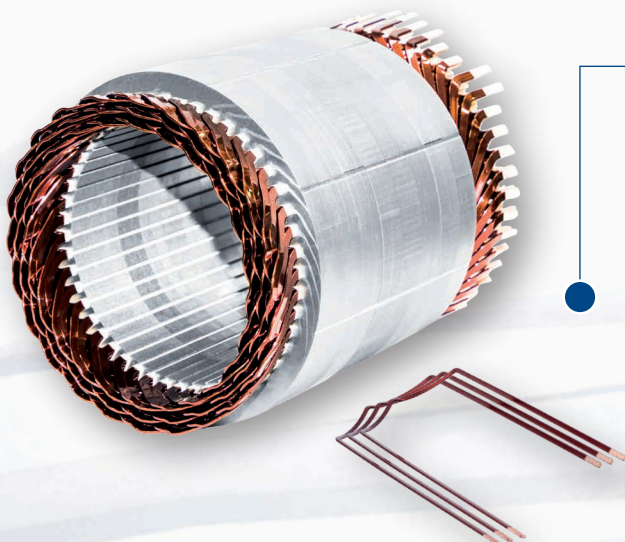
- + Simultaneous bending of multiple wires
- + Implementation of complex winding schemes using stacked or inserted wire mats
- + Long service life thanks to low-dynamic functional concepts
- + Realization of different winding head heights
- + High process reliability and machine availability



STATOR PRODUCTION WITH HAIRPIN TECHNOLOGY

Flatcopper wires are bent into U-shaped plug-in coils (hairpins), which look like hairpins, and are preassembled into rings. They are then press-fit into the laminated core and interconnected according to the winding scheme. This allows the manufacture of high-quality stators with the highest filling levels.

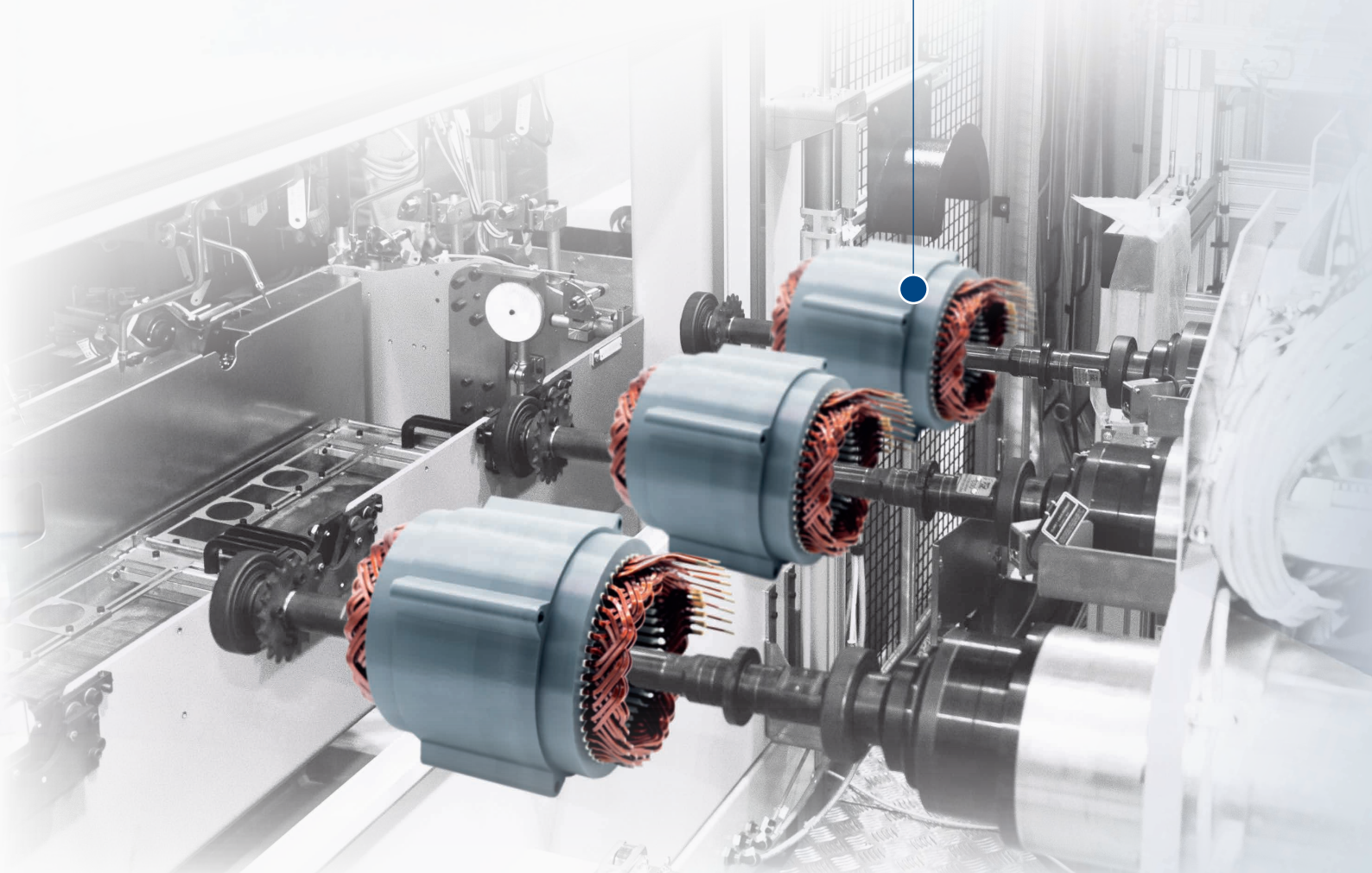
- + Innovative and flexible bending concept
- + Variable slot insulation types can be mapped
- + High in-process flexibility
- + Hairpin ring manufacturing using NC technology
- + Twisting and widening for up to 12 levels
- + Production of all necessary hairpins with one bending machine



STATOR IMPREGNATION

To fix the winding in position and for better dissipation of the generated heat, stators must be impregnated. For this purpose, liquid resin is applied to the preheated stators in a trickling process and then hardened in a subsequent gelling process.

- ⊕ Scaling of the output by means of a modular system structure
- ⊕ Innovative clamping concept – machining of different part geometries without setup
- ⊕ High level of vertical integration – even our furnace technologies are developed in-house by GROB



Partnership, efficiency & flexibility

STATOR AND ROTOR PRODUCTION SYSTEMS.

