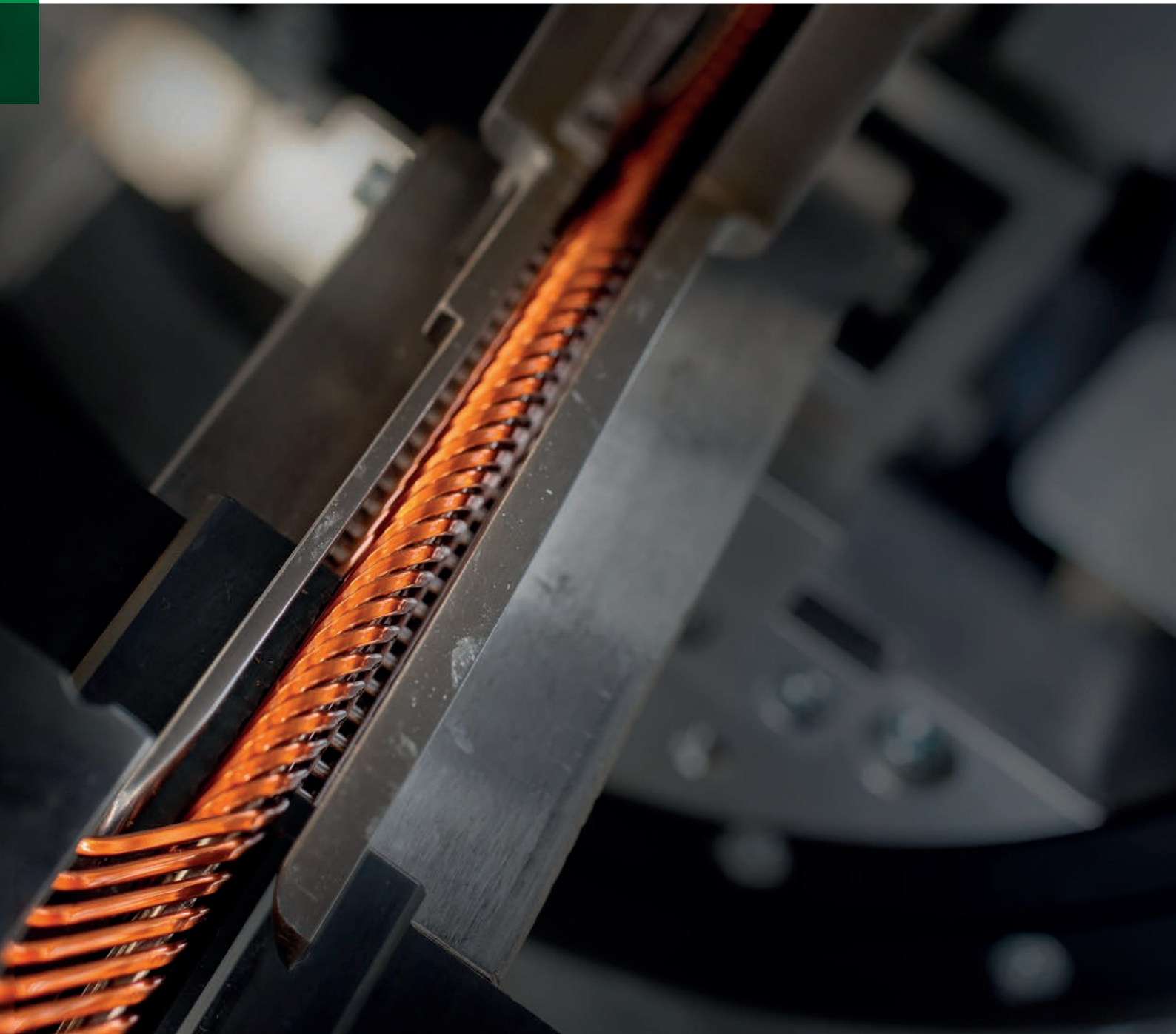


## Special Machinery

E-Mobility production equipment





# INDUSTRIALIZATION PARTNER FOR E-MOBILITY

## Flexible and efficient production equipment for of electro-mobility

**We support our customers in the transformation of mobility.**

In this process, we operate in the triangle of tension between industrialization costs, - timeline and product maturity. To achieve maximum efficiency and economic success, we meet these challenges with agile methods with agile methods, design for assembly and simultaneous engineering. This approach enables us to achieve short lead times as well as flexibility in planning and realization. By consistently separating parallel production processes and identifying potential risks at an early stage, we minimize the impact of product variance while keeping machine and change costs low.

