

Eberspächer Group:

Innovation – the Foundation of the Future

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The automotive industry currently exists in a sphere that deals with new technologies, society's strong level of environmental awareness, and strict legal requirements for Clean Mobility and traffic safety. At the same time, customers' desire for comfortable mobility solutions and the simple, intuitive operation of individual vehicle components is ubiquitous. Against this background, the automotive supplier Eberspächer applies its strengths and actively drives the transformation forward. In doing so, innovation serves as the basis for all activities. It is the element that connects the established Divisions of Purem by Eberspächer, Climate Control Systems, Automotive Controls, and the development of new areas of activity.

Clean Mobility as motivation

The goal of **Purem by Eberspächer** is clean and quiet mobility. The products of the exhaust emission conversion and acoustics specialist improve air quality and sustainably lower traffic noise. The portfolio offers solutions for all major passenger car and commercial vehicle manufacturers and supports them in meeting present emission legislations. At the same time the experts are working on minimizing emissions even further. Purem by Eberspächer is already working on innovative solution scenarios to meet upcoming legislations such as Euro 7 standard for Europe as well as other global legislative.

Because they can reduce emissions even further, optimized combustion engines and hybrid drives will play an important role in the mobility transition that's soon to take place. Purem by Eberspächer is thus pursuing various approaches, such as preheating the exhaust system. Catalytic converters require a minimum temperature in order to work

efficiently. The optimum temperature is only reached when there is sufficient waste heat available from the engine. The Active Heating Solutions shorten this cold start phase and thus already lower the emission values at the start of the trip. Heating elements provide earlier activation of the SCR system. Thus NO_x emissions can be reduced by up to 90 percent. In hybrid vehicles, heating components will also be used to bring the exhaust system up to temperature while the vehicle is being powered by the electric drive. The improved treatment of the urea-water solution is a further starting point for consistent emission reduction. Besides the continuous improvement of combustion or hybrid engines, the exhaust emission conversion and acoustics specialist is working on future topics and new technologies. By transferring its many years of expertise in exhaust technology, Purem by Eberspächer offers solutions for fuel cell applications and the hydrogen engine.

In addition to reducing emissions, there is also a focus on decreasing noise in road traffic. New, stricter acoustics legislation will come into force in Europe in 2024. Purem by Eberspächer's intelligently designed acoustic valves already meet these requirements today. While the valves limit the flow paths of the exhaust gas in city traffic and thus minimize noise, they open up the exhaust gas flow's entire effective muffler volume in intercity or highway traffic. The backpressure in the engine is reduced, and at the same time the fuel consumption and thus CO₂ and other emissions decrease.

Thermal management expertise for all drive types

The air conditioning systems of the Climate Control Systems Division cover heating and cooling components as well as intelligent control elements. They are tailor-made to ensure optimum temperatures in the vehicle interior. The operation of the fuel operated product families Airtronic (air heaters) and Hydronic (water heaters) pre-heaters is convenient and simple. The comfort solutions can be operated and controlled via app, smartwatch, or the Alexa voice assistant. Variants of the fuel operated pre-heaters can be operated with Diesel, gasoline, and bio-ethanol. In the automotive industry, Eberspächer components are used for more than just conventional drives. The compact high-voltage water heaters with PTC technology for electric and plug-in hybrid vehicles are leading the way. With their inherent self-regulating effect, these high power PTC elements protect against overheating, thus enabling safe and performant heating. These heaters are already in use in more than 6 million electric and hybrid vehicles. They not only guarantee pleasant

warmth in the interior of the vehicle, but also keep the lithium-ion battery at the optimum operating temperature.

From passenger cars to logistics vehicles and through to special vehicles, OEMs, OESs, and vehicle body manufacturers rely on Eberspächer's expertise. In passenger traffic and especially in city traffic, more and more public and private transport companies rely on electrically-operated buses. The demands on comfort for drivers and passengers are high, regardless of the type of drive. Despite the outside temperatures, which range between freezing cold and desert-like heat, the interior climate should be pleasant. Environmentally friendly heating and cooling in electric buses is achieved using the refrigerant R744 which simply means carbon dioxide. With a GWP (Global Warming Potential) value of 1, CO₂ has the lowest global warming potential used in bus thermal management. In addition, it is not flammable or toxic compared to other natural refrigerants such as ammonia or hydrocarbons.