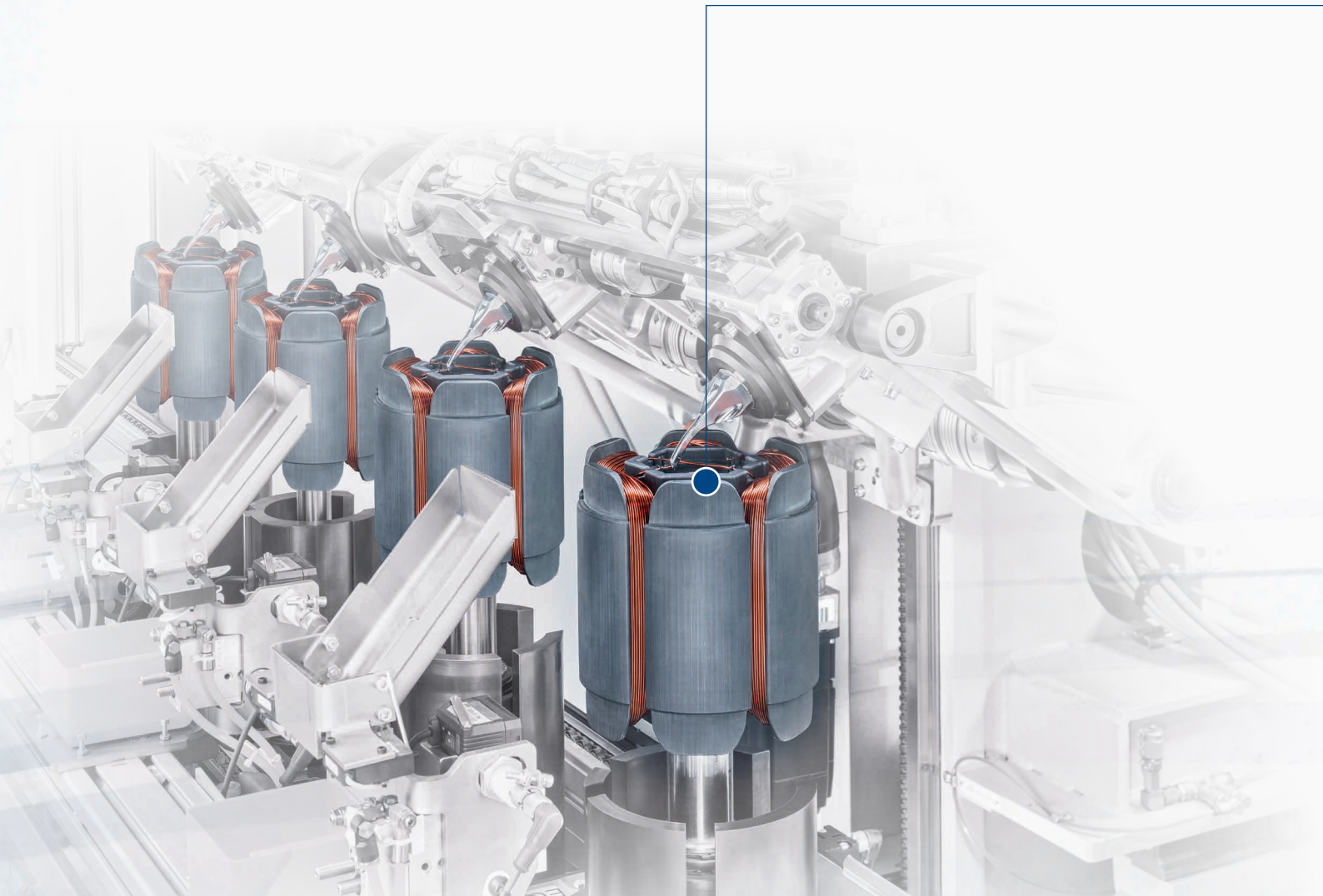
Experience our technologies in the field of stator and rotor manufacturing already in the product design phase in our technical application centers in Mindelheim, Bluffton, Dalian, and Turin.

MANUFACTURING OF AXIAL FLUX MOTORS

We manufacture axial flux motors using two different methods. First, we offer linear winding where the stator tooth is wound linearly orthocyclically with round wire.

Second, we offer the manufacture of axial flux motors with rectangular wire. With this method, the wire is continuously bent in free form into a triangular coil. After additional process steps, finished stators are finally produced.

- ⊕ Implementation of different coil geometries and heights
- ⊕ Round wire wound perfectly orthocyclically
- ⊕ Rectangular wire with trapezoidal thickening compensation





STATOR PRODUCTION WITH INSERTION TECHNOLOGY

Insertion technology is a proven method for the production of closed stators with distributed round wire windings and is suitable for a vast range of applications. In insertion technology, we rely on flyer and template-based winding technology.

- ⊕ Patented anti-twist solution
- ⊕ Modular and scalable system structure
- ⊕ Technology usable across industries
- ⊕ Proven plant engineering

ROTOR PRODUCTION WITH NEEDLE WINDING

Needle winding is a complex process for applying round wire to laminated rotor cores. Here, the needle that feeds the wire circles the rotor pole and winds it.

- ⊕ Reduced wire stress by using a bent winding needle
- ⊕ ODD (One Drive Direction) winding without wire retraction at the needle
- ⊕ NC control system with Sinumeric One
- ⊕ Quick and easy setup thanks to the GROB winding app with graphic support

ROTOR PRODUCTION WITH PERMANENT MAGNETS

In the production of rotors with permanent magnets, the permanent magnets are separated and fed into the individual laminated cores using different methods, depending on the number of units and output quantity. Various methods are used to fix the magnets, depending on the individual customer requests and performance requirements.

- ⊕ Pick & Place solution (manual/robot)
- ⊕ High output thanks to rotary separation
- ⊕ Different ways of fixing the magnets (press-fitting/clamping; dosing of adhesive/resin/silicone; injection with EMC (epoxy molding compound))
- ⊕ Implementation of different system solutions
- ⊕ Project experience – from prototype construction to fully automated systems

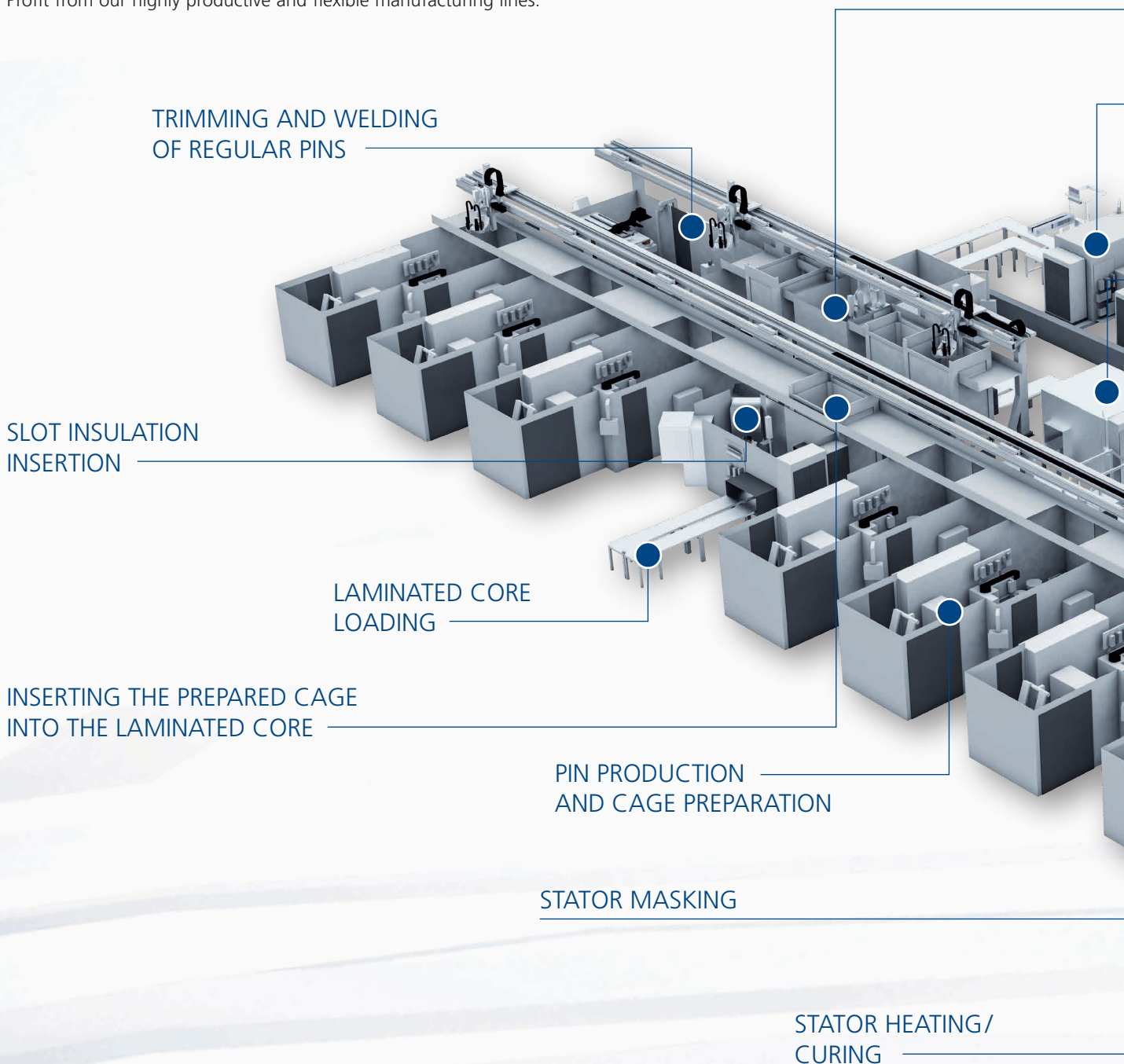
Source: VW AG

Partnership, efficiency & flexibility

CUSTOMIZED TURN-KEY ASSEMBLY LINES.

We have been delivering customized assembly lines for meeting high type and quantity flexibility requirements from a single source since 1982. With you, we develop solutions for stator, rotor, e-motor, and e-axis assembly tailored to your requirements and needs. Our product range spans from stand-alone, semi-automatic machines to fully automated turn-key systems.

Profit from our highly productive and flexible manufacturing lines.