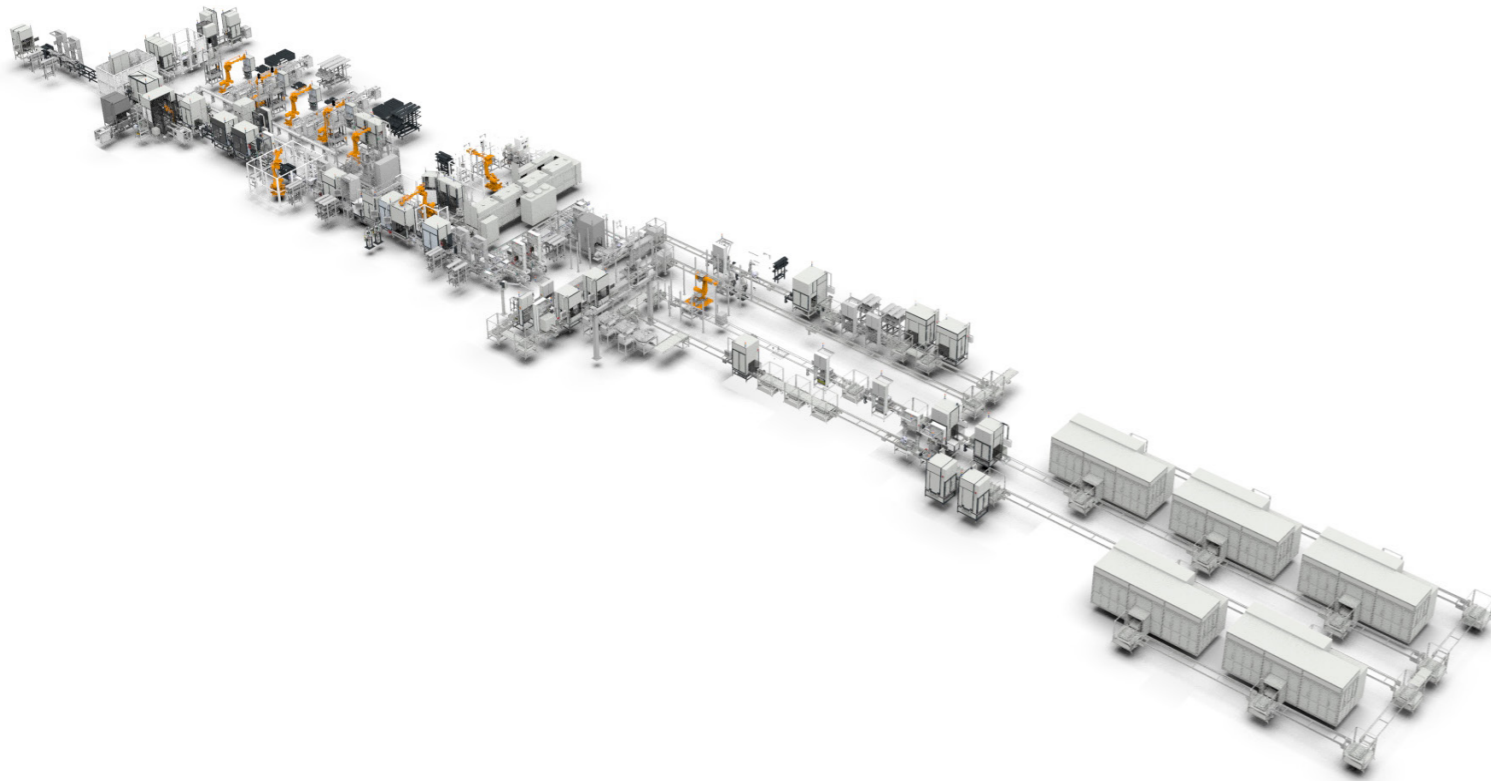
**In our intelligently automated, efficient and sustainable concepts we**

combine current production trends, such as cobot and AGV applications, to realize economic potential, increase flexibility or reduce production costs.

