EKPO Fuel Cell Technologies GmbH

www.ekpo-fuelcell.com

EKPO develops and manufactures fuel cell stacks in large series. The company is backed by a strong pairing, as the joint venture was founded in 2020 by automotive suppliers ElringKlinger and OPmobility. As a component and system supplier, EKPO manufactures solutions for all types of vehicles. Whether on the road, rail, water, or off-road – EKPO's fuel cells power every engine with zero emissions.

INDUSTRY
Mechanical engineering

NUMBER OF EMPLOYEES
approx. 220

LOCATION
Dettingen an der Erms (Germany)

TRUMPF PRODUCTS

- TruFiber
- TruDisk
- TruLaser Cell
- TruMark
- TruMark Station

APPLICATIONS

- Laser welding
- Laser cutting
- Laser marking

Challenges

Bipolar plates are at the heart of every fuel cell, where their role is to connect, distribute, conduct and cool. Bipolar plates consist of two very thin metal plates that are welded together. They are etched with microfine channels – known as the flowfield – through which hydrogen and oxygen later flow. A coolant circulates between the two plates. Only when the connection is absolutely gas-tight does the chemical reaction in the fuel cell work safely and reliably. "If a single weld seam leaks, the whole stack is unusable," says Arno Bayer, Head of Industrial Engineering Joining at EKPO. With up to 400 plates per stack, every single seam counts – particularly as defects cannot be repaired afterwards.

"The bipolar plate is a mass-produced product, but it requires the utmost precision which is exactly what the TruFiber delivers."

ARNO BAYER
HEAD OF INDUSTRIAL ENGINEERING JOINING AT EKPO

Solutions

EKPO was seeking a laser welding solution that was precise, and fast, while retaining process reliability. "It was clear to us that we needed a laser that would work extremely precisely, but also do so reliably under industrial conditions – and TruFiber can do that," says Bayer. EKPO was particularly impressed by the combination of excellent beam quality and high process reliability. "Bipolar plates require a great deal of expertise. At the same time, they are also genuine mass-produced products, as we need up to 400 of them per fuel cell. And each plate has up to three metres of weld seams". EKPO manufactures around 10,000 stacks per year. So the fibre laser at the Dettingen site has to produce some 12,000 kilometres of weld seams annually – equivalent to a round trip between Hamburg and New York .

Implementation

In EKPO's automated production line, the laser beam connects the two sides of the bipolar plate to form a gas-tight unit – using weld seams with a maximum width of 0.2 millimetres. In this process, EKPO operates close to the "humping" speed limit, at which physical factors cause unwanted bead-like protrusions in the seam. The fibre laser handles this effortlessly, and consistently delivers high-quality results, with a reject rate of well below one percent. The welding process is followed by a rigorous conductivity and leak test at up to two bar pressure. If the weld seams hold up, the bipolar plate is ready for the stack.

Forecast

"We are seeing growing demand for fuel cells with high performance combined with greater efficiency and longer service life," says Bayer. "Marine and rail applications, heavy-duty trucks on the road and construction site vehicles are on the rise." EKPO is responding to this development with its new NM20 stack. It achieves electrical outputs of up to 400 kilowatts, making fuel cell technology competitive in other areas too.

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