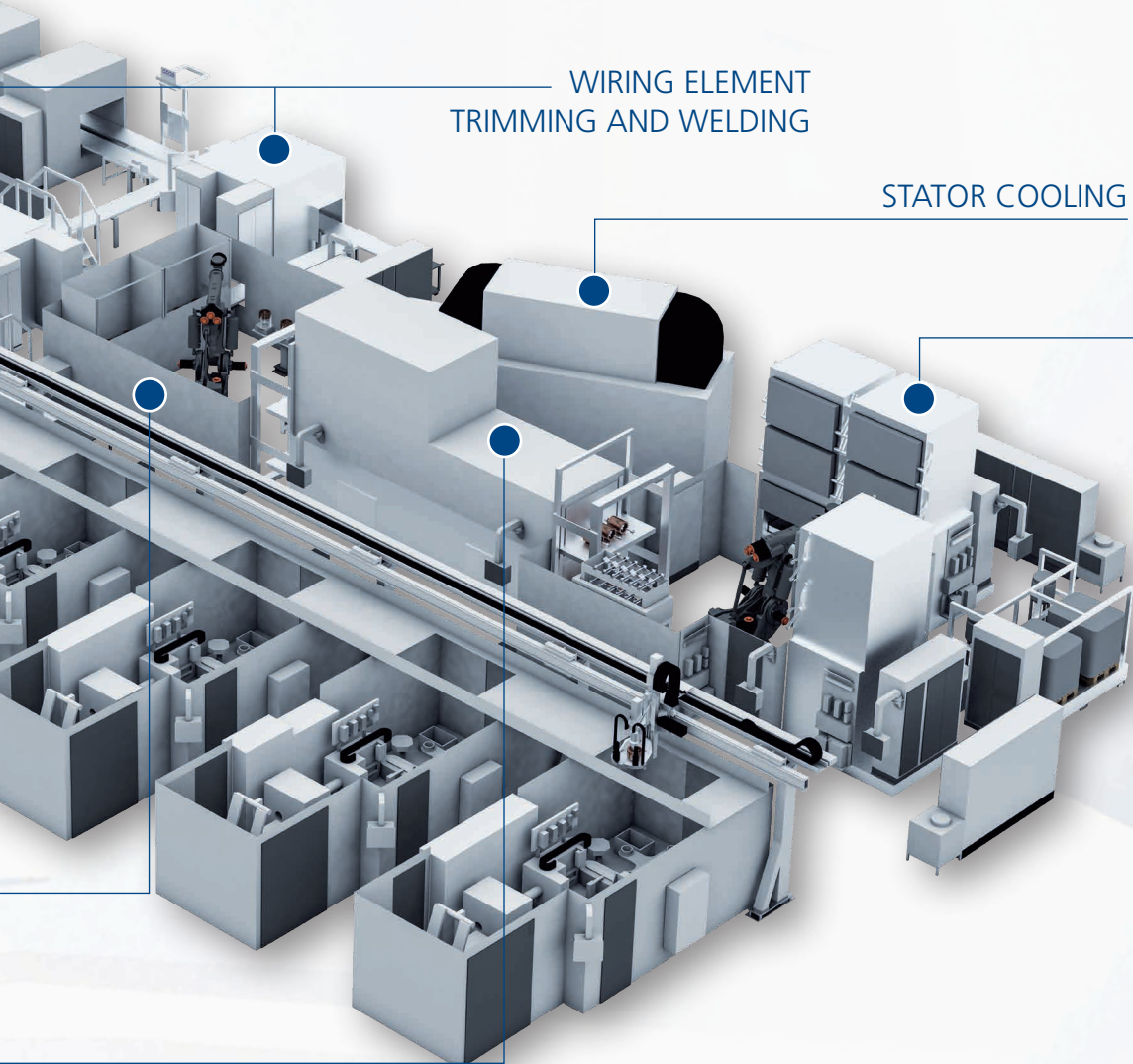
STATOR WIDENING AND TWISTING

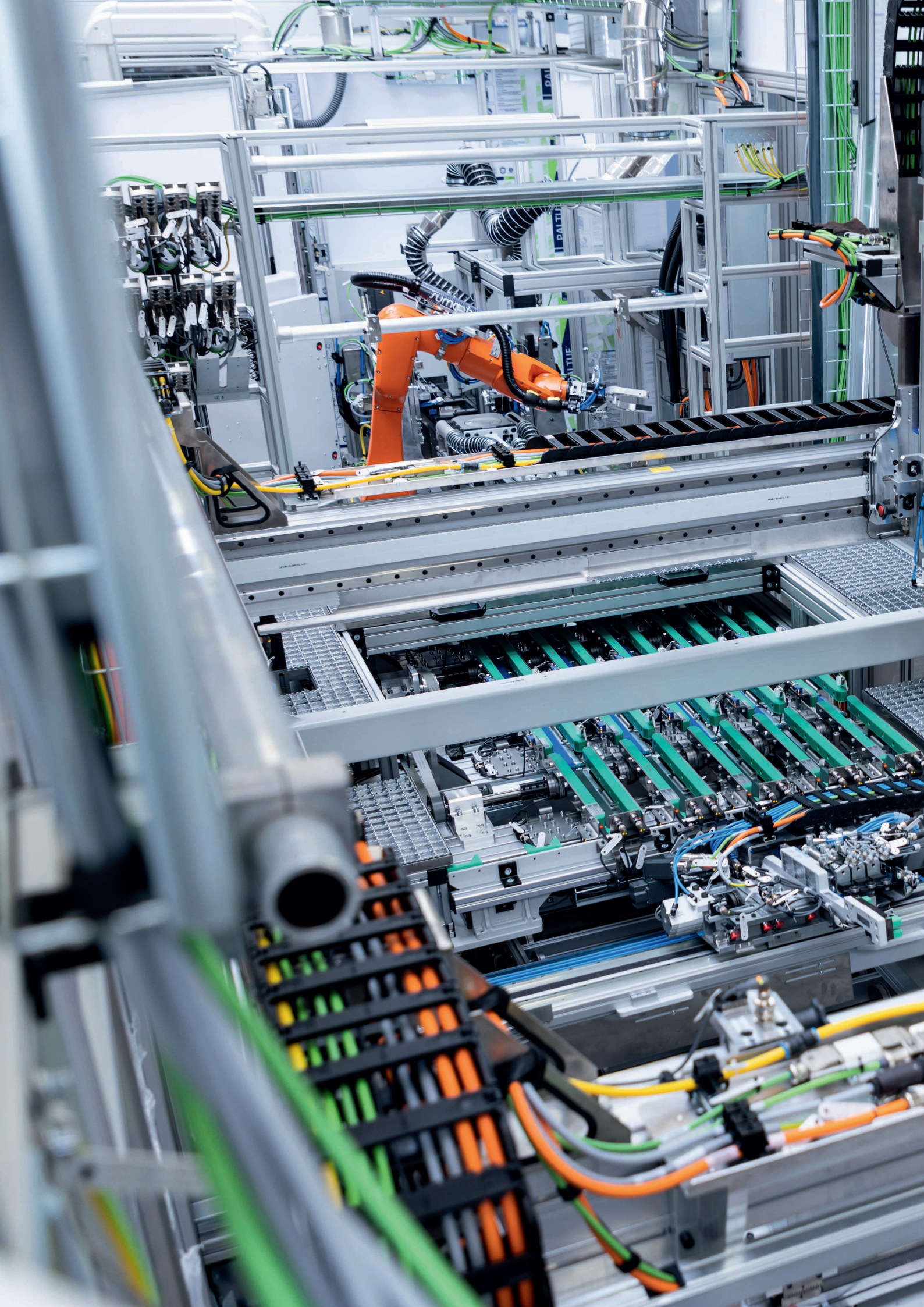
ELECTRICAL STATOR CHECK
BEFORE AND AFTER IMPREGNATION

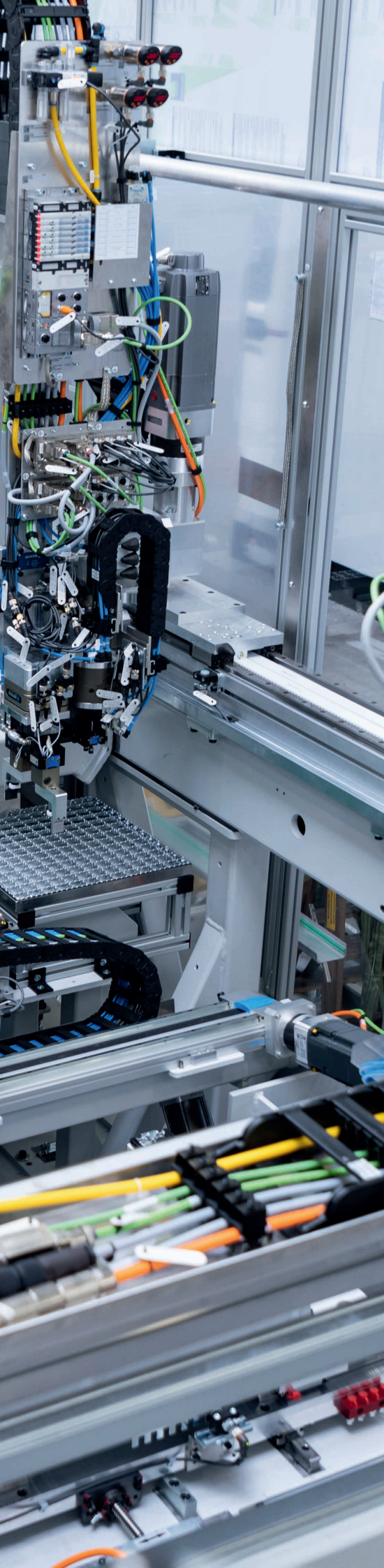
WIRING ELEMENT
TRIMMING AND WELDING

STATOR COOLING

STATOR TRICKLING
AND GELLING







Innovative, sustainable & flexible

MAXIMUM REACH WITH OUR INNOVATIVE SYSTEM CONCEPTS.

We support you in designing systems for the manufacture and assembly of battery storage systems. With our innovative product solutions providing competitive and sustainable volume production, we cover the entire battery manufacturing process – from battery cell assembly to battery module assembly and battery pack assembly.

The focus is always on your requirements – ensuring that degrees of automation, cycle times, and yield quantities are guaranteed! Our systems range extends from individual machines for laboratory and pilot manufacture to fully automated turn-key systems.

- ⊕ Innovative production solutions
- ⊕ Modular and scalable system
- ⊕ Fully automated production lines
- ⊕ In-depth know-how in battery storage systems



OUR PORTFOLIO FOR BATTERIES.