**With competence since 1960,**

our global network and highly motivated team enables us to be a partner for production excellence, not only for e-mobility solutions, but across industries.

# Our portfolio for E-mobility



## Our e-mobility specialists develop

custom-fit production concepts for our customers for the manufacturing of individual components through to complex system solutions. In recent years, we have implemented modular and flexible production lines at our worldwide locations, covering a spectrum from hybrid modules to complete e-axle systems. We accompany our customers from the initial concepts to stable series production.

In the realization of combined production lines, we connect all important manufacturing processes for the production of, for example, rotor and stator, e-motors as well as differentials and transmissions. Of course,

### Some of our technological highlights are:

- Dynamic gear testing (single flank rolling test)
- Multidimensional imbalance correction methods
- Pulse magnetization of rotors

### At Schaeffler Special Machinery, we combine the expertise for

- Assembly lines
- Testing systems
- Handling and feeding technology
- Robotics
- Machine vision systems
- And production IT.

# E-mobility assembly concepts

## The development of modular and scalable production concepts

is our philosophy. For our customers, we ensure that the investment costs follow the actual requirements. Our concepts are perfectly matched to the requirements in production. Depending on the production capacity, our systems range from manual workstations to highly automated, cam-controlled production lines.

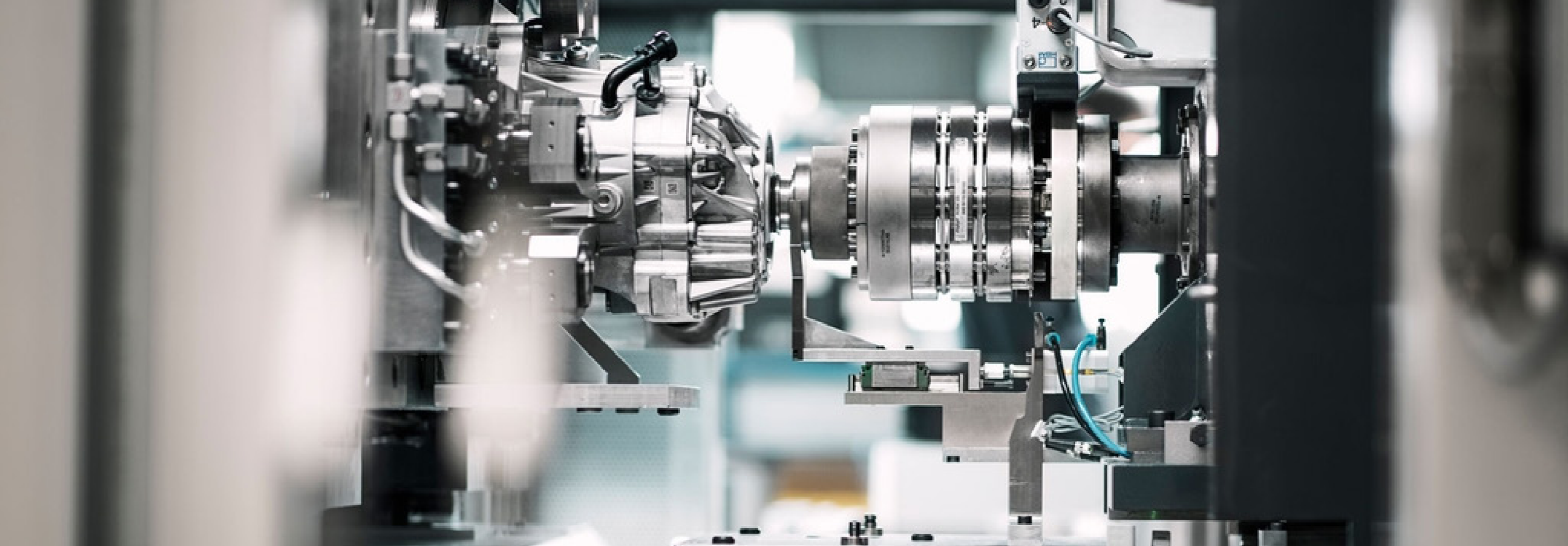
In the assembly of e-mobility components, products and systems:

