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At ACT Expo, Bosch showcases support for hydrogen economy across the lifecycle

Powertrain expertise yields solutions for hydrogen engines and mobile fuel cells

- Hydrogen engines are based on proven technology as 90 percent of existing development and manufacturing technologies can be reutilized
- Southwest Research Institute Class 8 heavy-duty vehicle with hydrogen engine being shown at ACT Expo supported by Bosch and others in industry
- Bosch offers customers options in mobile fuel cells with components and systems
- Full range of solutions supports areas including service, re-fueling and hydrogen production

LAS VEGAS - Bosch is committed to the advancement of hydrogen, providing solutions for multiple technologies along the entire hydrogen value chain. The provider of technology and services offers an expanding range of components for both mobile fuel cells and hydrogen engines to optimize engine performance. It also is developing cryopump technology to support faster re-fueling times and electrolyzer technology for the production of hydrogen. Bosch has reaffirmed its business expectations in the growth area of hydrogen: by 2030, its sales with hydrogen technology could reach nearly $5.5 billion globally. In 2023, Bosch invested around $530 million (500 million euros) globally in the development and manufacturing of its hydrogen technologies and plans to invest around the same amount in 2024.

At the 2024 Advanced Clean Transportation (ACT) Expo in Las Vegas May 20-23, Bosch will showcase key elements of its hydrogen portfolio in Booth #1444.

“Hydrogen is a key tool on the path to reducing emissions and developing alternate propulsion options,” said Paul Thomas, president of Mobility, Americas for Bosch. “We are applying our systems know-how and industrial excellence to help drive forward hydrogen solutions for our customers.”

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Components and systems knowledge for hydrogen engines
Bosch is developing components and applying its system knowledge to support hydrogen engines and the company expects the market for hydrogen engine technology to be worth around $1 billion globally by 2030. In fact, a first hydrogen engine with Bosch components is set to debut this year.

From a technical point of view, Bosch believes hydrogen engines represent a rapid path for reducing emissions in commercial-vehicle transportation and are a viable option along with battery-electric drives and mobile fuel cells. A major reason is that existing powertrain technology from today already provides a solid platform for hydrogen engines. Approximately 90 percent of existing development and manufacturing technologies can be re-utilized, as the basic structure of the fuel, air and exhaust system can be adopted from existing powertrain solutions. Additionally, existing skill sets of workforce can be naturally applied. And last but not least, hydrogen engines use very few rare earth materials.

“Hydrogen engines can be a powertrain of choice also for applications that require sustained high loads and robustness in challenging environmental conditions,” Thomas said. “We see this kind of application relevant for heavy long-distance transport as well as for agricultural and construction machinery.”

Next to port-fuel injection solutions, Bosch engineers are working to create specialized **low-pressure direct injection systems for hydrogen engines** that meet the performance and durability requirements of the commercial vehicle industry. In addition to fuel injection, Bosch as a **system supplier for hydrogen engines** also offers the electronic control unit, products for the storage and supply of hydrogen and further powertrain components as well as system engineering services.

The mobility industry is collaborating to show the opportunity in hydrogen engines. Bosch is among a group of industry collaborators supporting a **Southwest Research Institute (SwRI) joint industry program** that retrofitted a Class 8 heavy-duty vehicle with a hydrogen engine to demonstrate the low-CO2 and low-emissions potential’of hydrogen-powered engines using current technology. The vehicle will be on display at the 2024 ACT Expo.

A full portfolio to support mobile fuel cells

Bosch continues to provide customers with options in the area of mobile fuel cells. Already, the company is in production with the **fuel cell power module** to support global customers. Based on the learnings from the on-road experience, Bosch is exploring a next generation of the fuel cell power module with an increased power target of 300 kW and improved power to weight ratio.