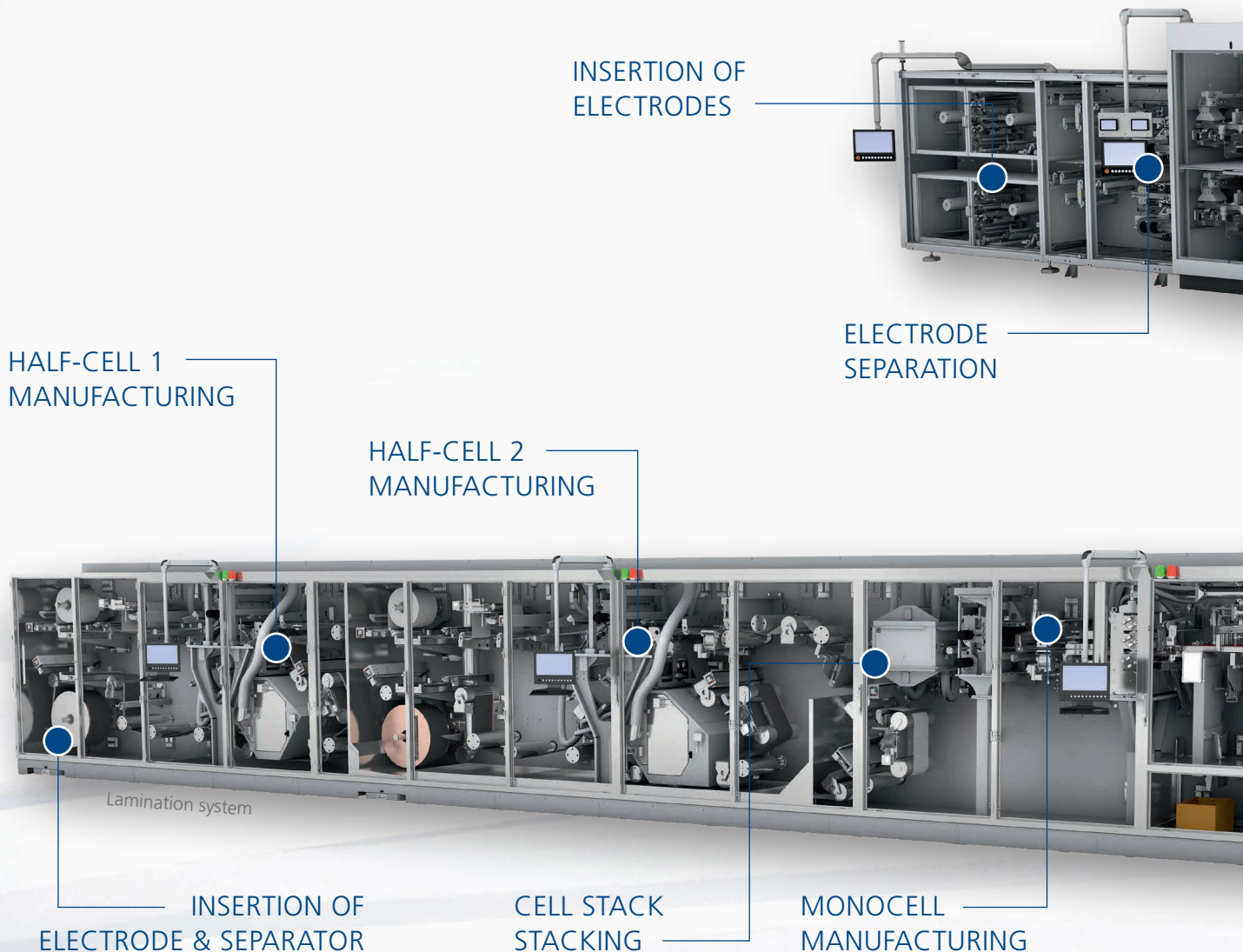
#battery cell #battery module #battery pack

Innovative, sustainable & flexible

SYSTEMS FOR BATTERY CELL ASSEMBLY.

Our state-of-the-art battery cell assembly systems with a focus on the assembly of prismatic cells and pouch cells offer you highly flexible production systems. The focus is on the production of cell stacks by means of Z-folding and lamination. Z-folding is a classic cell stacking technology that is already used in most gigafactories today. Lamination is an innovative process for the continuous processing of the electrodes and separators, leading to the production of cell stacks based on laminated monocoils.

In our application laboratory in Mindelheim, we can develop the individual production steps from the ground up based on your requirements and verify them. As with stator and rotor manufacturing, we are able to support you at every stage of the product development process for battery cells – from simultaneous engineering and the construction of the first prototypes to the series design of the cell as well as the design and construction of the associated production line.



