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From lab to field – scaling up production processes for public funded E|ROAD

CERV 2023 - Session #4

Dr.-Ing. Michael Weigelt

Test tracks all over the world prove that the technology of wireless charging is feasable. The challenge for scaling up the technology is the automation of manufacturing processes.

ORNL (2016), Knoxville
10 m, 20 kW, $\eta = 90$ %

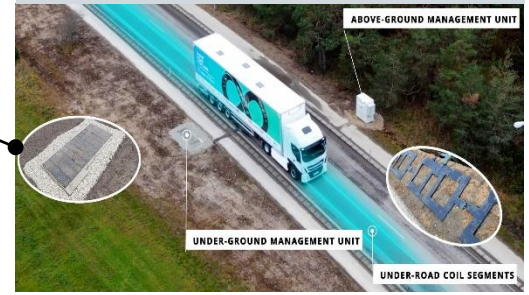
IPT Tech. (2015), Mannheim
80 m, 200 kW

duraBast (2022)
Cologne, 100 m

KAIST OLEV (2010), Seoul
370 m, 100 kW, $\eta = 74$ %

FABRIC (2017), Versailles
100 m, 20 kW, $\eta = 70$ %

Electreon (2019)
Gotland, 1600 m; 70 kW

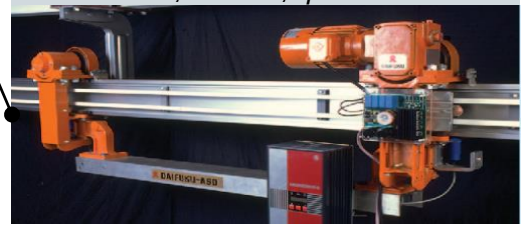


Israel (202x)
Tel Aviv

EnBW (2019)
Karlsruhe, 100 m

E|MPOWER (2024)
Bavaria, 1 km

Auckland (2013)
10 m, 30 kW, $\eta = 85$ %

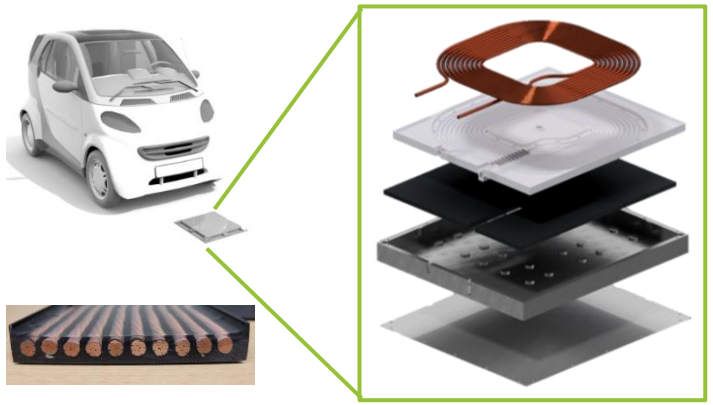


FAPS prepared large important projects in the field of IPT technology over 10 years.

E|PROFIL: Stationary

E|ProFIL, Zollner, LEONI, BOSCH, FAPS

Efficient processes for manufacturing of inductive charging systems.



- Stationary charging up to 11 kW
- Budget of 2.8 million €
- Optimization of semi-finished products
- Increase of transmission efficiency

E|ROAD: Semi-dynamic / dynamic

E|ROAD, wheelE, stelcon, TECHNISCHE UNIVERSITÄT DRESDEN, AT bast, FAPS

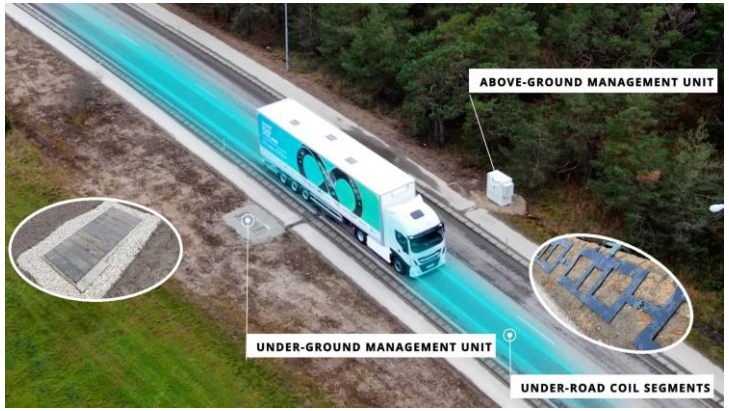
Manufacturing processes of primary-side coil modules for electrified roads in concrete technology