In addition to keeping the passenger compartment at a pleasant temperature, the heating and cooling solutions from Eberspächer enable constant-temperature transport of food, temperature-sensitive plants, as well as medical and pharmaceutical products – an area of activity with future prospects. Networking of the individual thermal management elements will be performed by Connectivity Services. The cloud-based digital platform e-connected for networking and using digital services was launched for this purpose in 2021. The first service offered by Eberspächer is cold chain monitoring for fleet operators.

Reliable energy flow in the power grid

Eberspächer has the in-house electronics expertise for thermal management in vehicles. The control units for fuel operated and electrical heating solutions are developed and produced in the **Automotive Controls** Division. In addition, semiconductor-based switches and control units ensure stable power grids and proper functioning of the entire chain of driver assistance systems – from the sensors to the main computer and through to the actuators. This includes cameras, brakes, and steering of all safety-related components.

As a result of electrification, high-performance systems are finding their way into vehicles. For this purpose, the Automotive Controls Division develops power storage systems that can be used to recuperate energy, store it electrically in the interim, and make it available

to electrical consumer on demand. Electronic switches as well as energy and electrical power distribution systems, which are specially designed to meet the high demands of autonomous driving, offer strong reliability as well as a robust design. The Redundant Safety Switch is a series product for Level 4 autonomous vehicles. The semiconductor-based disconnecter switch connects and disconnects partial power grids – for example, in the event of overvoltage or undervoltage. This ensures that safety-related functions are safeguarded within a few microseconds.

Eberspächer operates outside of the automotive industry with its battery management systems. In medical technology, logistics, and production, they guarantee the reliable function of lithium-ion battery-operated systems and means of transport.

Acting sustainably

Sustainable action is anchored in Eberspächer's corporate strategy and is based on a clear goal: CO₂-neutral production by 2030. Compared to the base year 2019, production-induced CO₂ emissions have already been reduced by 45 percent. The purchase of green electricity will be continuously expanded, with production plants in Europe in 2022. Further global locations will follow. With additional programs in defined fields of action, Eberspächer is working for climate protection and resource conservation (Green Footprint), shaping clean mobility (Innovation) and assuming responsibility for employees and society (People). More on this in the [Sustainability Report](#).

Growth and new business areas

Eberspächer's growth is driven both organically and by joint ventures, investments, and acquisitions. Hydrogen is gaining importance in the drive mix of the future. Focus of **the new business area Hydrogen Mobility** is particularly on hydrogen and fuel cell applications in both the stationary and mobile sectors. The acquisition of Vairex air systems in July 2021 marked the beginning of the Eberspächer Group's activities in fuel cell technology. Air compressors for supplying cathode gas to the fuel cell and the associated components are developed and produced in Lafayette (Colorado), USA. The performance of the fuel cell can be managed by precisely controlling the air flow and air pressure. As such, the compressor is a key component for fuel cell performance and contributes significantly to the efficiency, optimal design and durability of the overall system. Based on the acquisition of Vairex air systems, Eberspächer intends to develop further in the long term with components for hydrogen fuel cell technology. To this end,

the Group is leveraging the expertise of the Divisions and working together across Business Units. With **Next Shed** as a venture client unit, the company drives forward business ideas close to its core business in a scalable way together with startups.

Sustainable production methods and Dedicated People

In order to make its innovations available to a broad market as quickly as possible, Eberspächer is increasingly relying on **modern development and production methods**. The entire processes of the company are becoming increasingly digitized. In the area of R&D, vPPD (virtual Product and Process Development), simultaneous engineering, and other virtual development and simulation methods are used. The individual companies within the group work closely together across borders. Eberspächer is present at around 80 locations in around 30 countries and supports the cross-border exchange.

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About Eberspaecher:

With approximately 10,700 employees at 80 locations worldwide, the Eberspaecher Group is one of the automotive industry's leading system developers and suppliers. The family business, headquartered in Esslingen am Neckar, stands for innovative solutions in exhaust technology, automotive electronics and thermal management for a broad range of vehicle types. In combustion or hybrid engines and in e-mobility, the components and systems from Eberspaecher ensure greater comfort, higher safety and a clean environment. Eberspaecher is paving the way for future technologies such as mobile and stationary fuel cell applications, synthetic fuels as well as the use of hydrogen as an energy carrier. In 2022, the Group generated revenue of around 6.4 billion euros. Net revenue adjusted for transitory items amounted to 2.7 billion euros.