



BOSCH In-line Coating System

Hydrogen Energy Coating Solutions

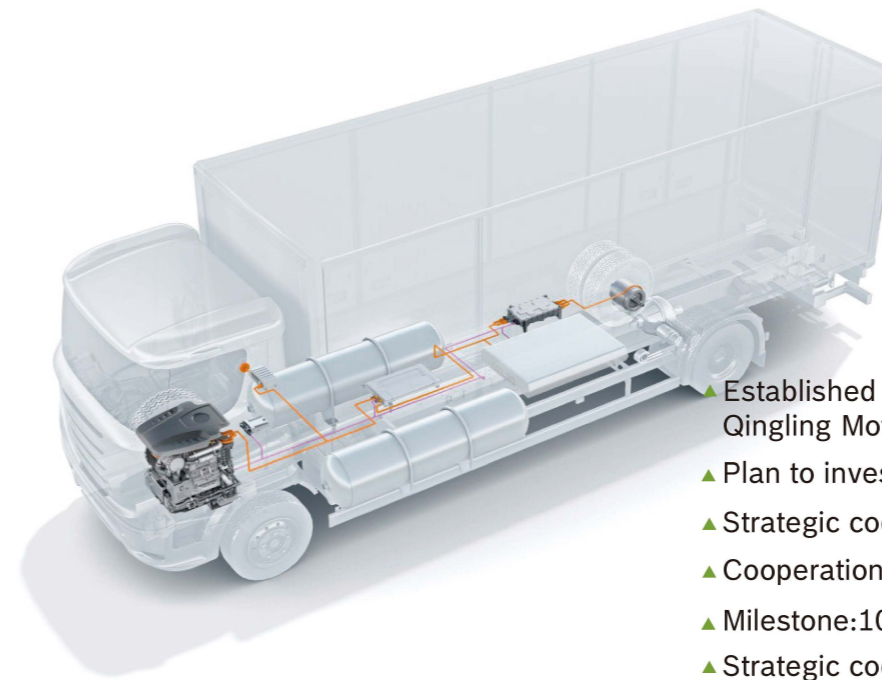
Bosch Hydrogen Path

– Leading Automotive Industry toward Carbon Neutrality

Bosch has put in place a dual strategy in its efforts around carbon neutrality. On the one hand, the Bosch Group is the first global industrial enterprise to achieve climate neutrality with its over 400 locations worldwide already in 2020. On the one hand, as a technology and

service provider, Bosch aims to take leading role in establishment of a hydrogen economy and providing corresponding products to partners and customers.

Coating solutions to enhance corrosion resistance of bipolar plates used in fuel cells and electrolyzers are one of those technologies offered by Bosch.



- ▲ Established Bosch Hydrogen Power System (Chongqing) Co., Ltd. with Qingling Motors
- ▲ Plan to invest 1 billion euros in fuel cell technology by 2024
- ▲ Strategic cooperation with FAW Jiefang Automotive Company
- ▲ Cooperation with OMB Saleri in Hydrogen fuel supply system
- ▲ Milestone: 100 small SOFC power plants in operation in EU
- ▲ Strategic cooperation with Weifu Group for carbon neutrality projects
- ▲ Established a joint venture “stack JV” with Weichai and Ceres Power

2021

- ▲ Cooperation with Nikola Motor Company in hydrogen powertrain system for heavy trucks
- ▲ Strategic cooperation with Chinese automaker Weichai

2017

- ▲ Cooperation with Powercell Sweden AB, official enter hydrogen Automotive market
- ▲ German start to pilot SOFC power station
- ▲ Bosch found Fuel Cell Center in China

2019

2020

- ▲ Planned to start Full-scale production of distributed smallscale power stations based on SOFC technology in 2024
- ▲ Join the EU H2Haul project

2022

- ▲ Develop the advanced tank valve and high-pressure regulator technology for the Hydrogen storage system in FlatHyStor Project
- ▲ Won "2022 Discovery Trust - New Energy Power Innovation Award" in China