- We master all common potting techniques for the rotor incl. transfer molding
- We flash software modules for power electronics
- We contact and wire all commercially available winding concepts

## Supplemented by our digital offer,

we can offer our customers comprehensive solutions. Digital simulations enable us to verify the cycle time at manual workstations and a virtual commissioning of the machine software enables us to shorten delivery times. Our clear and user-friendly human-machine interface processes selective, individual results from sensors and measurements as well as data from the machine control system to simplify production control.





End-of-Line-test bench for e-axle drives

## High performance end of line inspection

### **Our high-performance end-of-line test benches for e-mobility**

are designed to ensure the highest product quality. For the design of customer-specific solutions, our concepts are capable of testing closed and open transmissions. The modular and cost-optimized design with vibration damping base frame made of ultra-high performance concrete supports best test results.

Our experts design modular, scalable and application-specific systems with different logistics modules (manual loading, directly interlinked with pre-processes, robot loading, AGV transport) and our own testing software. This software, specifically developed for the test stands, is characterized by easy handling of product parameters and machine data with user-friendly interface and intuitive user guidance.

### **With a broad portfolio of**

electrical tests, efficiency measurements, power data measurements in endurance tests or acoustic measurements, our systems are perfectly matched to the requirements of e-mobility and combine all essential tests in a modular system with a space-saving design.

#### **Fields of application of our end of line test systems:**

- Application-specific test cycles of load and speed spectra
- Determination of drive and gear parameters
- Functional tests
- NVH testing by tactile or non-contact acceleration measurement

# Innovative technologies for mobility of tomorrow

**Together with our partner Schaeffler Elmotec Statomat,** we complete our offer for the production of e-mobility products with wire winding technologies. In particular, the innovative flat wire shaft winding enables a lower product weight with a simultaneously higher copper fill factor for improved efficiency.

**Due to a modified process chain,** we can achieve high energy and CO2 savings in production. This makes this technology ideal for the sustainable automotive production of the future. The fast, efficient and reliable manufacturing process of flat wire shaft winding enables us to achieve the greatest customer benefits.

For more than 70 years, Schaeffler Elmotec Statomat has also been offering alternative winding and feeding technologies for round wire, with a high number of parallel wires for a very flexible coil variance.

The portfolio ranges from semi-automatic stand-alone machines to fully automatic production lines for the production of stators.

## Complemented by know-how in the field of

- Insulation
- Winding
- Pressing in
- Forming
- Coating

the specialists from Schaeffler Elmotec Statomat complement our portfolio for e-mobility into complete production lines.



Fully automatic production line for the manufacture of stators with the use of round wire.



The flat wire wave winding technique is characterized by very few welding points in the wire run. As a result, the manufacturing process is both fast, efficient and reliable in production.

# Sustainable production

**We at Schaeffler Special Machinery face up to our responsibility to** reduce the CO2 footprint of our machines and achieve climate-neutral production.

For our e-axis test stands in production alone, annual savings of approximately 1.1 t of CO2 and around 3,500 kWh of electricity have already been achieved, as well as an extension of the service life of components used.

