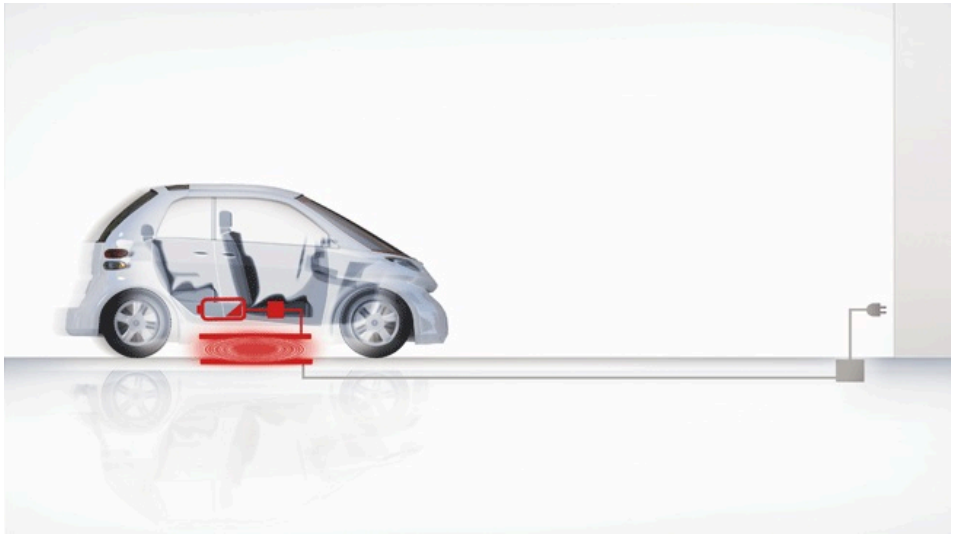
Brose-SWE: Electric drives and charging technology from a single source



The principle of induction entails power being transmitted via an air gap of up to 20 cm. The coil which generates the magnetic field is embedded in the parking area. The counterpart to this is the receiver in the underbody of the vehicle.

- **New joint venture for electric mobility presents portfolio at the IAA**
- **Wireless charging technology for electric and hybrid vehicles**
- **Electric motors ranging from 0.25 to 150 kilowatt**

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At the beginning of the year, two strong partners pooled their competence for electric mobility: Brose Fahrzeugteile GmbH & Co. KG, market leader in mechatronic systems and electric motors for the vehicle body and interior, and SEW-EURODRIVE, one of the leading suppliers of industrial applications, founded Brose-SEW Elektromobilitäts GmbH & Co. KG. The goal of this joint venture is to develop, produce and sell drive and charging systems for electric and hybrid vehicles. Having access to the know-how and production facilities of the two parent companies Brose and SEW-EURODRIVE, the joint venture will be able to achieve additional economies of scale and cost benefits. Apart from developing customer-specific electric motors ranging from 0.25 to 150 kilowatt, the joint venture will also be seeking to find intelligent and economical ways of implementing individual electric mobility. This is where Brose-SEW has a viable, forward-looking solution to offer: wireless charging technology facilitates accessing power supplies at home and on the move; moreover, it is more convenient than a plug-supported solution.

"Filling up" with electricity without cables

Intelligent and user-friendly charging technology is a vital pre-condition if electric vehicles are to be successfully established on the mass market. The components required for wireless power transmission consist of the power supply element and the pad on the ground which act as "the energy source" and a module underneath the vehicle which assumes the role of the receiver. Power is transmitted inductively i.e. non-contact power

transfer up to a distance of 20 centimeters between the ground and the vehicle via a magnetic field. An electromagnetic shield in the coils protects the passenger compartment from the magnetic field. This way of charging the car is convenient, safe, clear and weatherproof. Moreover, regular top-ups are kinder to the battery.

Power is transmitted in line with the resonant transformer principle: alternating current produces a magnetic field in the primary coil which induces alternating current again the secondary coil. The primary coil is installed, for example, in the ground of the parking lot and supplied from a power-feeding device. When an electric vehicle arrives, it activates this power-feeding device via near field communication; it switches from standby to operating mode. Once the electric vehicle's battery is charged, the power-feeding device returns to standby.

In March 2011, the VDE/DKE approved a code of practice (VDE-AR-E 2122-4-2), thus establishing a basis for standardization in order to prepare this highly innovative and convenient charging technology for mainstream use. BROSE-SEW has developed its system conforming with this standard and can already it offer it to customers for installation in vehicles.

Inductive charging technology as a pre-condition for widespread electric mobility

Wireless charging technology enables vehicles to be automatically recharged at every short stop e.g. at traffic lights and railway crossings or in multi-level car parks or parking spaces. This is not
only kinder to the power storage unit, but ensures that the vehicle has enough power for its maximum range. Subsequently, the size of expensive batteries can be reduced bringing about significant savings in costs and weight.

Drive and charging technology from a single source

Another of the joint venture's core competences is drive solutions for electric and hybrid vehicles - from electric bicycles to e-sports cars. The joint venture supplies customer-specific, highly efficient
asynchronous or synchronous machines. Depending on the type of vehicle, they can be individually adapted and configured over a broad spectrum ranging from 0.25 to 150 kilowatt. In addition to its existing kit of standard motors, Brose-SEW also uses drives which have been specially designed for electric mobility applications in conjunction with the automakers.

Given the massive rise in raw material prices over the last few months, asynchronous and separately excited synchronous machines are becoming increasingly important because these
do not need rare earth magnet materials, thus providing significant cost benefits.

The separately excited 90 kw synchronous machine with integrated power electronics and a maximum speed of 11,000 rpm provides benefits in terms of efficiency in the drive cycle. This variant does not require a connector between the power electronics and e-motor. Another advantage: through internal cabling, electromagnetic influences on other vehicle components are reduced to a minimum.

The asynchronous motor with differential gear and a power output of up to 30 kilowatt is particularly suitable for town cars and small commercial vehicles. The copper die-cast rotor used makes it possible to achieve a significantly higher degree of efficiency compared to conventional asynchronous machines while retaining the advantage of being a rotor which can be produced at a reasonable price.

The permanent magnet excited 90 kilowatt motor from the joint venture's portfolio has a compact design while delivering a high level of power density. Based on many years of experience in design, this motor has an optimized magnetic circuit of rotor and stator, and the highest degree of efficiency at the best operating point, compared to other variants.