The company offers a full portfolio of **fuel cell components and sub-systems**. Some of the key systems and components are the fuel cell stack, the electric air compressor, the anode recirculation blower, the anode module, the hydrogen injector, the fuel cell power transfer unit and the fuel cell control unit. These components perform critical functions that control the supply of hydrogen and oxygen to the fuel cell stack.

“The diverse experience at Bosch provides our customers with a variety of options to match their needs as they bring mobile fuel cell vehicles to market,” Thomas said.

Solutions for service, re-fueling and hydrogen production

Bosch is active on other aspects of the hydrogen value chain. As part of its Mobility Aftermarket business, Bosch brings together its comprehensive expertise in hardware, software, and repair solutions to prepare service centers for the latest vehicle technologies in the market. The company’s **vehicle service readiness** solutions include support for servicing vehicles equipped with electric and fuel cell powertrains.

In addition to the solutions shown at the ACT Expo, Bosch is also active in hydrogen re-fueling solutions and hydrogen production. Based on its decades of experience in hydraulics, Bosch Rexroth is developing customized solutions for an economical hydrogen infrastructure, working together with collaborators. The aim is to refuel Heavy Goods Vehicles (HGV) with 100 kg of hydrogen in less than 10 minutes. Working with the market leader for the commercial operation of hydrogen filling stations in the USA, FirstElement Fuel in California, Bosch Rexroth has developed a **cryopump** that can compress up to 600 kg of liquid hydrogen per hour.

Bosch is also participating in the rapidly growing market for hydrogen production by developing components for electrolyzers. The company is developing the **electrolysis stack** – the core component of an electrolyzer, based on proton exchange membrane (PEM) technology. This stack comprises more than 100 electrolysis cells that use electricity to split water into oxygen and hydrogen. Currently the stack is on course for market entry next year.

Press photos and infocharts are available on the Bosch Media Service at us.bosch-press.com.

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About Bosch

Having established a presence in North America in 1906, today the Bosch Group employs 42,000 associates in more than 100 locations in the North American region (as of Dec. 31, 2023). Bosch generated consolidated sales of $16.5 billion in the U.S., Mexico and Canada in 2023. For more information visit www.bosch.us, www.bosch.mx and www.bosch.ca.

The Bosch Group is a leading global supplier of technology and services. It employs roughly 429,000 associates worldwide (as of December 31, 2023). The company generated sales of $99 billion in 2023. Its operations are divided into four business sectors: Mobility, Industrial Technology, Consumer Goods, and Energy and Building Technology. With its business activities, the company aims to use technology to help shape universal trends such as automation, electrification, digitalization, connectivity, and an orientation to sustainability. In this context, Bosch's broad diversification across regions and industries strengthens its innovativeness and robustness. Bosch uses its proven expertise in sensor technology, software, and services to offer customers cross-domain solutions from a single source. It also applies its expertise in connectivity and artificial intelligence in order to develop and manufacture user-friendly, sustainable products. With technology that is "Invented for life," Bosch wants to help improve quality of life and conserve natural resources. The Bosch Group comprises Robert Bosch GmbH and its roughly 470 subsidiary and regional companies in over 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. Bosch's innovative strength is key to the company's further development. At 136 locations across the globe, Bosch employs some 90,000 associates in research and development, of which nearly 48,000 are software engineers.

The company was set up in Stuttgart in 1886 by Robert Bosch (1861–1942) as "Workshop for Precision Mechanics and Electrical Engineering." The special ownership structure of Robert Bosch GmbH guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant upfront investments in the safeguarding of its future. Ninety-four percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation. The remaining shares are held by Robert Bosch GmbH and by a corporation owned by the Bosch family. The majority of voting rights are held by Robert Bosch Industrietreuhand KG. It is entrusted with the task of safeguarding the company's long-term existence and in particular its financial independence – in line with the mission handed down in the will of the company's founder, Robert Bosch.

Additional information is available online at www.bosch.com, www.iot.bosch.com, www.bosch-press.com.

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