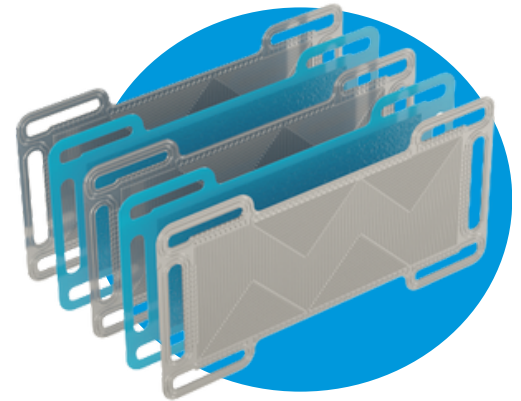


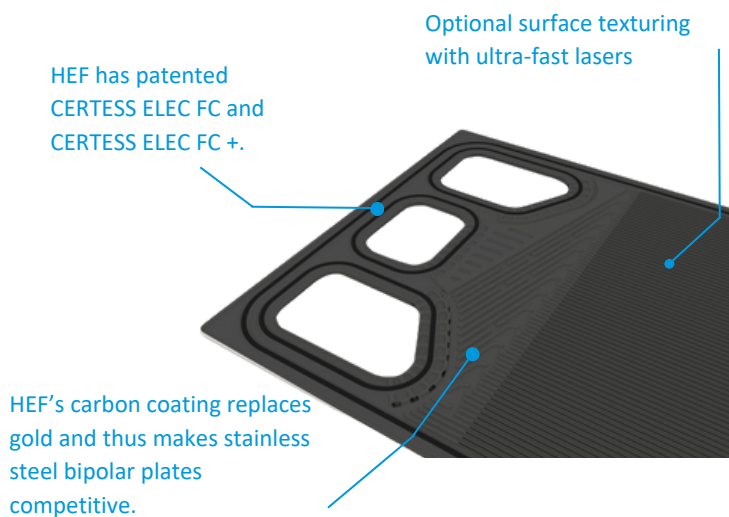


HEF leverages its expertise in surface materials engineering for the hydrogen value chain. With more than 50 years of PVD experience, HEF develops unique and resilient carbon coatings for bipolar metal plates, One of the main components of proton exchange membrane fuel cells (PEMFCs).

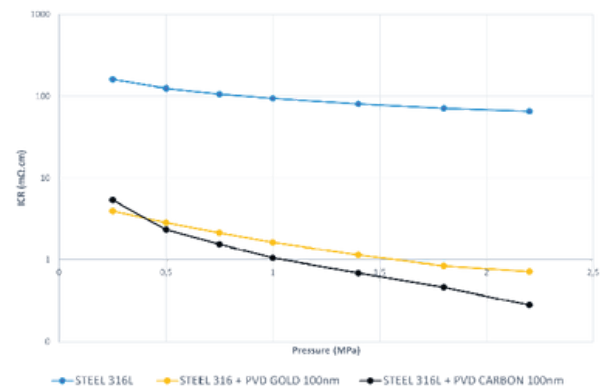


### | HEF – innovative partner with coatings for hydrogen energy

By applying a protective coating on the surface of the plates corrosion is prevented and optimum electrical conductivity is ensured for operating times of several thousand hours. PVD treatment is a tried-and-tested solution that offers extremely dense coatings with low levels of contamination.



### Interface contact resistance (ICR)



	Certess ELEC FC	Certess ELEC FC+
Corrosion, cathode (1,0V vs NHE at 80°C) 24H	<1 μA/cm <sup>2</sup>	<1 μA/cm <sup>2</sup>
Interface Contact Resistance after treatment	<5 mΩ.cm <sup>2</sup>	<5 mΩ.cm <sup>2</sup>
Interface contact resistance after 24h (1.0V vs NHE at 80°C)	<10 mΩ.cm <sup>2</sup>	<10 mΩ.cm <sup>2</sup>
Durability in extreme conditions (1.6V vs NHE at 80°C) 24H	≈ 2h	≈ 20h

## | State-of-the-art industrial equipment

HEF's industrialisation teams have developed an automated, in-line, high-output, processing machine based on our validated coating process. This robust, high-performance machine is designed to meet the challenges of hydrogen production, and at the same time optimise costs and materials.

Our first plant was commissioned in France in response to our customers' increasing requirements for coatings applied on hydrogen equipment.



### Performance

HEF develops coatings that guarantee electrical conductivity, corrosion resistance and durability of the parts in the vicinity of these coatings.



### Environment

HEF lessens the environmental footprint of systems by reducing the use of precious metals and by offering alternative solutions in their place.



### Economically competitive

A coating machine for hydrogen energy combines high productivity and economic competitiveness



### Customised solutions

For 5 years, the HEF R&D organisation has been commuted to offering its partners unique, made-to-measure solutions.