



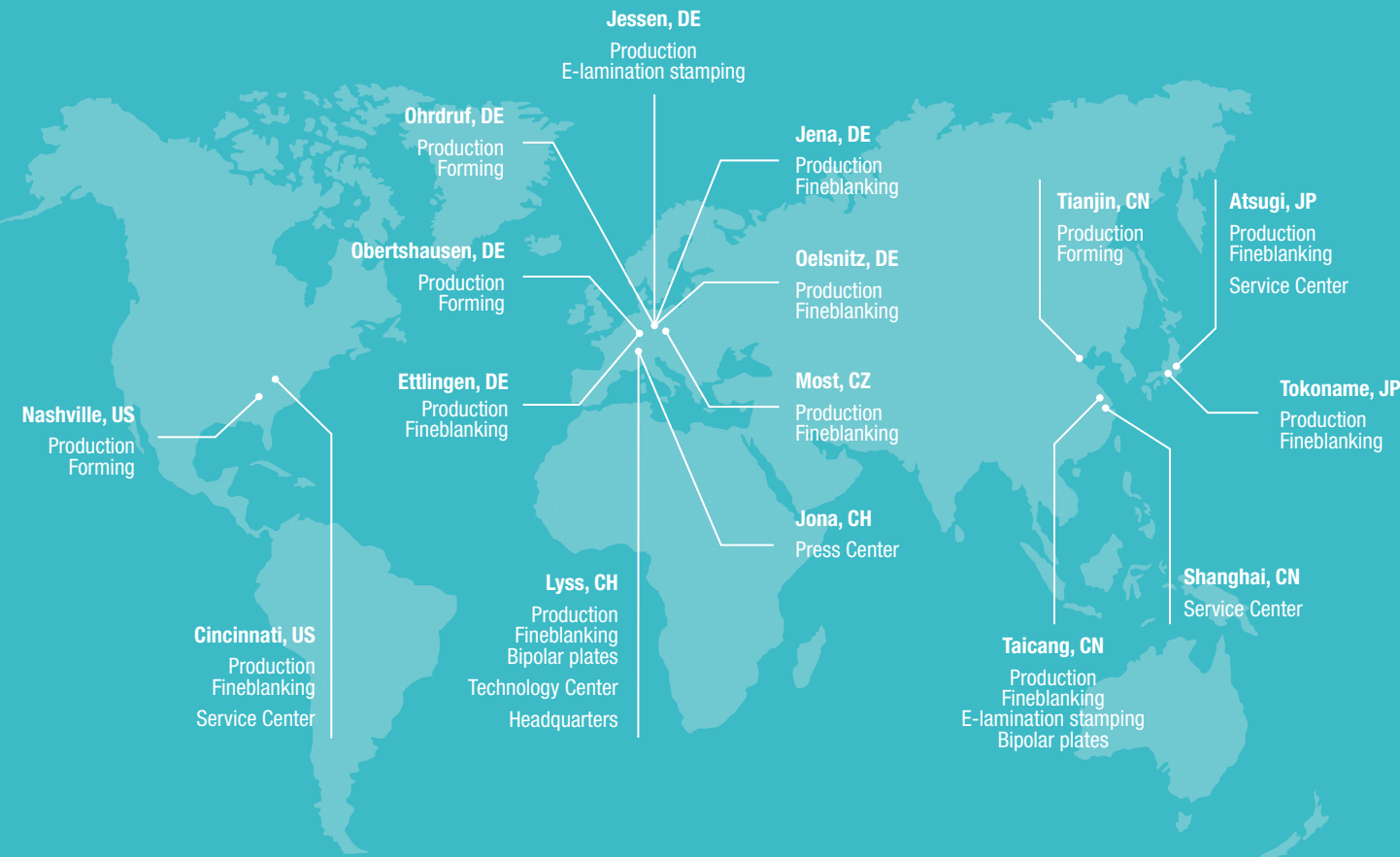
# TECHNOLOGIES FOR THE ELECTRIC-POWERED FUTURE

Innovative and cost-effective solutions for a new  
generation of vehicles



EXPANDING HORIZONS

## GLOBAL COMPETENCE - LOCAL PRESENCE



As a partner to global automotive manufacturers, we maintain a presence in all relevant markets.

