



PVD EQUIPMENT & PRETREATMENT SYSTEMS

for Hydrogen Applications,
e.g. Bipolar Plates &
Electrolyzers

SINGULUS 

High Volume Production Systems

for Advanced PVD Processing & Pretreatment Systems for Successful Manufacturing of Bipolar Plates for Fuel Cells and Electrolyzers

Introduction Hydrogen

To combat climate change and reduce reliance on fossil fuels, the energy sector is turning to green hydrogen as a game changer. Green hydrogen holds immense potential across industries, particularly in electrolysis, transportation, and electricity generation. Key to a carbon-neutral hydrogen-based energy industry are fuel cells and electrolyzers. Electrolyzers generate hydrogen efficiently, with "Proton Exchange Membrane" (PEM electrolysis) being the preferred method for producing high-purity green hydrogen from water and electricity, generated from renewable energy resources. Fuel cells, in turn, convert hydrogen and oxygen into electric energy and water, driving emissions-free transportation and energy production. Within fuel cells, coated bipolar plates (BPP) are vital components, poised to fuel the growth of clean energy solutions.

GENERIS PVD

STREAMLINED PVD PROCESSING SYSTEM FOR EFFICIENT BIPOLAR PLATES FOR FUEL CELLS AND ELECTROLYZER PRODUCTION

SINGULUS TECHNOLOGIES presents an efficient solution for manufacturers in the fuel cell and PEM electrolysis industries. Our innovative PVD sputtering technology allows cost-effective production using lightweight sheet metal plates coated with an affordable protective layer that meets all necessary requirements. The GENERIS PVD machines from SINGULUS TECHNOLOGIES are modular, scalable systems designed to cater to various applications, from research to large-scale production. Our inline process efficiently transports substrates through the GENERIS PVD chambers, enabling dual-sided coatings with precision.

TYPICAL PERFORMANCE CHARACTERISTICS

- » Parallel processing of several substrates, different substrate sizes possible
- » Modular configuration, manual or semi-automated lab versions on request
- » Low cost of ownership and high uptime
- » Efficient substrate pretreatment
- » Substrate heating before and during the deposition process
- » Dual side sputtering
- » Sputter sequence configurable
- » Rotatable cylindrical magnetrons for highest utilization of target material

GENERIS 750 S

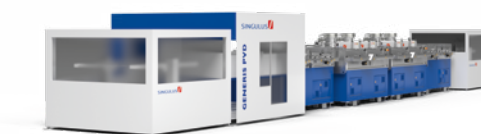


Low Throughput

Deposition Area: approx. 510 x 1500 mm

Transport Mode: Multipass Inline, Single/Double Ended

GENERIS 1250 M

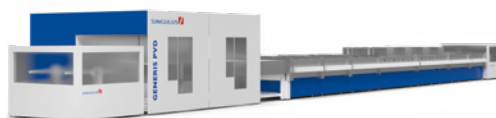


High Throughput

Deposition Area: approx. 850 x 1000 mm

Transport Mode: Inline, Double Ended

GENERIS 1800 L



Ultra High Throughput

Deposition Area: approx. 1400 x 1600 mm

Transport Mode: Inline, Double Ended



CONDISYS BPP

PRETREATMENT AND CONDITIONING SYSTEM FOR BIPOLAR PLATES

When addressing the surface treatment demands in hydrogen technology, SINGULUS TECHNOLOGIES excels with the pretreatment system CONDISYS BPP, a reliable and field-tested solution. This modular system can be custom-tailored to meet the specific needs of each customer, ensuring unparalleled reliability and precision in its operations. A key advantage is its ability to deliver consistently prepared substrates, regardless of the quality variations in the incoming materials. This consistency guarantees uniform conditions for follow-up processes, thereby enhancing the performance of the final product.

SINGULUS TECHNOLOGIES stands at the forefront of cutting-edge solutions in wet processing, catering to the demands of high-efficiency applications across various industries. With a focus on innovation and versatility, our modular wet processing systems are engineered to deliver a diverse range of process options, ensuring adaptability to evolving technological needs.

Our machine concept embodies a commitment to meeting both present and future requirements of capacity, flexibility, and reliability, making it an ideal choice for mass production environments. By leveraging advanced engineering and design principles, we provide solutions that not only meet industry standards but also anticipate and exceed the expectations of our customers.



In sectors such as Solar, Medical Technology, Semiconductor, Hydrogen and beyond, where stringent surface treatment requirements are paramount, SINGULUS TECHNOLOGIES emerges as a trusted partner. Our wet processing systems have garnered a reputation for reliability and market-proven performance, offering a process guarantee tailored to the unique needs of each customer application.

SYSTEM DESCRIPTION AND FEATURES

- » Dedicated pretreatment sequences for subsequent deposition processes
- » Matched throughput and substrate condition for vacuum deposition machine platforms and other post processes
- » Compatible for different substrates sizes and materials
- » Focus on low OPEX costs
- » High uptime with maintenance friendly access to installation area
- » Advanced process control by onboard data tracking
- » Wide range of optional features to support and adapt the pretreatment process



CONDISYS BPP
Pretreatment and Conditioning System for Bipolar Plates



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THIN FILM
DEPOSITION

SURFACE
ENGINEERING

THERMAL
PROCESSING

WET
CHEMICAL

SINGULUS TECHNOLOGIES - Thin-Film Coating and Surface Treatment

SINGULUS TECHNOLOGIES develops and assembles innovative machines and systems for efficient thin-film coating and surface treatment processes, which are used worldwide in the Photovoltaics, Semiconductor, Medical Technology, Packaging, Glass & Automotive as well as Battery & Hydrogen markets.

The company's core competencies include various processes of coating technology (PVD sputtering, PECVD, evaporation), surface treatment as well as wet-chemical and thermal production processes.

SINGULUS TECHNOLOGIES sees sustainability as an opportunity to position itself with innovative products. In the focus are environmental awareness, efficient use of resources and avoidance of unnecessary CO₂ pollution.

SINGULUS TECHNOLOGIES attaches great importance to responsible and sustainable corporate governance.