



## The “start-up” powertrain for electric cars: the Bosch e-axle offers greater range

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- ▶ New development: more efficient and affordable than other electrical powertrains
- ▶ All-in-one principle speeds up automakers' development times
- ▶ Bosch board of management member Dr. Rolf Bulander: “Economically speaking, the e-axle may turn out to be a major coup”

Gerlingen, Germany – It's now common knowledge that a more powerful battery will increase an electric car's range. But can a new powertrain have a comparable impact? In the case of the Bosch electric axle drive, or e-axle, the answer is a definite yes. What's so special about it is that Bosch has combined three powertrain components into one unit. The motor, power electronics, and transmission form one compact unit that directly drives the car's axle. This makes the powertrain not only far more efficient, but more affordable as well. “With its e-axle, Bosch is applying the all-in-one principle to the powertrain,” says Dr. Rolf Bulander, member of the board of management of Robert Bosch GmbH and chairman of the Mobility Solutions business sector. It is precisely for this reason that the new powertrain is a potentially huge business opportunity for Bosch. The components are very flexible, which means the e-axle can be installed in hybrids and electric cars, compact cars, SUVs, and even light trucks – a huge market.

### A powertrain that also speeds up development times

“Economically speaking, the e-axle may turn out to be a major coup for Bosch,” Bulander says. The novel electrical powertrain is playing a key role in the company's drive to be the global mass-market leader for electromobility from 2020. On the world's roads, there are already well over 500,000 electric and hybrid cars fitted with Bosch components. Bosch thus has many years of experience in the manufacture of electric motors, axle drives, and power electronics. The expertise it has gathered in the process is now bearing fruit in its newly developed electric axle. With this component alone, Bosch is hoping to generate sales running into

the billions. “The e-axle is the ‘start-up’ powertrain for electric cars – also at established automakers. It allows them to save valuable development time and to get their electric vehicles to market considerably faster,” Bulander says. As Bosch customizes the powertrain to each automaker’s requirements, customers no longer have the time-consuming task of developing new components. Samples of the electric axle have already been tested with customers. The start of mass production is planned for 2019. Bosch already has a flexible, globally applicable manufacturing concept for this component. The concept guarantees that each customer will get a customized solution that can be quickly integrated into its manufacturing operations.

### **Up to 6,000 Newton meters of torque and 300 kilowatts of power**

The e-axle’s USP is its high level of versatility, which means it can be adapted to many types of vehicles. “Instead of reams of specifications, a few parameters are enough for Bosch to customize the e-axle,” says Dr. Mathias Pilin, the executive vice president for electromobility. All the customer has to do is state what performance, torque, and installation space they require, and Bosch then optimizes the rest of the powertrain to fit these parameters. In this way, a complete, customized powertrain can be delivered directly to an automaker’s assembly line. This is a further reason why the Bosch electric axle is the next logical step for powertrain engineering.

The powertrain can deliver between 50 and 300 kilowatts, and is therefore also capable of powering large vehicles such as SUVs completely electrically. Torque at the vehicle axle can range from 1,000 to 6,000 Newton meters. When installed in hybrid and electric vehicles, front- and rear-axle drive is possible. An electric axle delivering 150 kilowatts weighs roughly 90 kilograms, and thus far less than the combined individual components used so far. Compared with competing products, the distinguishing feature of the Bosch electric axle is an especially high peak performance combined with a high level of continuous performance. In other words, the electrical powertrain can accelerate better and maintain a high speed for a longer period. To achieve this, Bosch has not only redesigned the system as a whole, but also improved the motor and power electronics components.

## **Q&A – Additional information about the Bosch electric axle**

### **What makes the electric axle more efficient than previous electrical powertrains?**

Highly efficient individual components are the basis for a high level of overall efficiency. In this respect, Bosch has the benefit of years of experience in the market. In addition, efficiency losses are minimized by reducing interfaces and components such as high-voltage cables, plugs, and cooling units. One of Bosch's strengths is its ability to combine individual components to form systems, to use the interactions in the system, and in this way to arrive at an overall optimum. In the case of the e-axle, this relates not only to efficiency, but also to things such as acoustics and electromagnetic compatibility.

### **When will the e-axle be available in the market?**

Bosch has had electric axle drives in the market since 2012 (in the Peugeot 3008 and Fiat 500e, for example), but the power electronics was not fully integrated into them. With the new generation of the electric axle, Bosch is in the development phase, and is in contact with automakers from around the world. More precisely, samples of the electric axle are ready for use, and are currently being tested. Start of production is planned for 2019 at the latest.

### **What vehicles can it be used in?**

The Bosch electric axle is designed so that it can be adapted to many types of vehicles. When installed in hybrid and electric vehicles, front- and rear-axle drive is possible. This applies to any vehicles up to a total weight of 7.5 metric tons, and thus to light trucks as well as passenger cars.

### **Why is the e-axle less expensive than the powertrains used up to now for electric cars?**

Since the e-axle combines power electronics, electric motor, and transmission in a single component, fewer parts are needed. For example, the new electric powertrain does completely without thick and expensive copper cables linking the components. In addition, the cooling system can be simplified, and there is no need for bearings for rotating components. This reduces the powertrain's cost while increasing its efficiency. Placing the transmission close to the motor saves valuable installation space, which is always an important factor in the auto industry.

### **How deeply is Bosch involved in electromobility?**

On the world's roads, there are already well over 500,000 electric and hybrid cars fitted with Bosch components. In its efforts to make a breakthrough in electromo-

bility possible alone, the company invests 400 million euros annually. The company has already won more than 30 electromobility-related orders from international automakers.

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