We are a global technology company operating in the fields of fineblanking, forming, and e-sheet stamping with proven expertise. It is our mission to continuously expand technological horizons and develop intelligent solutions for our customers. We therefore create fineblanking systems with innovative tools and offer complete processes for high-precision fineblanked, formed, and electroplated components. The company is specialized in the production of large quantities for demanding industrial applications.

Feintool was established in 1959 and has its headquarter in Lyss, Switzerland. With around 2,600 employees over 16 locations on three continents, we are always close to our customers.

## SHAPE THE FUTURE WITH US

Feintool masters the technologies needed to manufacture electric drive systems – whether battery or hydrogen-powered. We develop and produce components that will be used in the next generation of vehicles.

Feintool is a highly regarded partner for trendsetting solutions and cost-effective innovations. Alongside fineblanking and forming, our core areas of expertise are incredibly diversified. We also specialize in engineering and manufacturing high-precision rotor and stator stacks and bipolar plates, which are needed not only in the field of e-mobility but also in industrial applications, power generation, power distribution, as well as in transportation and robotics.

Our mission is to shape the transformation towards a new era of mobility with our key technologies. Feintool supports and guides its customers as an experienced and reliable supplier to ensure that this transformation will be successful. We know how to apply our innovative capabilities to the challenges that lie ahead – in a cost-effective, precise, and timely manner.

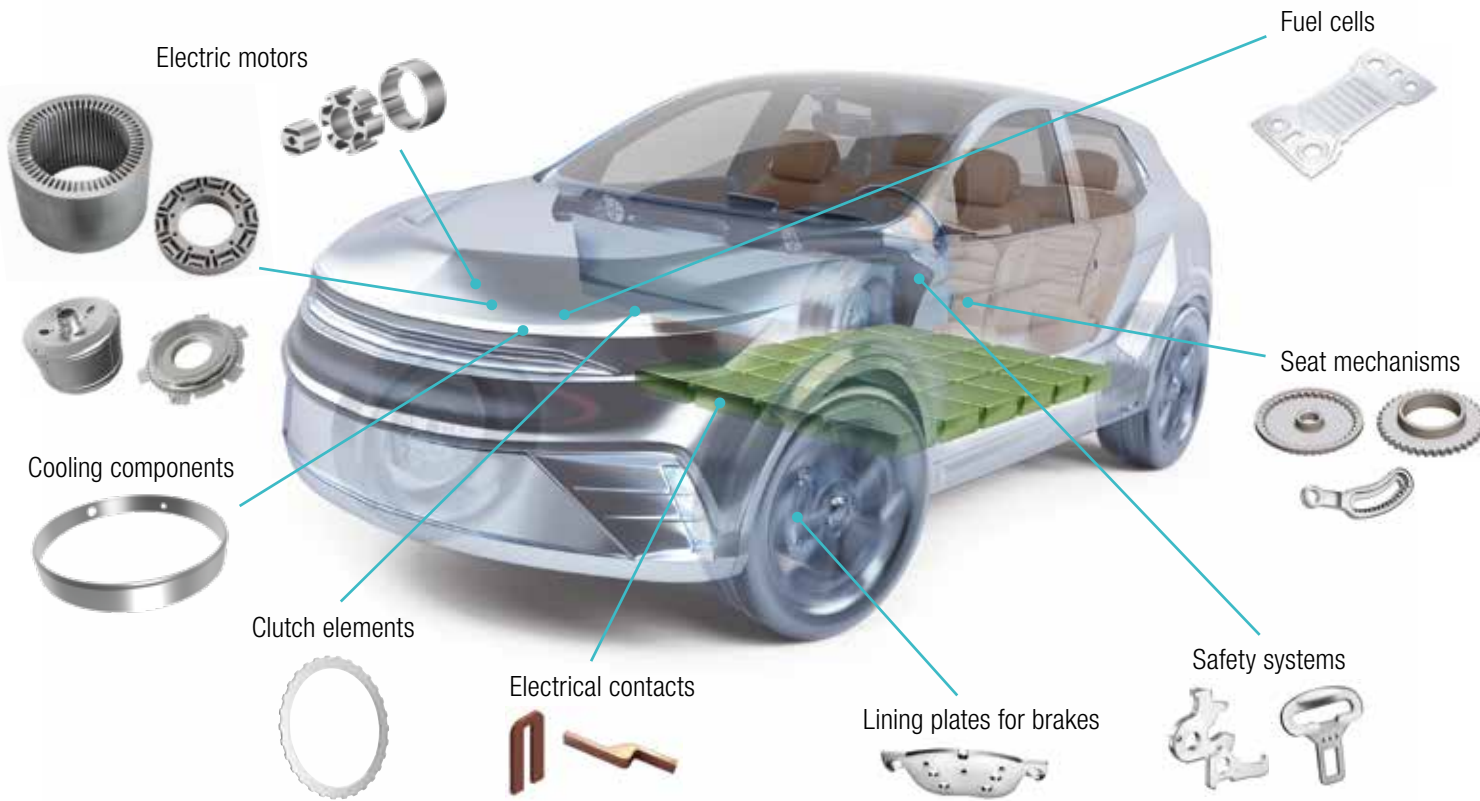
We always stay one crucial step ahead – take this step with us.

