



INNOVATIVE FAST INDUCTIVE CHARGING SOLUTIONS FOR ELECTRIC VEHICLES

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Wireless Charging: vehicle aspects

- ❖ BEV and charging
- ❖ Positive aspects of wireless charging on vehicle system and architecture
- ❖ Negative aspects that could hold back adoption of wireless charging

BEV and charging

Today's drawbacks of EVs:

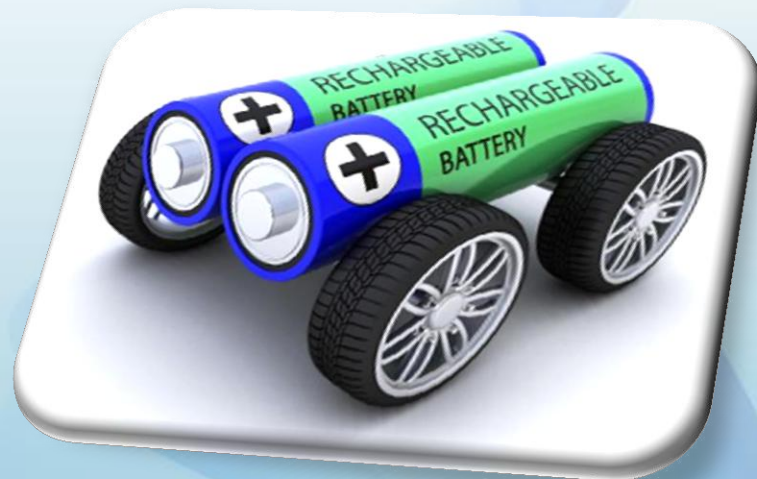
- Range anxiety: range limitation related to energy content of the batteries;
- Infrastructure: charging station and charging points are not yet widespread, holding back the users from switching to EVs;
- Charging time: reduction through high power (fast) chargers (not at home);
- Cost of the battery pack: especially in EVs, the cost of energy accumulators is a significant part of the overall cost, making the EV less affordable.



Positive aspects of wireless charging

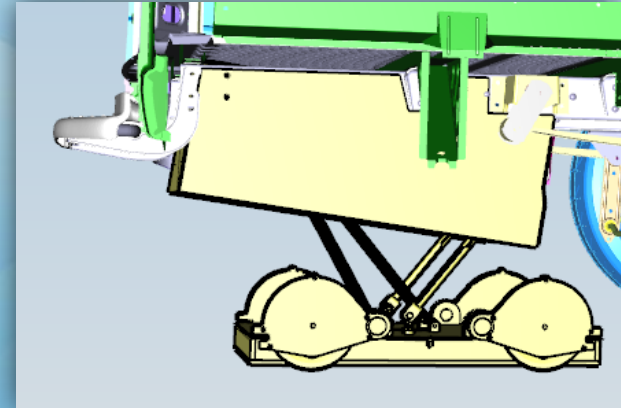
Wireless charging potentialities

- it allows reducing the battery pack size, giving as byproduct reduced costs and weights, and reducing the range anxiety on user side;
- ease of operation by any user, robustness;
- potential outcomes of the extension from static to dynamic charging using the same hardware equipment;
- with dynamic charging scenarios this trend is even more evident, increasing the benefits and therefore the added value of the vehicle hosting such a technology;
- a wise implementation of this technology requires the weight of the system to be contained, otherwise the weight benefits could be frustrated.



Negative aspects and open points (1/3)

- Positioning systems: requirements of compliance with existing or soon to be marketed driving assistance systems and technologies could be problematic;
- Integration of the wireless charging systems (secondary coil) on the vehicle chassis should follow ideally a plug&play approach that minimises effort for integrating it on the existing architecture.
- Compatibility with the electric traction system (current, voltage, EMC, communication).



Negative aspects and open points (2/3)

- Interoperability between the installed secondary coil and different wireless charging stations;
- Delta cost of the vehicle equipped with wireless charger vs. conductive charger alternatives;
- Device efficiency vs. conductive charger alternatives;
- Safety (electromagnetic compatibility with on-board systems, safety of the users, objects intruding the airgap).

Negative aspects and open points (3/3)

Dynamic charging presents some critical aspects that need to be carefully addressed:

- Airgap should be consistent with safety distances from the ground plane, especially while in motion;
- The management of the charger's output can be challenging in terms of a proper closed loop control of inductive power transfer;
- Effect of possible (metallic / organic / living) static or moving parts in the airgap during operation in motion on the overall safety and reliability of the charger must be addressed.

