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Hydrogen Instead of Diesel

Freudenberg and ZF Friedrichshafen AG are joining forces to develop a fuel cell-based drive system for heavy-duty commercial vehicles

Weinheim/Munich, September 15, 2022. Technology supplier Freudenberg and ZF Friedrichshafen AG have signed a long-term strategic agreement for the development of a hybrid fuel cell/battery drive system for trucks and coaches that is sustainable and emission-free. The first prototype vehicles are expected to hit the roads by 2023 at the latest, using a high-performance fuel cell/battery system that completely replaces conventional diesel drives. The start of series production is scheduled shortly thereafter.

Saying goodbye to conventional diesel trucks – and the sooner, the better: The transport industry is under political pressure to meet obligatory targets for climate protection. Vehicle manufacturers and suppliers have already initiated numerous innovative concepts in their transition to CO_2 emission-free freight traffic on the roads. In 2021, Freudenberg and ZF Friedrichshafen AG had already started the “HyFleet” research project to develop a fuel cell drive for new long-distance bus platforms. Now both companies are intensifying their efforts and combining their skills for the long term as well. The goal is to develop a highly integrated hybrid fuel cell/battery drive system and the balance-of-plant (BoP) components that are critical for its functioning, specifically for heavy-duty commercial vehicles. This will initially focus on truck & bus applications, but later it can also be extended to rail and special vehicle systems – such as construction and agricultural vehicles – as well as to marine applications.

"We are investing heavily in the mobility of the future. In battery, hydrogen and fuel cell technology as well as in the development of high-tech components for electric vehicles. The long-term cooperation with ZF agreed-upon today underscores the strategic importance and growth potential that we at Freudenberg see in this sector," explained Dr. Mohsen Sohi, CEO of the Freudenberg Group.

“Freudenberg and ZF are longstanding, experienced players in the industry and have complementary technology know-how,” adds Dr. Max Kley, CEO of Freudenberg e-Power Systems. “Through our cooperation, we’re bundling this experience to develop clean e-drive solutions and thus provide targeted support to the industry in achieving its climate goals.”

The joint development of hybrid fuel cell/battery systems by Freudenberg and ZF contributes to an innovation-driven field with high relevance for all heavy-duty applications.

“Decarbonization is a major aim of the transport industry, and within this, fuel cell technology will be a game changer. Together with Freudenberg, we can offer a ‘one-stop-shop' solution enabling manufacturers to quickly bring e-mobility solutions to market and supporting the industry's transformation towards a more sustainable future,” said Wilhelm Rehm, ZF Board Member with responsibility for Commercial Vehicle Solutions, Industrial Technology and Materials Management. “ZF’s cooperation with Freudenberg will develop highly integrated fuel cell e-drive solutions for the commercial vehicle industry. By reducing manufacturers’ development and project costs, our powerpack solutions will also help to lower the Total Cost of Ownership.”

With its fuel cell system, Freudenberg e-Power Systems relies on a modular approach that can accommodate different performance categories depending on customer and application requirements while also offering simple vehicle integration (plug&play). The focus of the development is on the lifetime and efficiency of the individual components and the respective subsystems.

The fuel cell systems on the market today were originally created for passenger cars and the corresponding load profiles. For heavy-duty applications, however, all aspects of the system must be designed for a long service life and the highest possible system efficiency. While passenger cars run for about 8,000 hours during the vehicle lifetime, trucks spend at least 35,000 hours on the road. In addition, it is particularly important to achieve the highest possible overall system efficiency – at nominal load and taking into account the BoP’s

energy requirement, Freudenberg's fuel cell experts are striving for an overall efficiency of an industry-leading 50 percent. After all, high efficiency of the entire powertrain leads to less fuel consumption, which in turn reduces the total cost of ownership.

"Our goal is to design the fuel cell battery drive system for a long service life and real-world heavy-duty profiles. This ensures that our customers benefit not only from a sustainable, emission-free solution in heavy-duty transport, it also pays off economically for them throughout the lifetime of the systems," says Dr. Kley.

When it comes to battery and fuel cell systems, Freudenberg has a depth of value creation that is unique in the industry: The in-house production of gas diffusion layers, permeation-optimized sealing materials and catalysts forms the basis for a fully integrated membrane-electrode assembly (MEA) and is the starting point for the commercial and technical competitive edge of the truck fuel cell.

"We have the complete technological understanding of the functionally critical components in-house, ranging from the raw material to the finished system," notes Kley. "The combination of our comprehensive fuel cell expertise and our over 25 years of experience in the large-scale industrialization of the essential components enables us to play a key role in shaping the development of an entire industry in the direction of emission-free mobility."

Since 2018, Freudenberg has already launched various cooperation projects with renowned partners to develop fuel cell systems for heavy-duty applications. Among other things, the company is a technology partner in the "Pa-X-ell2" project. The goal is to develop a new generation of fuel cells to be used for passenger ships on the open seas. In addition to Meyer Werft, the project consortium includes Lürssen Werft, the classification society DNV GL, the German Aerospace Center, AIDA Cruises represented by Carnival Maritime GmbH, besecke and EPEA GmbH.

Freudenberg also has many years of experience with battery systems in the heavy-duty sector and is among the market leaders in its target segments. Well over 60 million kilometers driven with Freudenberg's battery systems illustrate

this success. Longevity and low total cost of ownership of the systems over their lifetime are top priorities here as well. Its competence and innovative strength in both fuel cell and battery technologies distinguish Freudenberg e-Power Systems as a pioneer of electromobility in the heavy-duty sector.

Image 1: Freudenberg and ZF are jointly developing sustainable, fuel cell-based drive systems for heavy-duty commercial vehicles.

Image 2: Designed for long service life and highest possible system efficiency: Freudenberg fuel cells are tailored to heavy-duty applications right from the start.

Images: Freudenberg/ZF

About Freudenberg e-Power Systems

Freudenberg e-Power Systems is one of the world's leading suppliers of emission-neutral energy systems for heavy-duty applications. With its experience and expertise in battery and fuel cell technology, the company offers tailor-made solutions, in particular combined systems, for sustainable and economical e-mobility. With over 700 employees, Freudenberg e-Power Systems supports its customers from application development through to production, commissioning and service.

The company is part of the global Freudenberg Group, which has four business areas: Seals and Vibration Control Technology, Nonwovens and Filtration, Household Products as well as Specialties and Others. In 2021 the Group generated sales of more than 10 billion euros and employed more than 50,000 associates in around 60 countries. More information is available at www.freudenberg.com.

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