- Semi-dynamic and dynamic charging
- Budget of 1.6 million €
- Integration of coils into concrete elements
- Construction of a 50 m test track

E|MPOWER: Dynamic

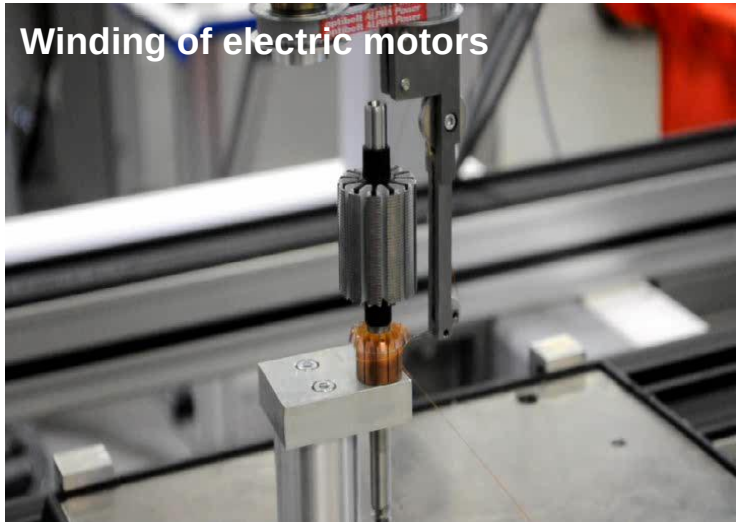
E|MPOWER, ELECTREON, VIA IMC, risomat, ELSYS, FAPS

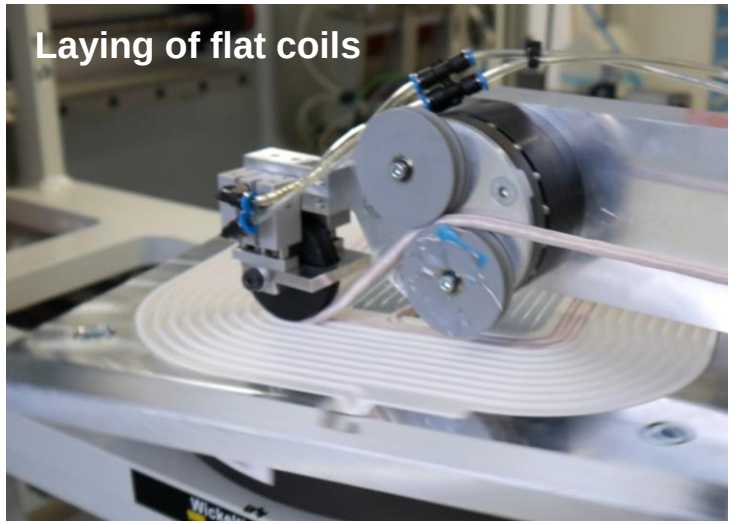
Automated manufacturing processes for Electric Road Systems in asphalt construction