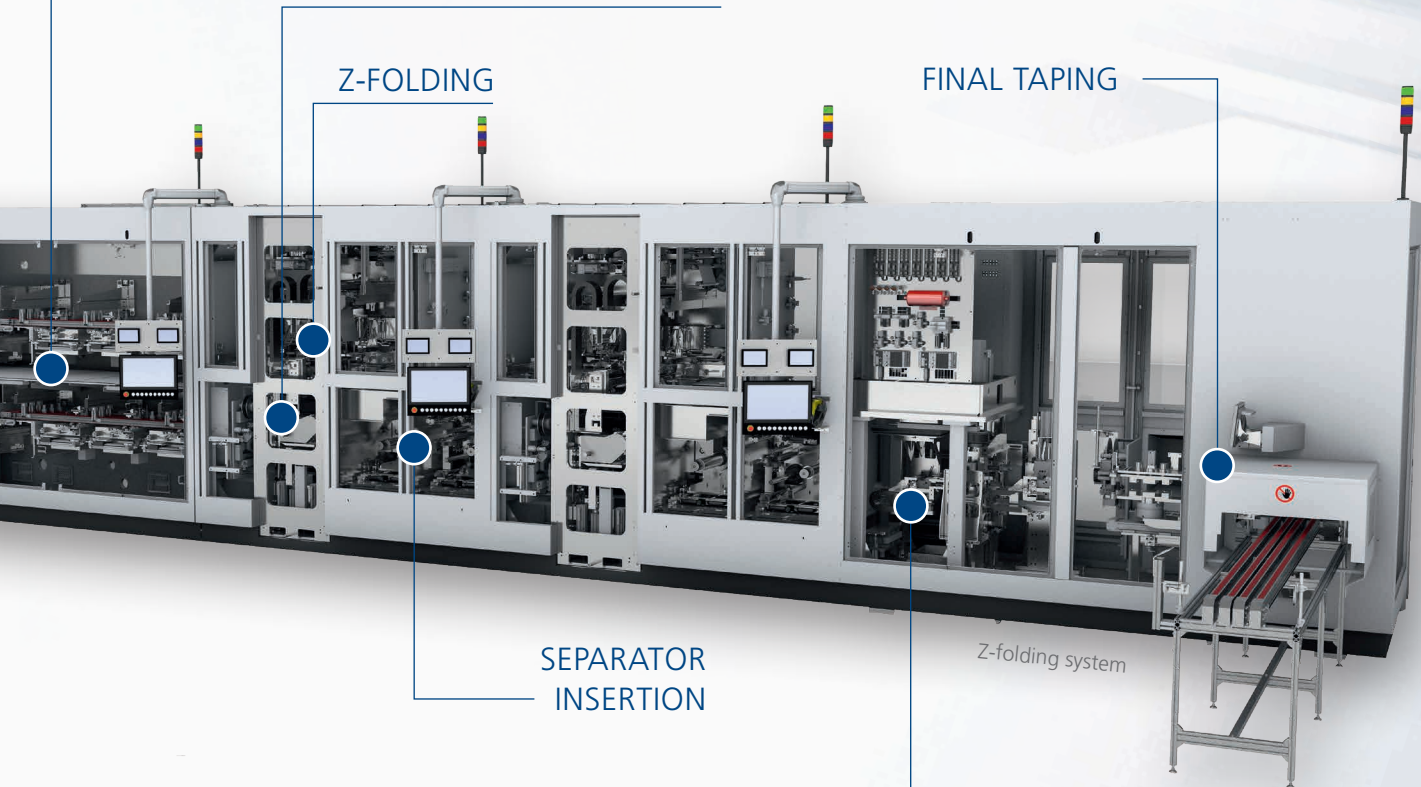


ELECTRODE TESTING & MAGAZINE STORAGE

WRAPPING & TAPING

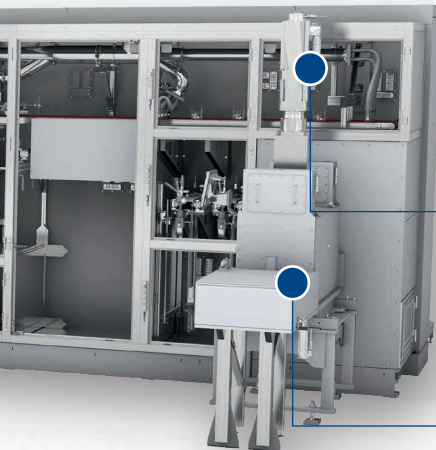
Z-FOLDING

FINAL TAPING



SEPARATOR INSERTION

PRESS-FITTING & HI-POT TEST



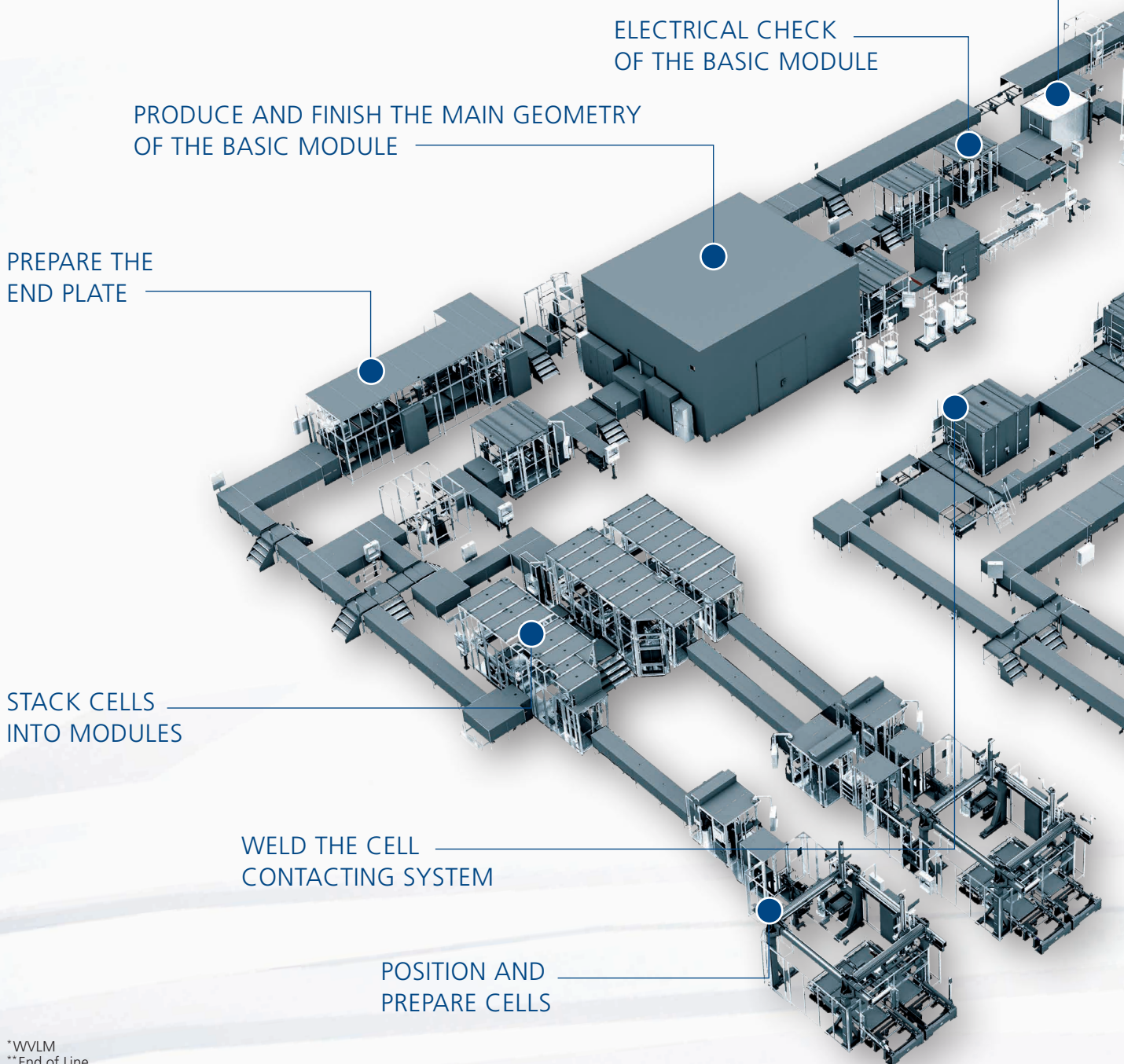
CELL STACK MANUFACTURING

CELL STACK LAMINATION

Innovative, sustainable & flexible

SYSTEMS FOR BATTERY MODULE ASSEMBLY.

In our fully automated and highly flexible GROB production lines for battery modules, your prismatic cells and pouch cells are stacked to different size battery modules and linked with contacting systems. Test systems at the beginning, within, or at the end of the line ensure the highest product quality and safety.