# PRECISION PARTS FOR THE NEXT GENERATION OF VEHICLES

E-mobility requires materials and technologies to meet both new and high demands. Our products are the keys to success in this respect, because they are built for maximum competitiveness and cover a wide range of applications. We offer the

right solution no matter the quantity. In combination with our services along the entire value chain, we give our customers that crucial competitive edge.

## BEV/FCEV WITH FEINTOOL



### Overview of Feintool's e-mobility product range

	HEV	BEV	FCEV
Electrolamination stamping	<ul style="list-style-type: none"> <li>▶ Rotor/stator for electric drives</li> <li>▶ Rotor/stator for auxiliary units</li> </ul>	<ul style="list-style-type: none"> <li>▶ Rotor/stator for electric drives</li> <li>▶ Rotor/stator for auxiliary units</li> <li>▶ Magnetic core for C-poles</li> </ul>	<ul style="list-style-type: none"> <li>▶ Rotor/stator for electric drives</li> <li>▶ Rotor/stator for auxiliary units</li> </ul>
Fineblanking	<ul style="list-style-type: none"> <li>▶ Clutch plates</li> <li>▶ Seat elements</li> <li>▶ Lining plate for brakes</li> <li>▶ Seat belt buckles</li> </ul>	<ul style="list-style-type: none"> <li>▶ Clutch plates</li> <li>▶ Seat elements</li> <li>▶ Lining plate for brakes</li> <li>▶ Seat belt buckles</li> <li>▶ Copper contacts</li> </ul>	<ul style="list-style-type: none"> <li>▶ Seat elements</li> <li>▶ Lining plate for brakes</li> <li>▶ Seat belt buckles</li> </ul>
Forming/FEINforming	<ul style="list-style-type: none"> <li>▶ Plate carriers</li> <li>▶ Planetary carriers</li> <li>▶ Pulleys</li> <li>▶ Encoder discs</li> </ul>	<ul style="list-style-type: none"> <li>▶ Planetary carriers</li> <li>▶ Housings</li> <li>▶ Rotor arms</li> </ul>	<ul style="list-style-type: none"> <li>▶ Planetary carriers</li> <li>▶ Bipolar plates</li> </ul>

# THE CHANGING FACE OF DRIVE TECHNOLOGY

## We master the key technologies

Our key technologies enable a mix of drive systems – for both systems that are installed in vehicles today and systems that will be installed in vehicles ten years from now and beyond. Over the past few years, we have consolidated and expanded

our market leadership in the technological development of our products. Feintool maintains a presence in every market in which our expertise is demanded.

