

Development of Inductive Power Transfer Systems

*Transmitter and receiver coil with developed
power electronics of a 3.6 kW IPT system*

© Fraunhofer IISB

Application

Inductive power transfer (IPT) systems have many advantages towards wired solutions, such as:

- Avoidance of disturbing wires
- No exposed electrical contacts
- Simple overcoming of air gaps

and therefore offer added value in a wide range of applications, for example:

- Auxiliary supplies (e.g. from 48 V to 48 V or 24 V to 24 V)
- Wireless plugs for demanding ambient conditions
- Energy supply for moving or rotating electrical loads
- Wireless charging for electric vehicles

Our Service

We develop and realize complete inductive power transfer systems. From the FEM-simulation, over power electronics analysis, simulation and mechanical integration to the realization of complete prototypes.



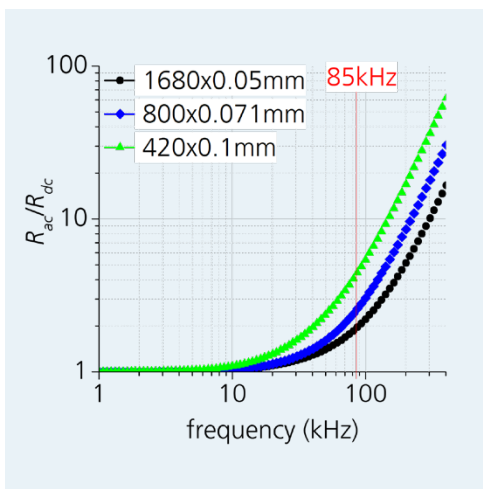
*Primary and secondary unit of the vertically oriented IPT system
developed by Fraunhofer IISB © Fraunhofer IISB*

Magnetic Design

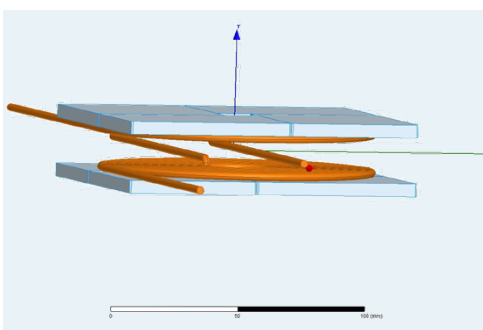
We use a computer-based system design algorithm. Our loss models are based on self-acquired material data.

As a result, we are able to:

- Calculate the magnetic parameters
- Calculate the winding losses (also litz wires) and core losses
- Perform multi-criterial optimization (e.g. efficiency, power density, costs)



Simulation of litz wire winding resistance ratio R_{ac}/R_{dc} © Christopher Joffe / Fraunhofer IISB

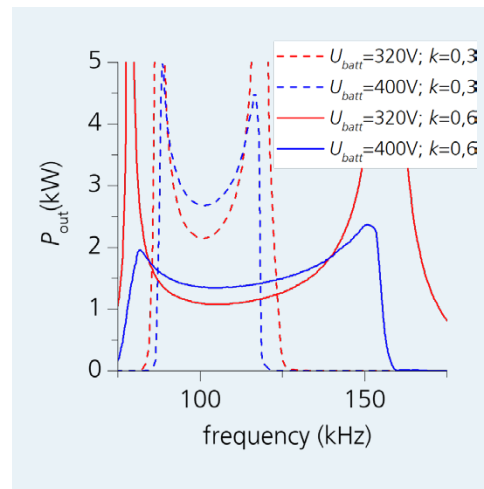


3D-FEM-Model of coils with ferrite © Christopher Joffe / Fraunhofer IISB

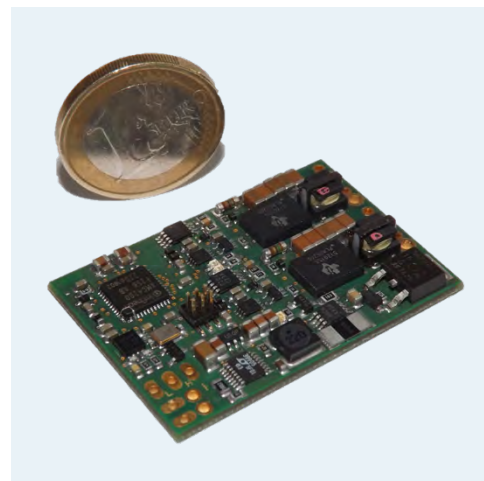
Electrical Design

In order to find the best electrical design for your application, we offer:

- Comprehensive topology studies
- Detailed converter and system simulation
- Development of fully controlled power transfer system including communication
- Design of highly integrated power electronic components (e.g. converter)



Simulated transfer characteristic of a series-series compensated IPT system © Christopher Joffe / Fraunhofer IISB



Intelligent 48 V GaN-based primary resonant inverter ($P=250\text{ W}$ and $f>1\text{ MHz}$) © Fraunhofer IISB

Reference Projects

In the field of inductive energy transfer, we have developed various IPT systems in bilateral customer projects and publicly funded research projects:

- 3.5 kW wireless charging with 96 % DC to DC efficiency
- 1 kW wireless plug with 98 % efficiency
- 140 W auxiliary supply for 24 V bus voltage
- 20 W wireless power transfer for ball bearings

Fraunhofer IISB is your research and development partner for inductive power transfer.

Contact

Stefan Ditze
Active Filters and EMC
Tel.: +49 9131 761-225
stefan.ditze@iisb.fraunhofer.de

Fraunhofer IISB
Schottkystr. 10
91058 Erlangen, Germany
www.iisb.fraunhofer.de