*WVLM
**End of Line

MEASURE THE GEOMETRY OF THE
BASIC MODULE (100 % INLINE)



CURE THE
BASIC MODULE

MAIN GEOMETRY OF THE DOUBLE MODULE
PRODUCTION AND FINISHING

PACKAGE THE
BATTERY MODULE

APPLY HEAT-CONDUCTING
COMPOUND* ONTO THE
COOLING PLATE AND PRESS-FIT THE
MODULE ON THE COOLING PLATE

ASSEMBLE THE
COVER

EOL** MODULE

CURE THE HEAT-CONDUCTING
COMPOUND*

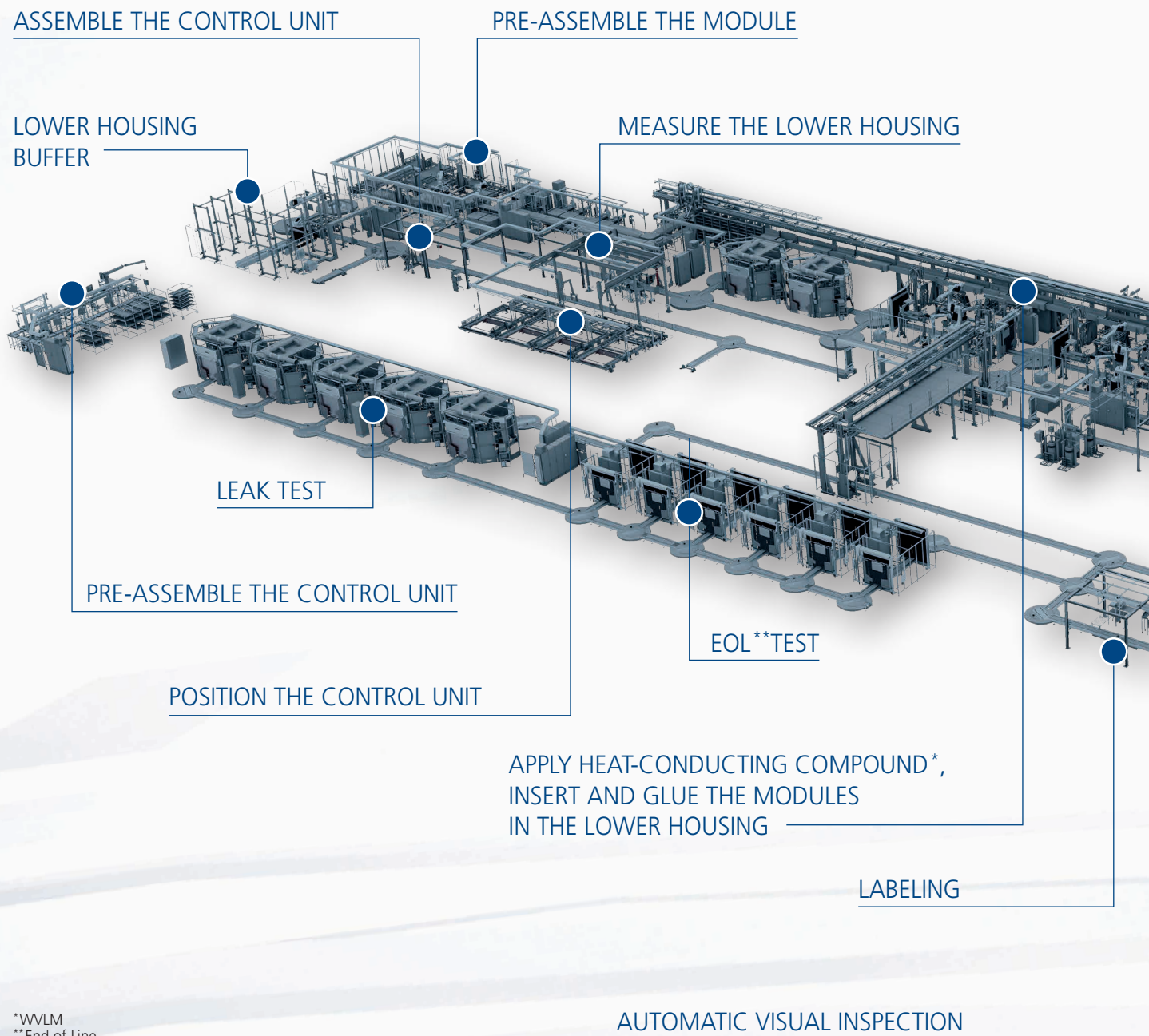
POSITION THE
CELL CONTACTING SYSTEM

ACTIVATE PLASMA ON MODULE BOTTOM
AND CHECK FOR PARTICLES

Innovative, sustainable & flexible

SYSTEMS FOR BATTERY PACK ASSEMBLY.

Our system solutions for the final assembly of complete battery pack systems round off our comprehensive portfolio in the field of battery storage systems. Finished battery modules are automatically placed, fixed and interconnected. The assembly of attachments such as cooling systems, connector plugs, cable harnesses, etc. is carried out manually or automatically, depending on requirements. Test systems such as those used in battery module assembly ensure the highest product quality and safety.