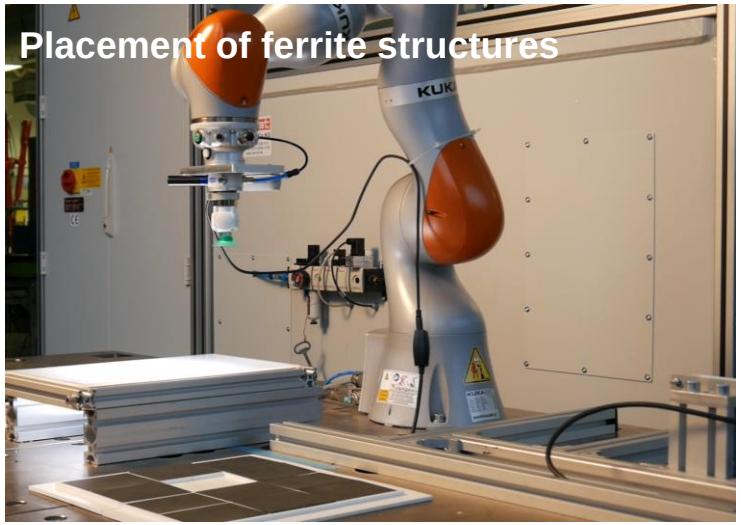


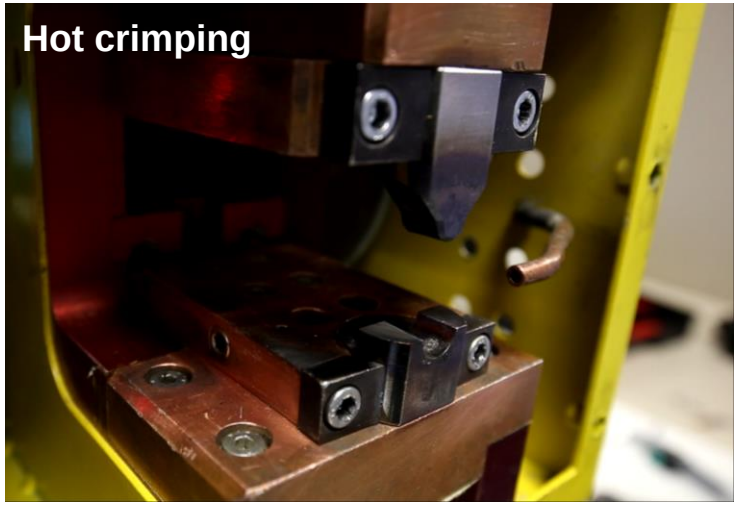
- Dynamic charging
- Budget of 7 million €
- Automation of road construction
- Construction of a 1 km test track on BAB

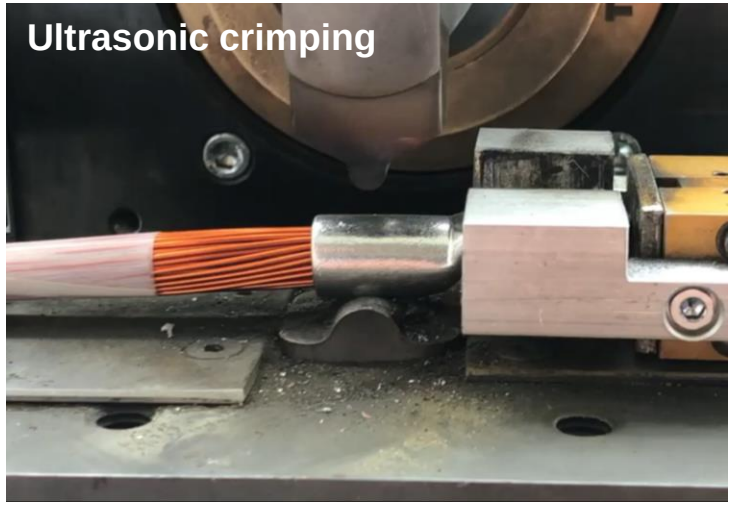
FAPS conducts research into various manufacturing processes: from electric motors to wireless power transfer technology

