



## 13.12.2015 How Dana's unique metallic bipolar plate technology helps enable the commercialization of fuel-cell powertrains

To meet global emissions standards, vehicle manufacturers are increasingly looking to fuel-cell powered vehicles. However, engineers face numerous challenges that must be overcome to make fuel-cell vehicles viable, including performance, product life, and cost.

With the release of the Hyundai Tucson Fuel Cell and Toyota Mirai, and with other leading automakers working to introduce fuel-cell vehicles to market, the need for high-volume fuel-cell manufacturing is growing.

To supply enough power for a vehicle, multiple individual fuel cells must be assembled into a fuel-cell stack. Bipolar plates – which distribute fuel, air, and coolant to each of the catalyst-coated membrane cells – are a critical component in any fuel-cell stack.

By improving manufacturability, sealing and durability, Dana's metallic bipolar plates help make the commercialization of fuel-cell powertrains possible.

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“Only Dana offers customers a complete integrated solution, and that’s what makes our product so valuable,” said Dana Power Technologies Group President Dwayne Matthews. “Automotive manufacturers require customized solutions, and Dana alone has the design and manufacturing capabilities to quickly bring fuel-cell solutions to market.”

Each repeating cell in a fuel-stack engine is made of a bipolar plate and a membrane electrode assembly. The bipolar plates are laser-welded assemblies that combine flow-field channels for gas distribution, as well as internal coolant passages. Features of Dana’s bipolar plate also include proprietary conductive coatings and combined seals.

Dana’s ultra-thin bipolar plates with durable conductive coatings provide best-in-class power density and a long life span. Plus, Dana’s patented integrated sealing technology features a flexible bead structure able to seal under light compression loading, which is critical to stack assembly reliability.

Over the past 15 years, Dana has been developing its metallic bipolar plate technology to meet the stringent power density, durability, and cost requirements of fuel-cell stack integrators. The company was one of the first to launch serial production of its metallic bipolar plates,

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which are cost-effectively produced to scale in Neu-Ulm, Germany. Dana has robust production processes in operation, which can be scaled to produce automotive-quality parts in large quantities.

The company's contributions to fuel-cell commercialization are being demonstrated to the world via the European Union's co-funded Auto-Stack CORE project. Launched in 2013, Dana has partnered with a coalition of 14 organizations – including BMW and Volvo, along with fuel stack integration supply industries and research institutions – to develop best-in-class automotive hardware for fuel-cell vehicles, including a powerful 95kW fuel-cell stack.

Dana's bipolar plate expertise is enabling the process to be cost-effective for production volumes. With unprecedented gains demonstrated in power density, performance, and durability, Phase 1 of the project has achieved its objectives.

"Another manufacturer may be able to perform stamping or joining, but only Dana's bipolar plates represent a cost-effective and complete product solution," said Matthews. "We provide customers with a high-quality Dana standard product – with integrated coating, sealing, and design features – that is then customized to solve a specific engineering challenge."

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By offering a cost-effective bipolar plate product that meets all customer requirements, Dana is helping to develop the growing global fuel-cell industry.



Leveraging Dana's plate, sealing, and coating expertise, the company's metallic bipolar plate technology represents an integrated solution that enables an efficient and cost-competitive product.

Dana's metallic bipolar plates have helped the Auto-Stack CORE network develop a cost-effective fuel-cell stack that achieves improved power density and performance.



Contents from site: <https://www.reinz.com/EN/NEWS/Press-News.aspx?conseq=1895>

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