The solutions used include

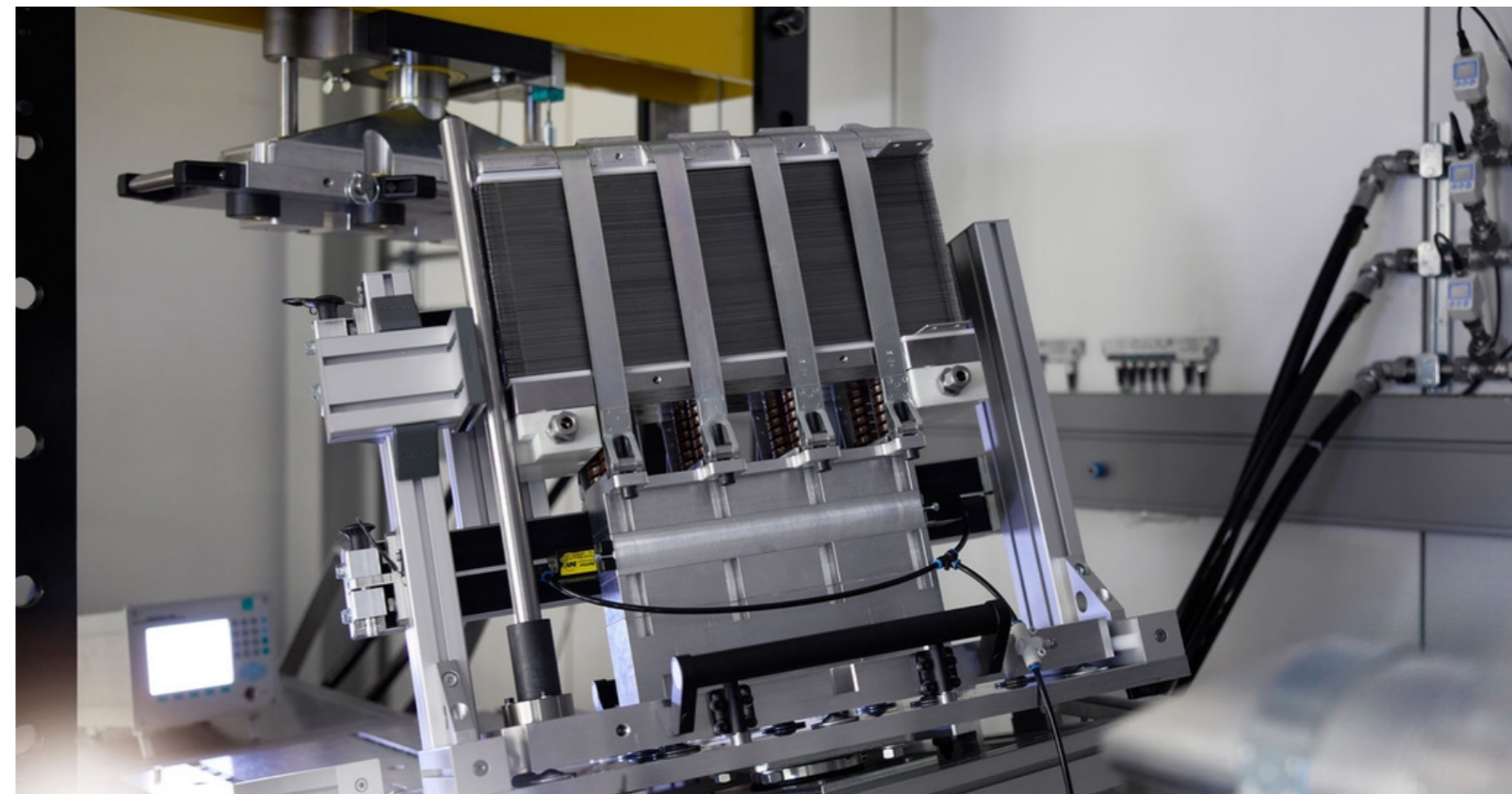
- The application of recyclable components
- The implementation of intelligent machine shutdown
- The reduction of compressed air through hardware and software adaptations

We complement our approaches by considering the entire supply chain and the resource-saving implementation of our systems, as well as the evaluation and overhaul of existing systems.

## Battery or fuel cells,

which technology will drive the mobility of tomorrow remains to be seen. Both systems have many advantages for sustainable and emission-free mobility. To make our technology fit for the future, we are developing innovative production solutions to meet the high demand for technology maturity and ensure long-term economic success for our customers.

With hydrogen as a potential perpetual source for the energy chain, hydrogen projects are on the rise. Assembly and testing technology for electrolysis stacks are part of our portfolio.



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