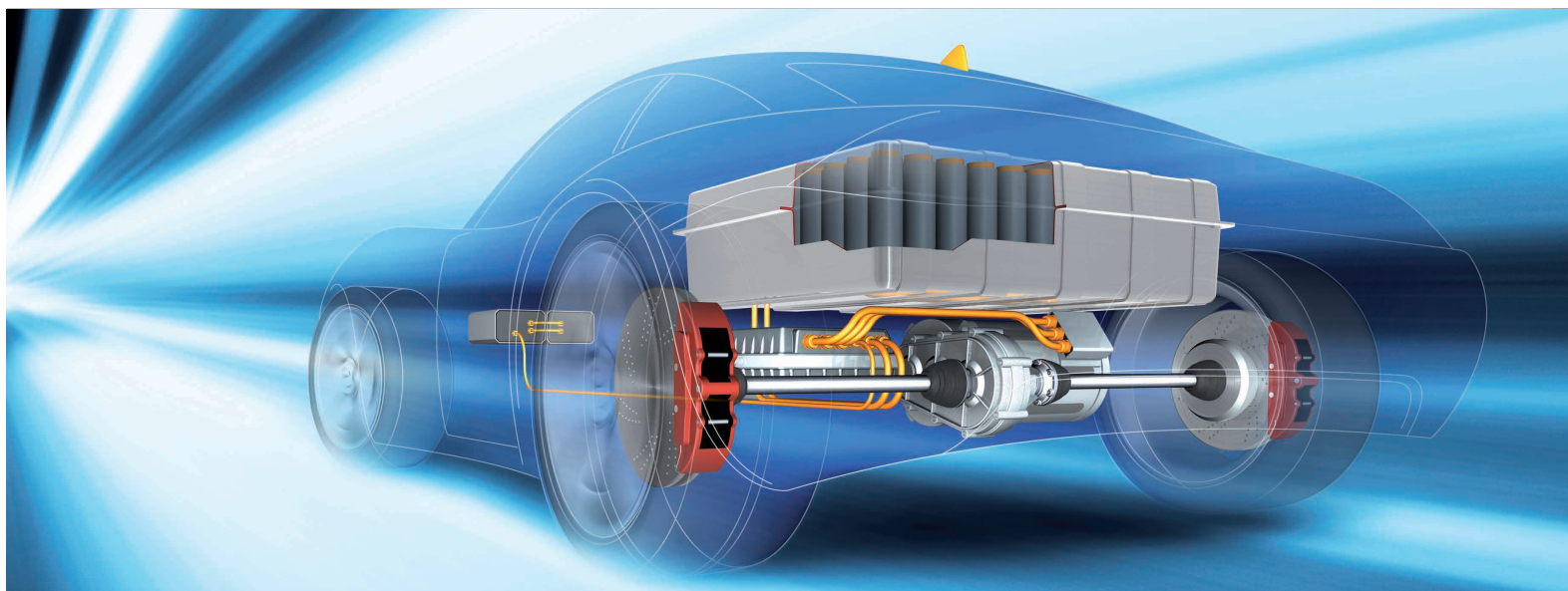


# Developing Electric Powertrains

IAV - Partner for the Electric Vehicles of Tomorrow



## Tomorrow's Powertrain

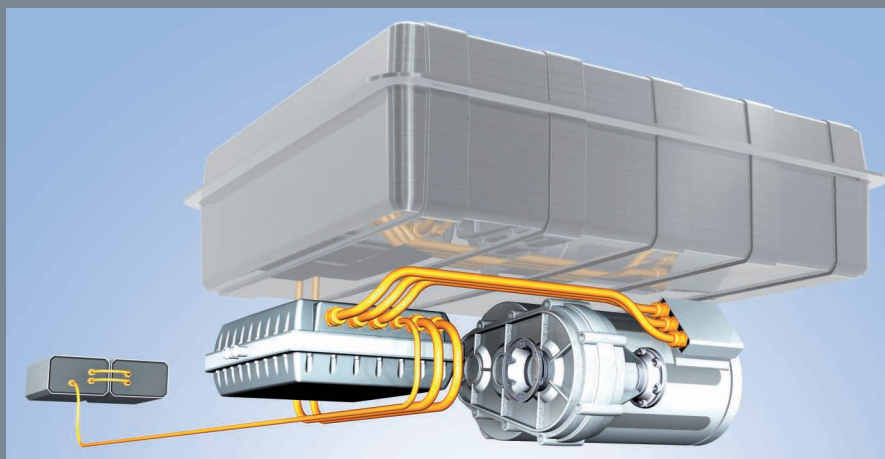
Electric motors provide a high level of efficiency and torque: the ideal prerequisites for a strong and efficient powertrain. But taking this power to the road in the most effective way possible demands a powertrain that is cut out for the job. Transmission, battery, power electronics and many other components need optimizing to meet the requirements they face.

