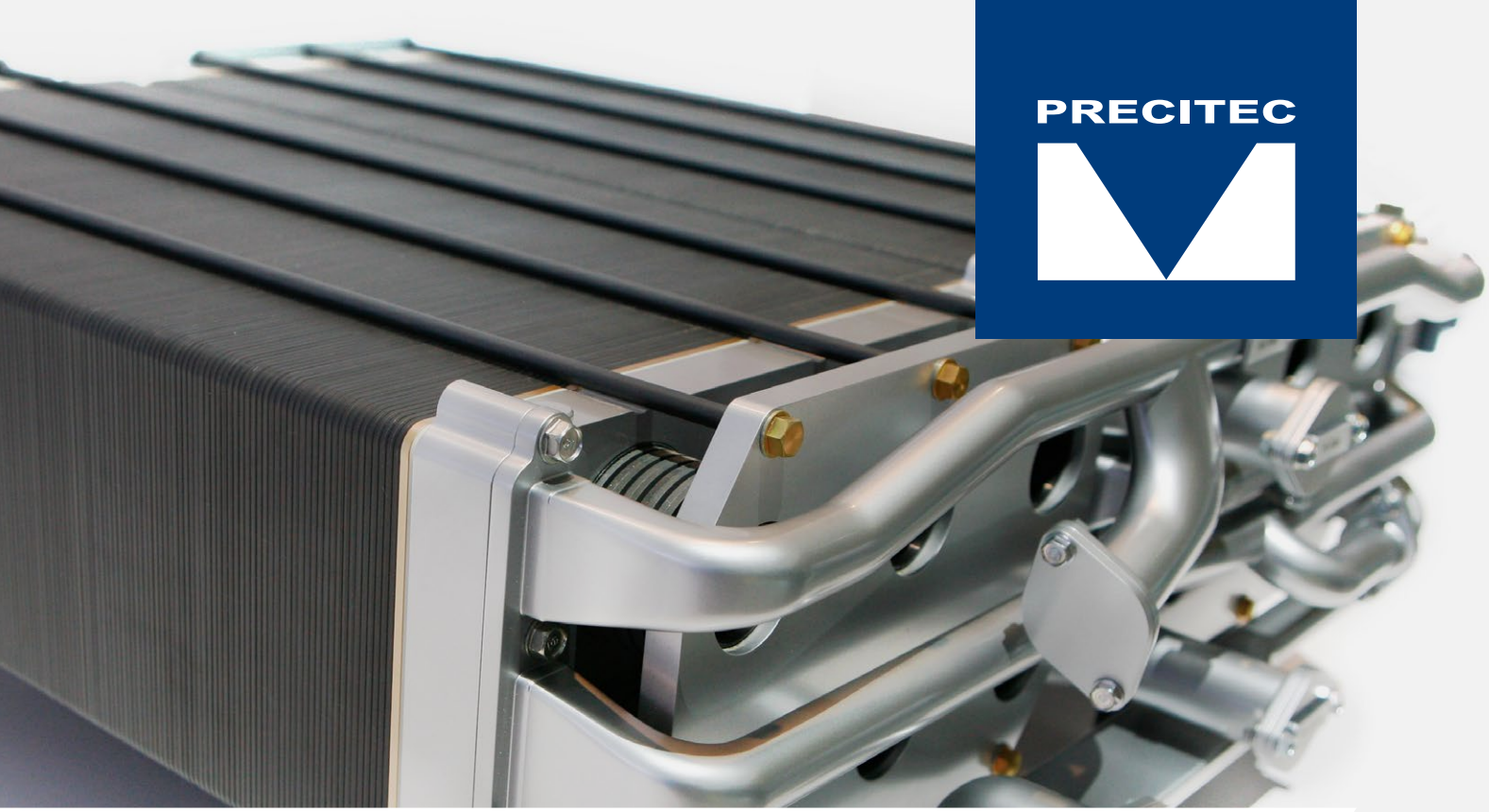


CONTROLLING THE THICKNESS OF COATINGS ON BIPOLAR PLATES IN FUEL CELLS

Precise monitoring and control of layer thickness via laser photothermal technology

Quickly, precisely and non-destructively measuring coatings deposited on bipolar plates in fuel cells and electrolyzers is still a challenging task for existing sensor technologies. Precitec now offers a breakthrough technology for this through Enovasense laser photothermal sensors.