*WVLM
**End of Line



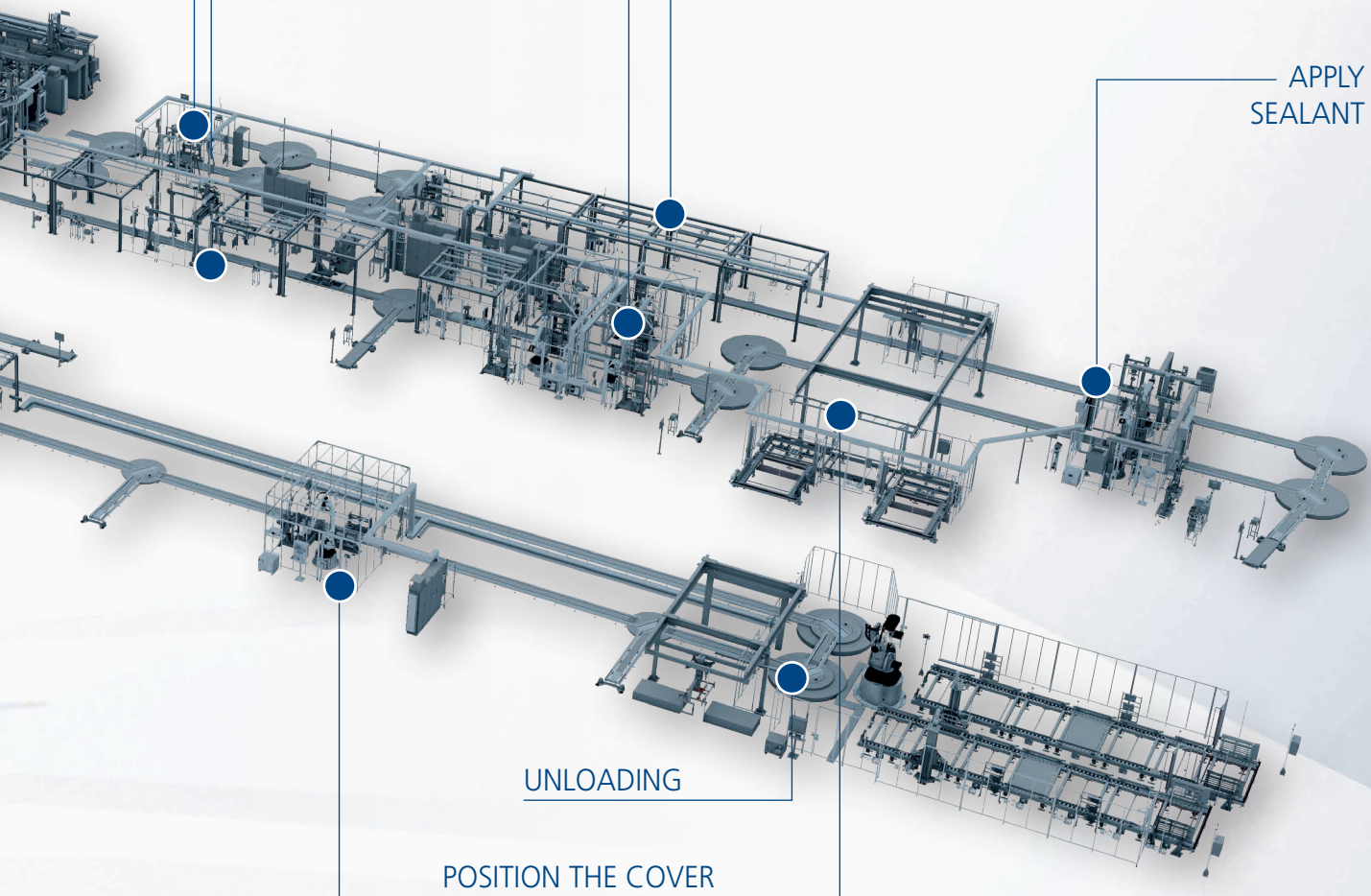
AUTOMATIC
INSULATION TEST

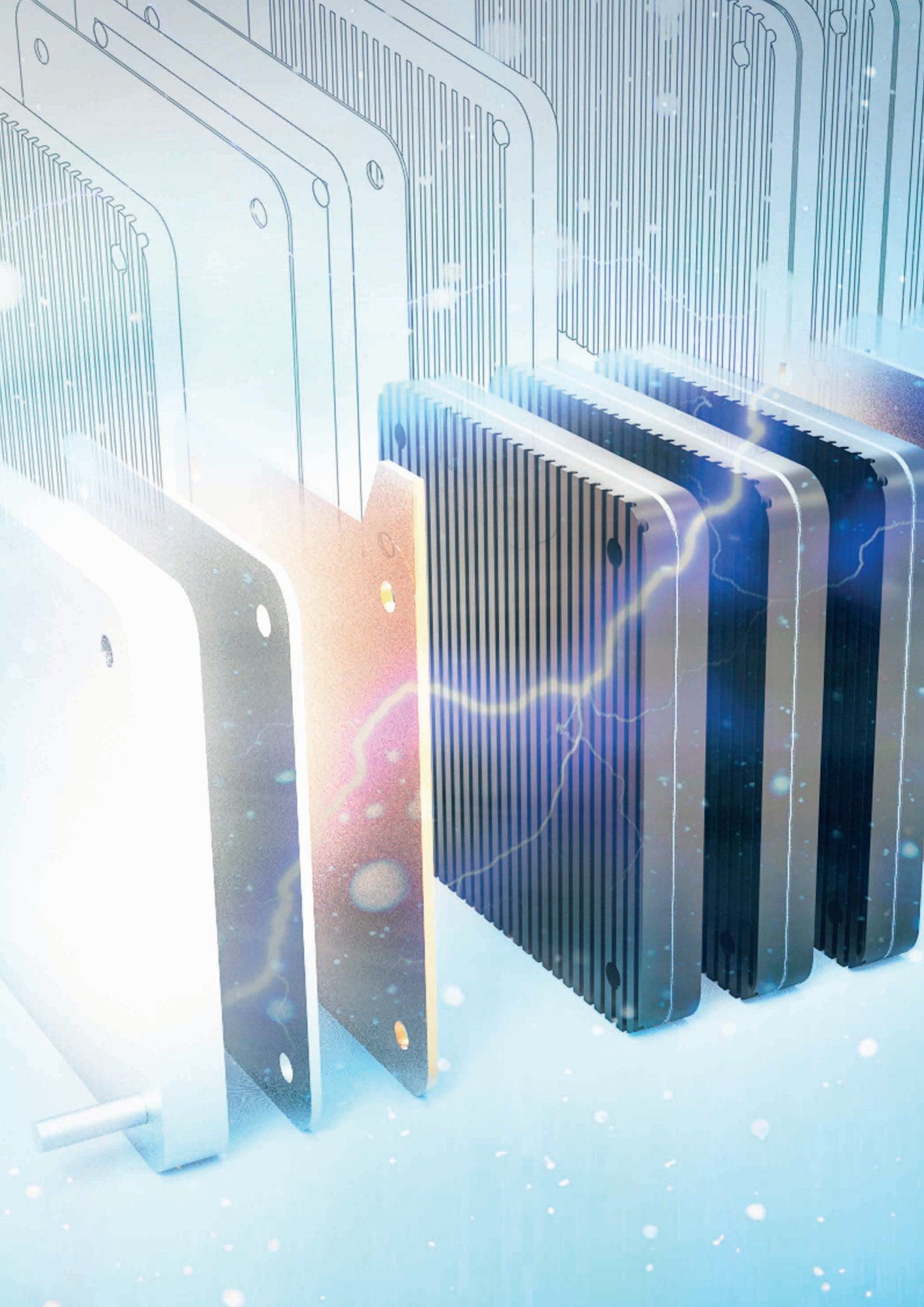
SCREW ON THE COVER

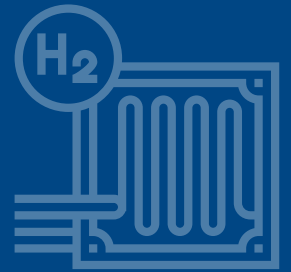
FINAL ASSEMBLY

CONNECT MODULES MANUALLY

APPLY
SEALANT







Variable, precise, and pioneering

BUILD FUEL CELLS WITH OUR SYSTEM SOLUTIONS IN MASS PRODUCTION.

For the assembly of components for vehicle fuel cell drives, we offer innovative and automatable manufacturing and assembly lines that guarantee a high degree of flexibility, productivity, and reliability. Profit from our expertise and comprehensive consulting service – from the initial idea to the concept and construction of your plant, all from one single source.

- ⊕ Processes suitable for large-scale production
- ⊕ Scalable and expandable production lines
- ⊕ High format flexibility
- ⊕ Inclusion of interfaces for future connection to BPP and MEA production



OUR PORTFOLIO FOR FUEL CELLS.

#stackproduction #systemproduction

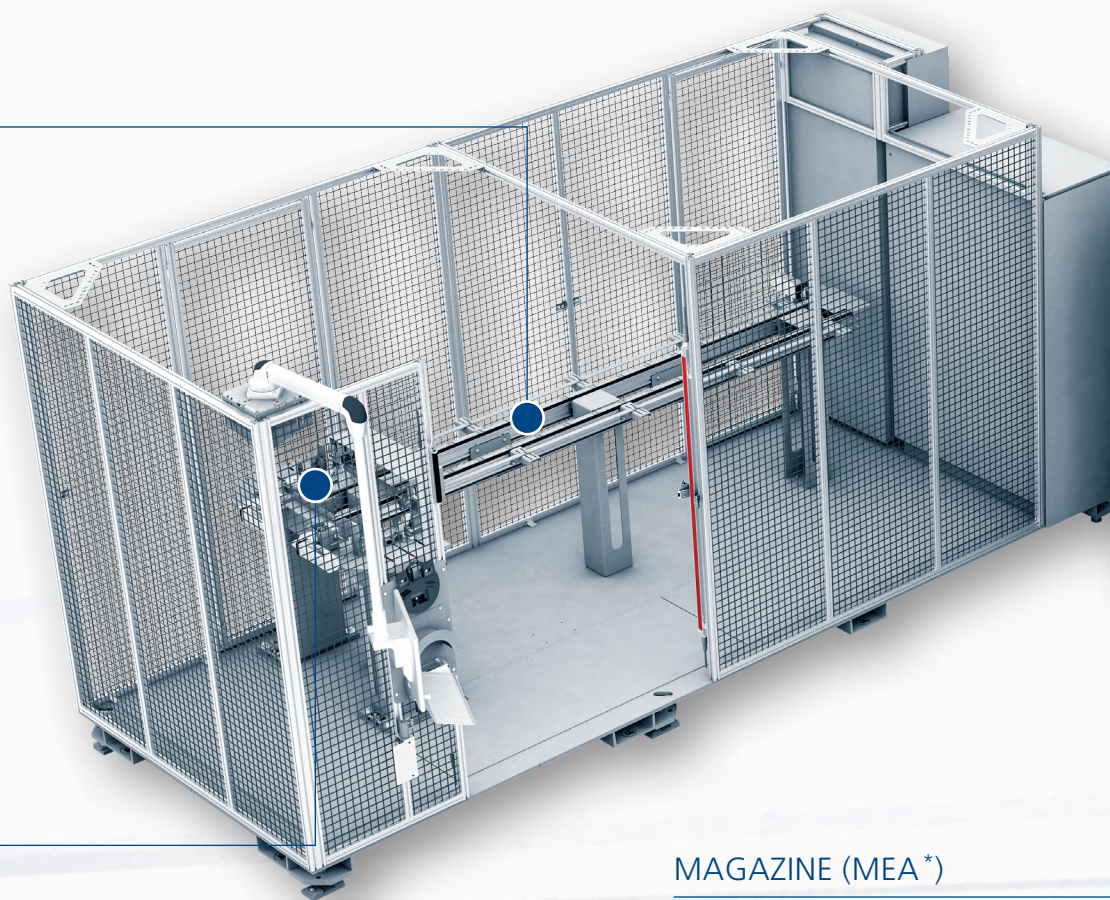
Variable, precise, and pioneering

SYSTEM CONCEPTS FOR FUEL CELL PRODUCTION.

We develop a custom plant design adapted to your individual needs so you can increase capacity for small to large-scale series production at any time. Decoupling of the individual process steps offers you maximum productivity and flexibility for fuel cell production. Our manufacturing solutions already provide interfaces for future connection to BPP and MEA manufacturing.