Regardless of whether a powertrain is developed entirely to satisfy the demands of an electric vehicle or whether the electric powertrain is integrated in an existing platform - vehicle concepts are undergoing extensive change from the norms based on a combustion engine.

Despite the electric powertrain consisting of altogether familiar components, it has still not been fully adapted to the needs of the automotive industry. IAV is already working on the concepts of tomorrow.

## 20 Years of Expertise

*IAV has 20 years of experience in electric vehicles. Do you need specialists with expertise in the entire vehicle, specialists who are passionate about developing electric vehicles? We can assist you from the concept and approved prototype phase right through to the start of production. Beyond this, we are also your partner for quality assurance and support in the field.*

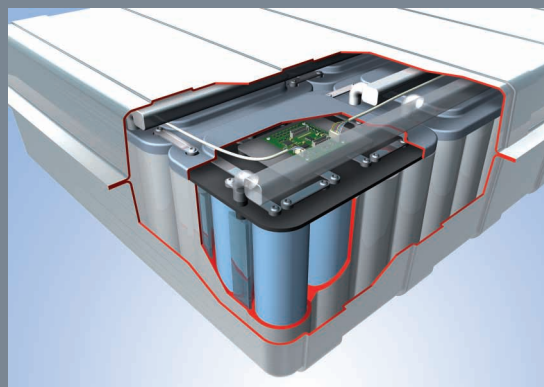


Electric powertrain

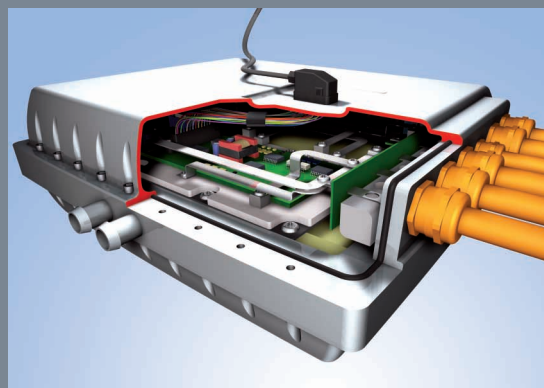




Unit comprising e-machine and transmission



Traction battery



Power electronics

### Integrating and Optimizing the Powertrain

Although the components of the electric powertrain are familiar enough, they are not always optimized for the conditions of the automotive industry. Simplifying installation of the powertrain in the production process requires a high degree of integration at the component level. A compact design allows for degrees of freedom in the vehicle's package. To meet the specific requirements in everyday operation, however, efficiency and lifespan are still in need of optimization. In this context, the components installed, as well as the entire powertrain, must satisfy all the requirements of safety and EMC. One aim of the automotive industry will be to provide a product range offering a wide choice of electrically propelled vehicles, which will require an electric powertrain developed on a modular and scalable basis. The acoustics of an electric powertrain also leave potential for optimization.

### Integrating and Optimizing the Auxiliary Power Users

The traveling range of an electric vehicle is largely governed by the careful use of energy available. On the one hand, this demands a complex system of energy management, particularly in heating, air-conditioning and comfort. On the other, it is also necessary to reduce the energy consumed by auxiliary power users. This will require adapting existing components or developing new ones.

### Integrating and Optimizing the Vehicle

Today, many electric cars are based on platforms of existing vehicle concepts. What is needed, however, is a roadmap for gradually adapting conventional vehicle engineering to electrification. Driving feel, in contrast, is an area closed to compromise, although an electric vehicle can be calibrated in the same way as a vehicle powered by a combustion engine.

### Expertise in the Entire Vehicle

Ultimately, traveling range, driving fun, comfort and costs are factors that must be reconciled in a way that ensures electric vehicles find acceptance with the motorist. To achieve this goal, an all-embracing concept for the electric vehicle is required as early as the design study phase. Only by thoroughly intermeshing all of the disciplines involved in the development process is it possible to arrive at the optimum result.

IAV has become experts in all areas of developing electric vehicles for 20 years.

### We Can Provide You with Support in the Following Areas:

- ▶ Powertrain simulation
- ▶ Selecting and ensuring the suitability of components
- ▶ Selecting and training suppliers
- ▶ Powertrain integration
- ▶ Thermal management in the vehicle
- ▶ Constructing prototypes
- ▶ Support in production-ready development activities
- ▶ Optimizing components
- ▶ Quality assurance
- ▶ Support in field trials