2003

- ▲ The first FC test stand

2018

- ▲ Cooperation with Ceres Power, UK, codevelop SOFC application

BOSCH Inline Coating System

– Design For High Demand

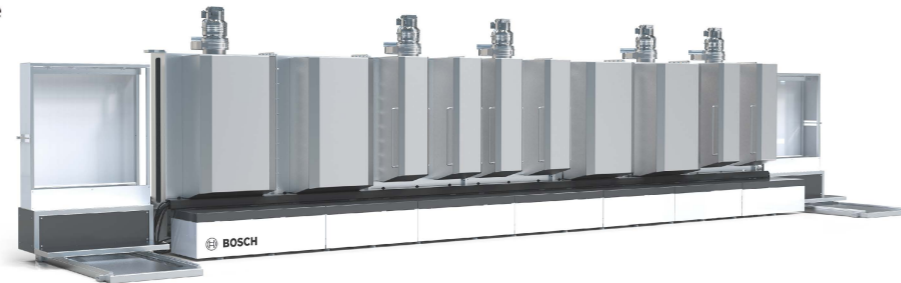
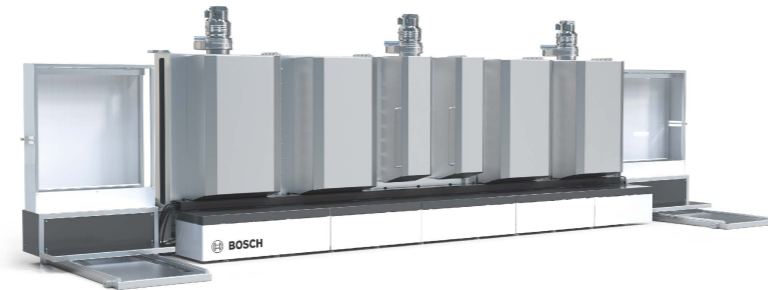
Bosch is a leading coating equipment supplier and also the end-user, our experts have dedicated over 30 years to the development of high-end plasma systems to overcome technical challenges in industry.

Double-sides coating for stainless steel bipolar plates (BPP) was developed. Currently the corrosion resistance and electrical conductivity of the coated BPP have been significantly improved, meeting ICR and ICORR required by the DOE in 2020.

Bosch Coating launches Single-chamber Inline Machine and Continuous Inline Coating System to fulfill customer needs from development to mass production.

Already in the early R&D and production stage, Development / Small volume Inline Machine (H₂-μPower 100) is equipped with a linear conveying system, ensuring the same uniform and dense film deposition, which is offered by the larger continuous inline machines.

Continuous Inline Coating System (H₂-μPower 500/1000 series) is designed for high volume mass-production. The multi-chamber deposition concept can easily achieve a multi-layer coating structure with better protection effect. It can effectively break the bottleneck for both performance and production cost of BPP in the near future and provide practical and effective solutions for the industrial production of BPP.