SEPARATION &
CLEANING (MEA*)

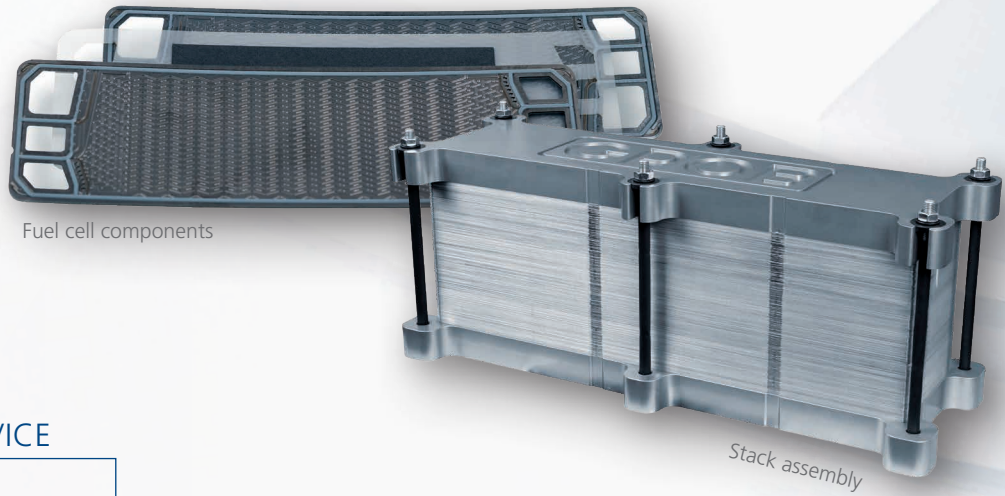
BPP FEED



BPP BUFFER
FILLING

MAGAZINE (MEA*)

* Membrane electrode assembly
** Bipolar plate



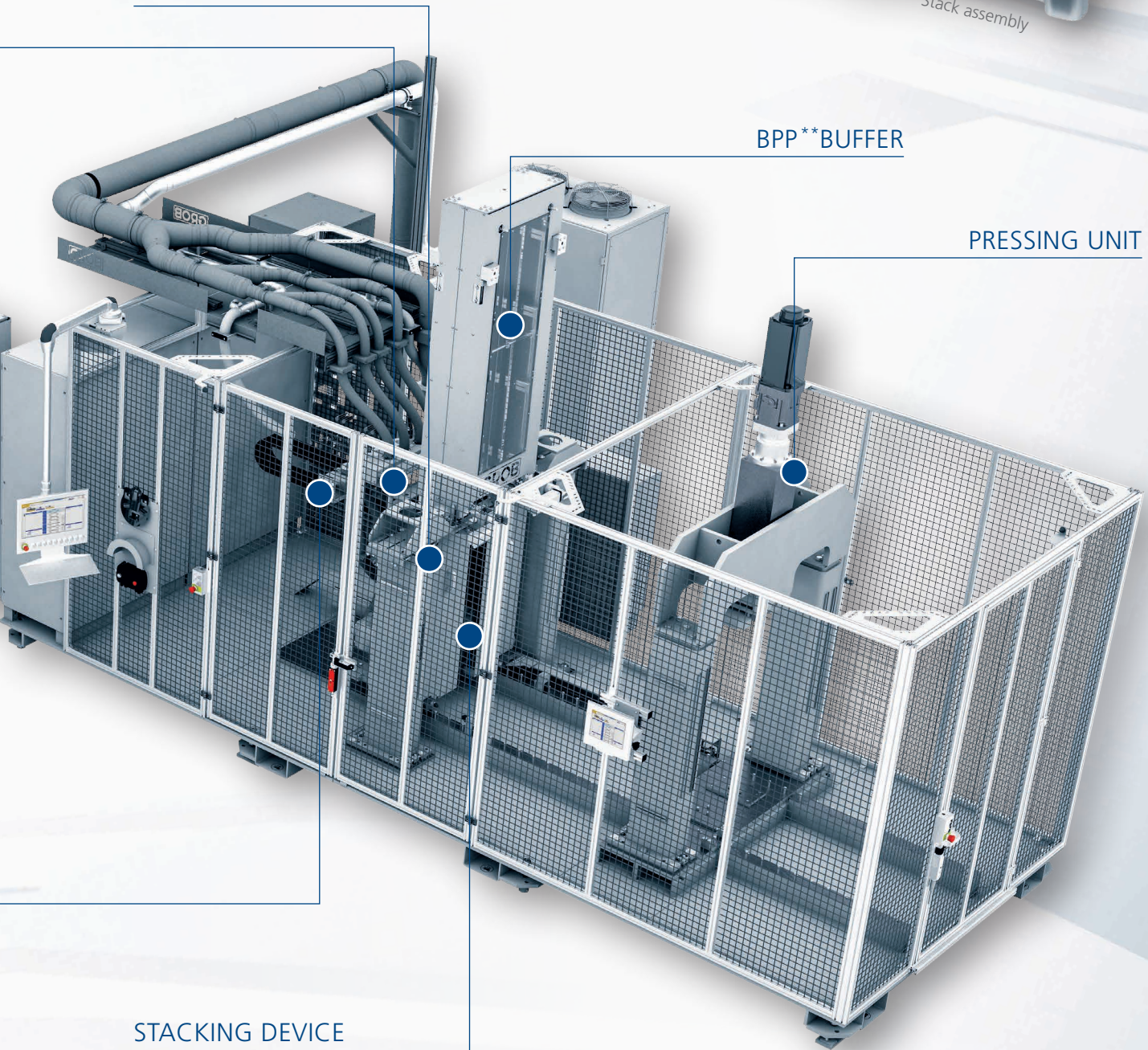
Fuel cell components

Stack assembly

POSITIONING DEVICE

BPP**BUFFER

PRESSING UNIT



STACKING DEVICE





Friendly, committed, competent **GROB SERVICE.**

From 24-hour service and a comprehensive range of spare parts and training courses to professional machine maintenance and analysis: The GROB service spectrum offers you a comprehensive range of products and services and is available to you worldwide thanks to our global production plants and service branches.

- ✦ Worldwide service network
- ✦ Available 24/7/360
- ✦ One hotline for everything
- ✦ We are right where our customers are



OUR SERVICE PORTFOLIO.

*#hotline #webshop #serviceagreements
#replacementparts #repaircenter
#overhaul&optimization #motorizedspindleservice
#grobtechnicalacademy*

Worldwide throughout the machine service life

GROB – GLOBAL AND INTERNATIONAL.

From Bavaria to the world: Since our founding in 1926 in Munich, we as a global, family-managed company have been on a constant growth trajectory developing and manufacturing systems and machine tools. Our customers include the world's leading automotive manufacturers, their suppliers, and renowned companies from the aerospace, mechanical engineering, and other industries. With our production facilities in Germany, Brazil, the USA, China, Italy and India, as well as 14 worldwide service centers and sales branches, we are represented around the globe, ensuring the highest quality.

FOUNDED IN 1926

NORTH AMERICA

Bluffton, Ohio, USA
Detroit, Michigan, USA
Querétaro, Mexico

6 PLANTS

14 SALES
AND SERVICE BRANCHES WORLDWIDE

SOUTH AMERICA

São Paulo, Brazil

Our global production sites



Mindelheim, Germany



São Paulo, Brazil

EUROPE

Mindelheim, Germany
Pianezza, Italy
Stratford-upon-Avon, Great Britain
Hengelo, Netherlands
Senlis, France
Baar, Switzerland
Poznań, Poland
Győr, Hungary

24/7 SUPPORT

8,300 EMPLOYEES WORLDWIDE



ASIA

Dalian, China
Bangalore, India
Beijing, China
Shanghai, China
Yokohama, Japan
Suwon, South Korea
Haiphong, Vietnam
Bangkok, Thailand



Bluffton, USA



Dalian, China



Pianezza, Italy



Bangalore, India



www.grobgroup.com

© GROB-WERKE GmbH & Co. KG - 03/2023/EN

GROB-WERKE GmbH & Co. KG

Pioneers in designing and building highly innovative production and automation systems for over 95 years.

*#machiningtechnology #universalmachiningcenters
#assemblyplants #electromobility
#automation #additivemanufacturing #digitalization
#usedmachines #service*