### ELECTROLAMINATION STAMPING

The core of an electric motor: **stator and rotor stack**, layered from hundreds of high-precision electrolaminations, either in-tool laminated, baked, welded, or glued.



### FEINFORMING

A **stack's** most important design elements consist of the bipolar plate and the MEA. Together, these two components largely determine the stack's performance.



### FINEBLANKING

A large number of fineblanked parts are installed in a battery-electric car, including **power rails** that, as high-voltage copper electrical contacts, have to meet extremely high standards.



### FORMING

When lightweight design and stability count. **Formed parts** in an electric motor include a component for the cooling jacket (top) and a sheet metal rotor arm and support flange (bottom).







«The punching process in high-volume production is a complex and high-precision mission that has a direct impact on the efficiency of an electric motor. Through our comprehensive range of products and services, we support our customers from their first contact with our company all the way through to delivery.»



Cutting-edge high-speed blanking presses ensure that production at the plant in Taicang, CN, is cost-effective.

## ELECTROLAMINATION STAMPING

### Cutting technology for the drive technology of tomorrow

Electrolamination stamping technology from Feintool is synonymous with long-lasting functionality and convenient safety. When large quantities and maximum quality are required for demanding applications, our electrolamination components play a decisive role. As a specialist for electrolaminations and sheet stacks, we guide our customers from the initial idea to profitable series production, be it for smaller volumes or demand-driven large-scale production.

Our expertise ranges from laser-cut prototypes to metal-to-plastic bonds and high-precision electrolamination stacks with a thickness of 0.1 to 1 millimeter – in-tool laminated, baked, welded, or bonded. Depending on the requirements, the sheet stacks are subjected to a heat-treatment process (tempering) in order to increase the efficiency of the electric motor.

Our comprehensive portfolio:

- ▶ Cost-benefit analyses
- ▶ Engineering
- ▶ Prototype manufacturing
- ▶ Product development
- ▶ Tool making
- ▶ High-volume production

The perfectly harmonized processes consistently meet the most stringent requirements and guarantee optimum results – with zero tolerance for errors. Feintool's vibrant culture of innovation creates the conditions that enable the company to cost-effectively manufacture even highly complex stacks.







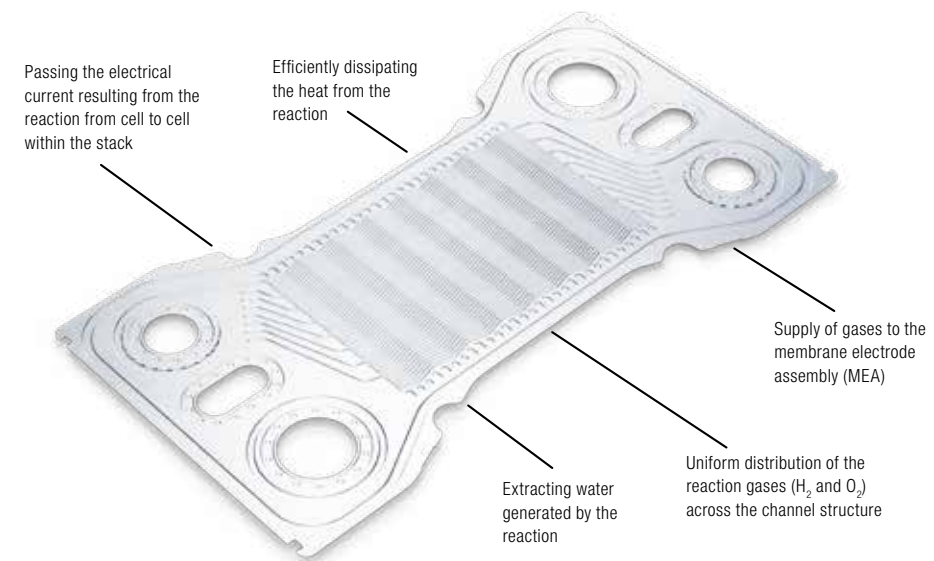
«A deep understanding of bipolar plate requirements coupled with extensive system engineering and tool making expertise: This is our recipe for success in achieving a new level of fuel cell drive efficiency.»