Development / Small volume Inline Machine



Bipolar Plate Multi-layer Structure Coating

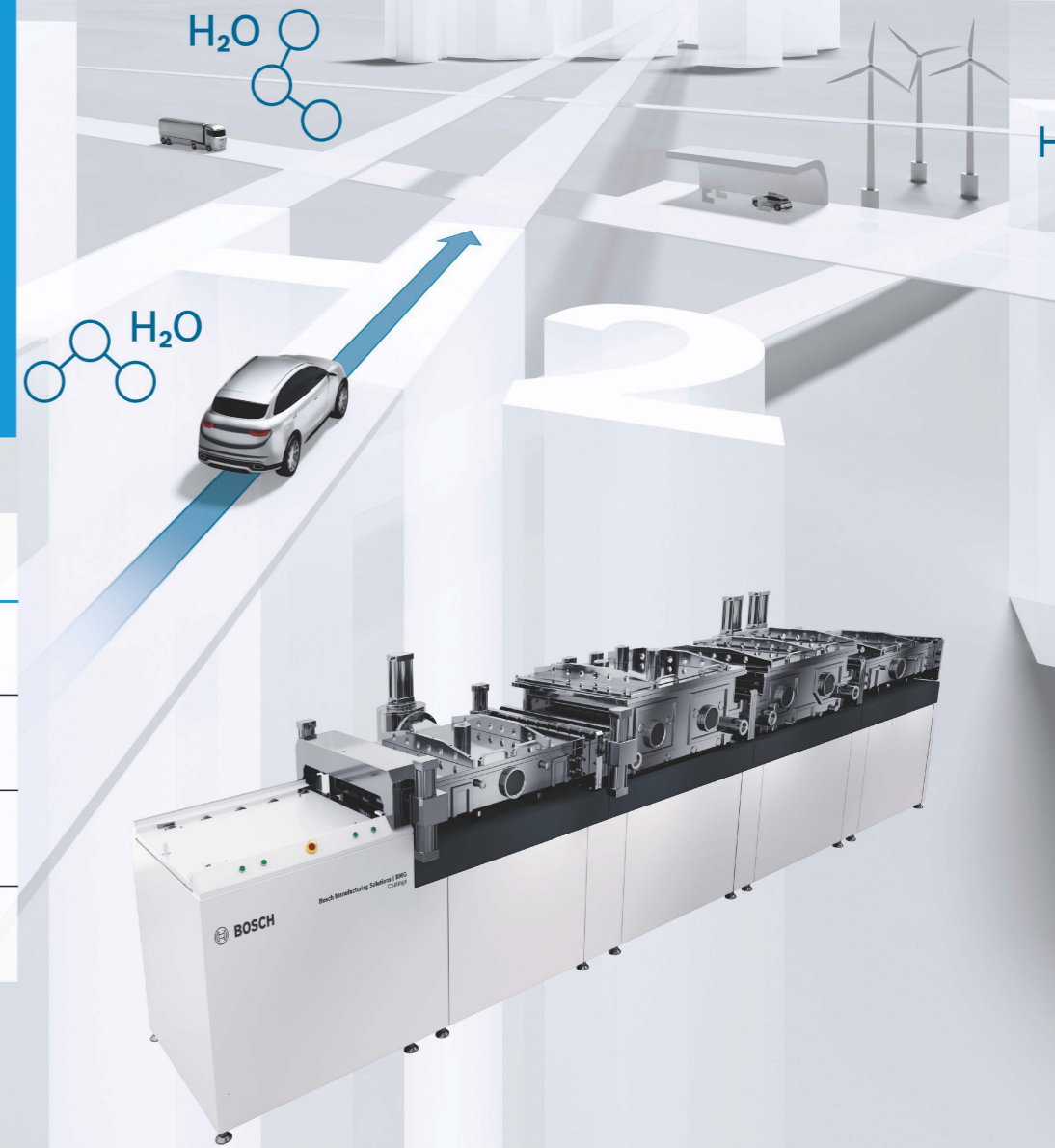


Low Machine Cost



Established Technology in Semiconductor Industry

Series	H ₂ -μPower 100
Quantity per Carrier	5 pcs
Coating Area	900mmx800mm
Machine Space	8mx4m
Annual Output	1 mio pcs



BOSCH Inline Coating System

– Design for Growing Demand









Series	H ₂ -µPower 100	H ₂ -µPower 500	H ₂ -µPower 1000
Coating Cycle Time	< 20 s	< 4 s	< 2 s
Quantity per Carrier	5 pcs	20 pcs	20 pcs
Coating Area	900mmx800mm	2200mmx1000mm	2200mmx1000mm
Machine Space	8mx4m	14mx4m	24mx4m
Annual Output	1 mio pcs	5 mio pcs	10 mio pcs

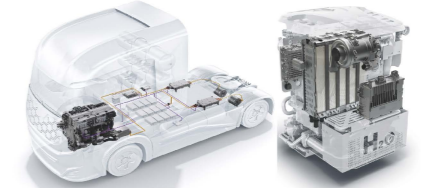
Scalable inline coating system

-  Multilayer Better Protection
-  Low Coating Cycle
-  Minimized Cost
-  Scalable as Demand Increase



Bosch Plasma Technology Coating Applications @ BOSCH

Electrolyser	 Bipolar plate coated with noble metals (gold platinum)  Corrosion protection for long-lifetime and low contact resistance
Fuel Cell	 Bipolar plate coated for corrosion resistance and electrical conductivity  Corrosion protection and cost-efficiency for high demands
Hydrogen Barrier Coatings	 Prevention of hydrogen from easy diffusion to avoid leakage or embrittlement  Dense heavy metal or ceramic coatings on various geometries
Wafer type part	 Large scale coating for metal sheets or flat parts  Functional/decorative coatings, high output, low unit cost



Our offer



Coating equipment

From a desktop system for fast sampling up to large batch coating systems we offer a wide spectrum of machines, which is also used worldwide in production plants of the Bosch group.



IOT – automation and connected industry

Tailored solutions for handling and testing steps. Innovative concepts for connected industry allow a fully connected process flow.



Turn Key Solutions

Based on know how from our own production we support the setup of your production location or provide consulting for optimization.



Services

By providing support to our Bosch coating centers throughout the world we built a competent team of machine, software and process experts, our team is available to provide individual support for your needs.



Process development

Our team of development engineers and physicists with long term experience in plasma coating is ready to take over targeted development projects or support your own experts with our know-how.



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