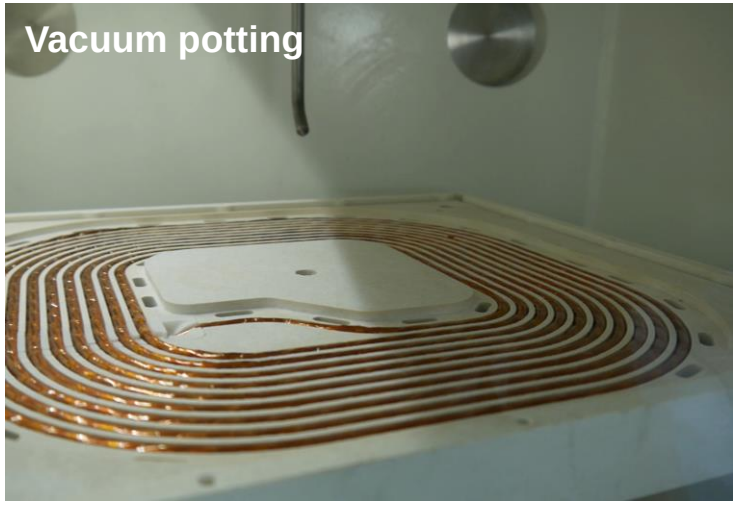










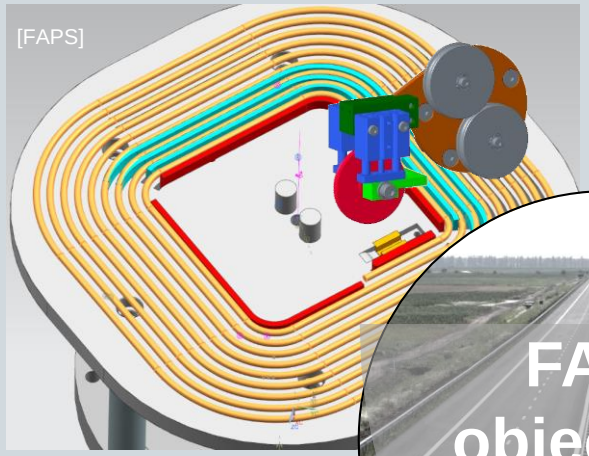


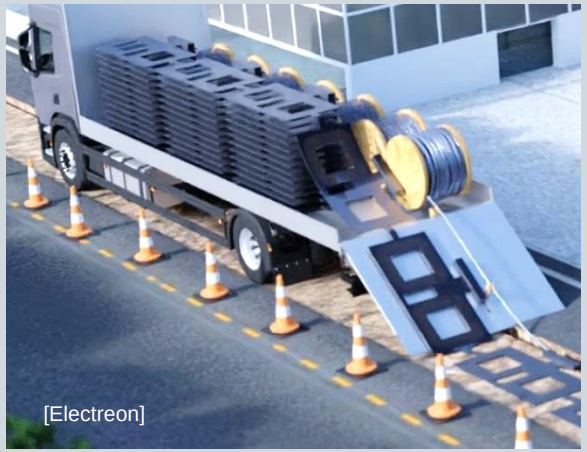
By 2025, we want to achieve significant process innovations, realize the planned test tracks as well as continue to develop the commercialization of the manufacturing technology

Innovations in production technology

Coil module production

- Automated winding process
- Direct contacting of litz wire to PCBs
- Potting strategies and process automation





Infrastructure integration

- Concrete modules
- Continues deployment to asphalt infrastructure

Test tracks and public awareness for technology

2023: Deployment of 50 m test track with concrete modules

E|ROAD

2024: Deployment of 1 km test track on German autobahn

E|MPOWER

E|ROAD-Center

Joint initiative of Bavarian research institutes and industry for development of ERS technology

Die Autobahn, LEONI, TUM, MAX BÖGL, vitesco TECHNOLOGIES, BMW, KUKA, Audi, HOCHSCHULE COBURG

Commercialization of production technology

Seamless Energy

Spin-off from FAPS:
Consulting, qualification and manufacturing services around IPT production technology

Seamless Energy Technologies

Leading manufacturing technologies for wireless power transfer systems

Services

- **Consulting:** design support for production-oriented oscillating circuit modules, development of process technologies
- **Qualification:** qualification of semi-finished products and systems, environmental testing, HV testing
- **Production:** prototype and sample production (< 100 pieces); medium-term: set-up of a partially automated line for higher output

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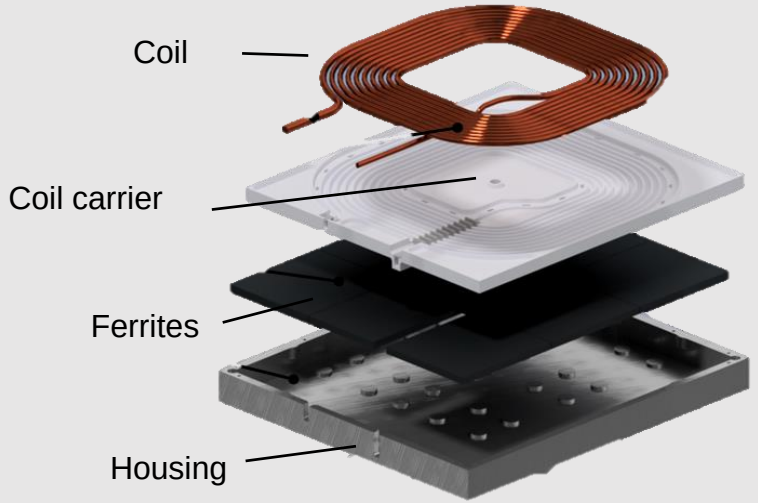
Inductive power transfer system



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THANK YOU