## FEINFORMING

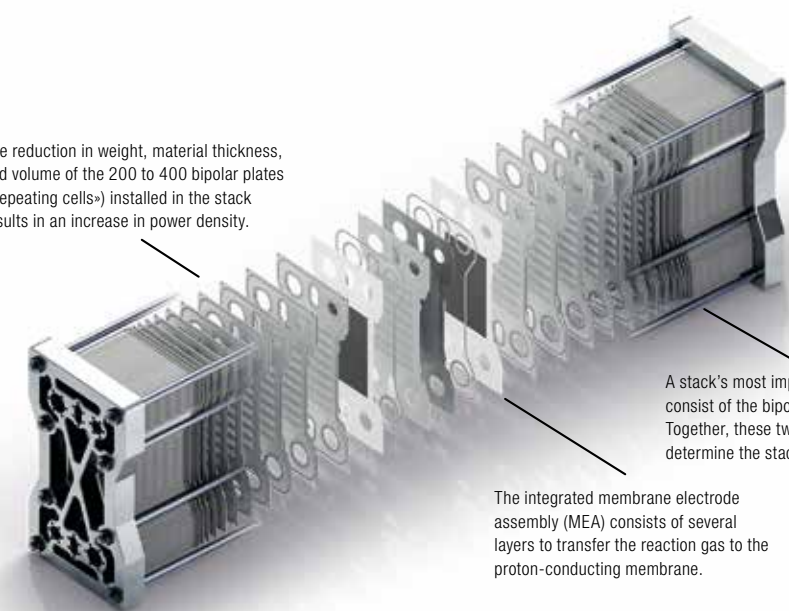
### Key technology for the production of bipolar plates

The bipolar plate is the core of the fuel cell. Where other manufacturing processes reach their limits, our key technology of «FEINforming» lays the foundation for a new level of fuel cell drive efficiency. High-precision machining of extremely thin materials enables the production of low-volume, low-weight bipolar plates. This results in increased power density in the

cell stack for long-range, compact vehicle drive systems. «FEINforming» – a combination of our core competencies of fineblanking and forming – delivers all the properties that are of key importance to the future viability of the bipolar plate. This is how we are supporting the transformation to sustainable e-mobility with cutting-edge press and process expertise.



The reduction in weight, material thickness, and volume of the 200 to 400 bipolar plates (=repeating cells-) installed in the stack results in an increase in power density.