In the fuel cell and electrolyzer industries bipolar plates are covered with various coatings, e.g. for converting hydrogen to an electrical current or for hydrogen generation. Those layers enable critical functions such as electrode conduction (e.g. silver or nickel), electrocatalyst function (e.g. platinum or carbon), corrosion resistance (e.g. chromium or titanium), sealing, water management or contact resistance reduction. Controlling the thickness of coatings on bipolar plates in fuel cells is critical to achieving uniformity, optimizing electrochemical performance, managing gas or water distribution, minimizing contact resistance, and ensuring manufacturing consistency. It directly impacts the functionality, efficiency, and reliability of a fuel cell system.

HKL 2 control station

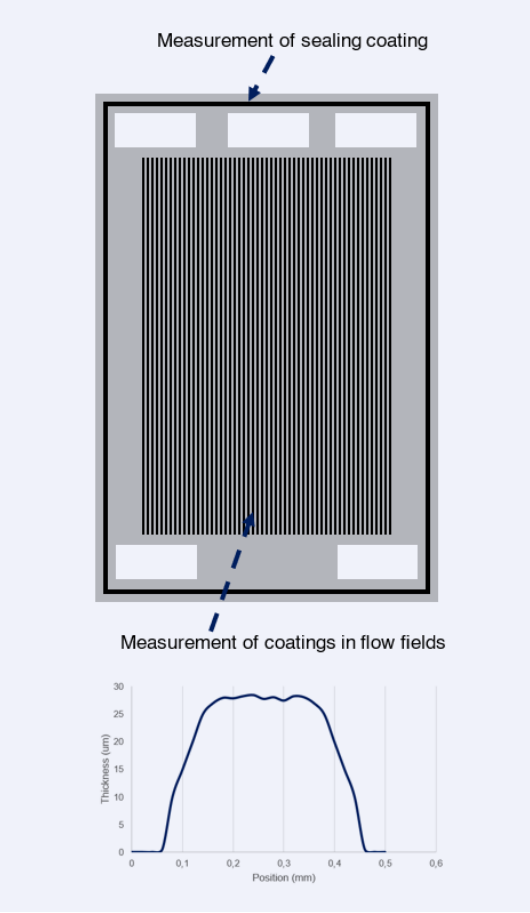
PRECITEC ENOVASENSE TECHNOLOGY

The laser photothermal technology Precitec Enovasense offers is a unique new proposition for fuel cell and electrolyzer applications. This technology allows non-contact, non-destructive, non-intrusive, non-radiative, fast, repeatable and easy-to-integrate measurements, which enables easy in-line and at-line measurement integration with a cost-effective positioning.

IN-LINE OR AT-LINE MEASUREMENT

Precitec Enovasense sensor technology can measure fuel cell coatings with an outstanding level of precision. RMS repeatability levels as low as 0.1µm can be obtained on a typical 10µm thick layer.
Carbon-based layers deposited in thin-width fuel cell flow fields can be measured using the small 0.3mm laser spot size – just one of many examples. Measurement of anti-corrosion and conductive nickel metallization layers of 10-200µm on electrolysis fuel cells is also validated. Moreover, the technology is capable of measuring sealing bands coated on the edges of a bipolar plate.
The sensor head can easily be integrated into a production process thanks to its ultra-compact dimensions and low weight (as little as 150g), its high distance (±10mm) and angle (±50°) tolerance, and its independence of part geometry, vibrations and temperature. The measurement data are automatically stored and archived, and data streamed live to the line controller.

The sensor can also be embedded in the fully automated 3-axis HKL 2 control station for at-line measurements. Pre-programmed cycles and positioning algorithms in this control station enable very tiny areas such as the flow fields to be inspected. Moreover, a full mapping of a part can be achieved automatically through a simple interface for development or a process setup.



Organic coatings can be measured in very thin flow fields and sealing layers.

HOW YOU BENEFIT

- Improved quality process thanks to great repeatability
- Compact and lightweighted – easy to measure coating thickness in-line
- Expertise for your parts thanks to fast and high-resolution coating thickness scanning

PARTNERING WITH YOU

Enovasense is an innovative French company and a member of the Precitec Optronik Group, a German manufacturer of highly innovative sensors and optical probes. The Enovasense® product line sets the standard in contact-free layer thickness measurements. Enovasense and Precitec products deliver in-process, in-line and offline measurements of the highest precision on all materials and measurement ranges from nano- to millimeters.

Precitec 3D Metrology – measure more precisely with light
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