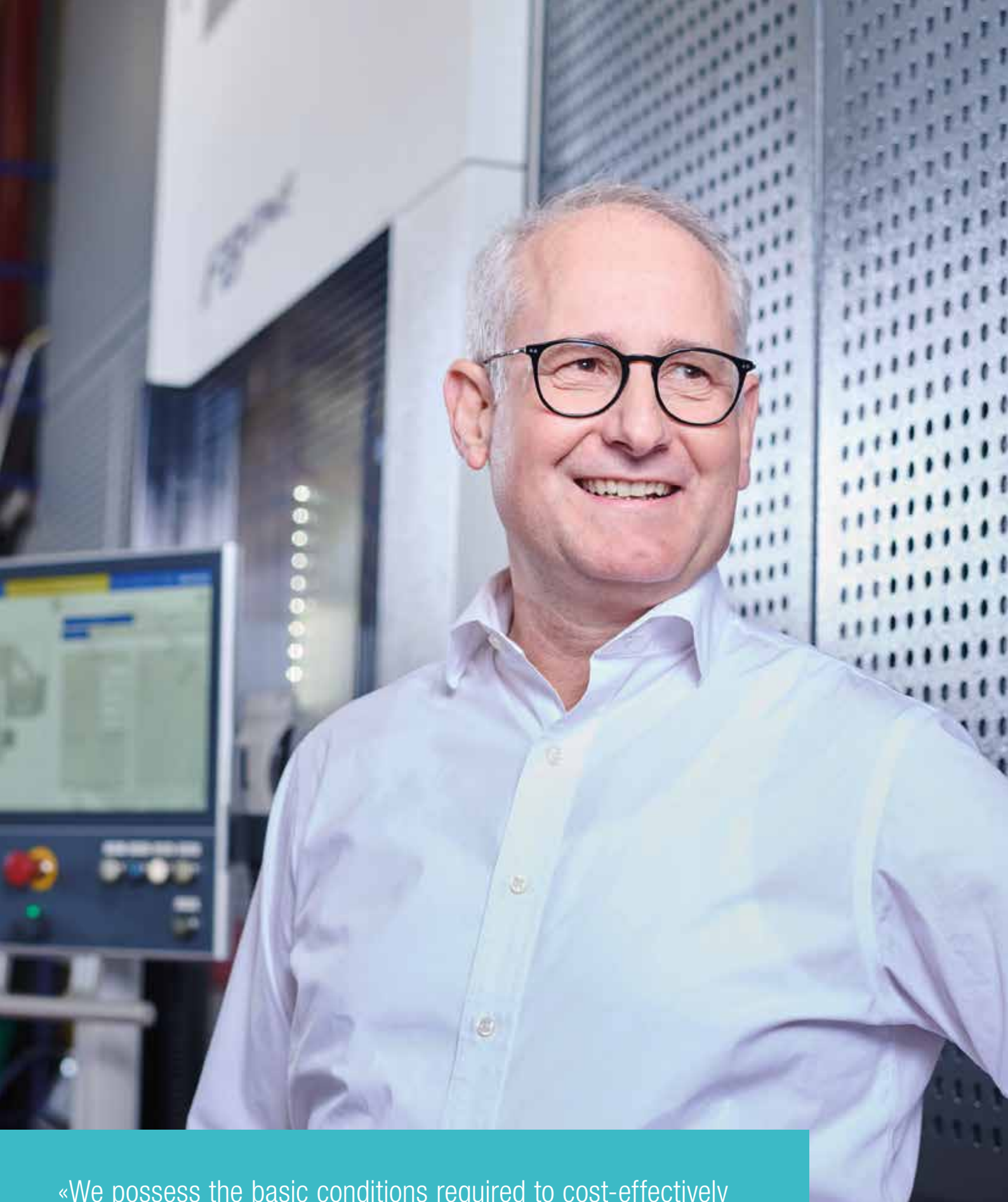


A stack's most important design elements consist of the bipolar plate and the MEA. Together, these two components largely determine the stack's performance.

The integrated membrane electrode assembly (MEA) consists of several layers to transfer the reaction gas to the proton-conducting membrane.

Depending on the car performance, a fuel cell stack can consist of several hundred bipolar plates.





«We possess the basic conditions required to cost-effectively manufacture components of variable technologies for e-mobility in scalable quantities.»



The FB one has taken hydraulics, design, control, and connectivity to a new level.

## FB ONE – MADE FOR E-MOBILITY

### A new dimension of fineblanking and FEINforming

The electrification of mobility means that production systems have to meet new requirements. The FB one series from Feintool marks a quantum leap in fineblanking technology. This press generation sets new standards in terms of performance,

energy efficiency, speed, and repeat accuracy. We get the opportunity to cut more precisely, all while using less energy. The FB one series is Feintool's technological answer to the challenges of the future.

#### Long-lasting cutting-edge technology for the production of sophisticated components:

- 1 Modular, flexible design allows it to be configured specifically for the production of bipolar plates
- 2 Dedicated tooling concept
- 3 Implementation of extremely small radii and minimal component tolerances
- 4 Perfect compatibility of tool and press
- 5 All-round improvement in performance
- 6 Long tool life
- 7 Up to 30 percent less energy consumption
- 8 Significantly lower production costs
- 9 Unmatched precision and rigidity

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