E-mobility Simulation Solutions

Powerful Tools for Efficient Design

Altair software suite and expert support team work closely with you to provide efficient assistance in the different approaches, to work on the right models to make this complexity simple, realistic and accurate. By focusing on the optimization of a single component or simulating the whole powertrain, Altair has the solution.

- Flux® – for design and analysis of motors
- HyperStudy – for performances optimization using Design of Experiments

A Wide Range of Applications

A careful design of each electrical device of the car is necessary to keep its consumption as low as possible whilst still maintaining performance, emitting low electromagnetic radiations, keeping temperature under control, being compact, etc. Each component can be very complex, and constraints are numerous.

A Wide Range of Analysis

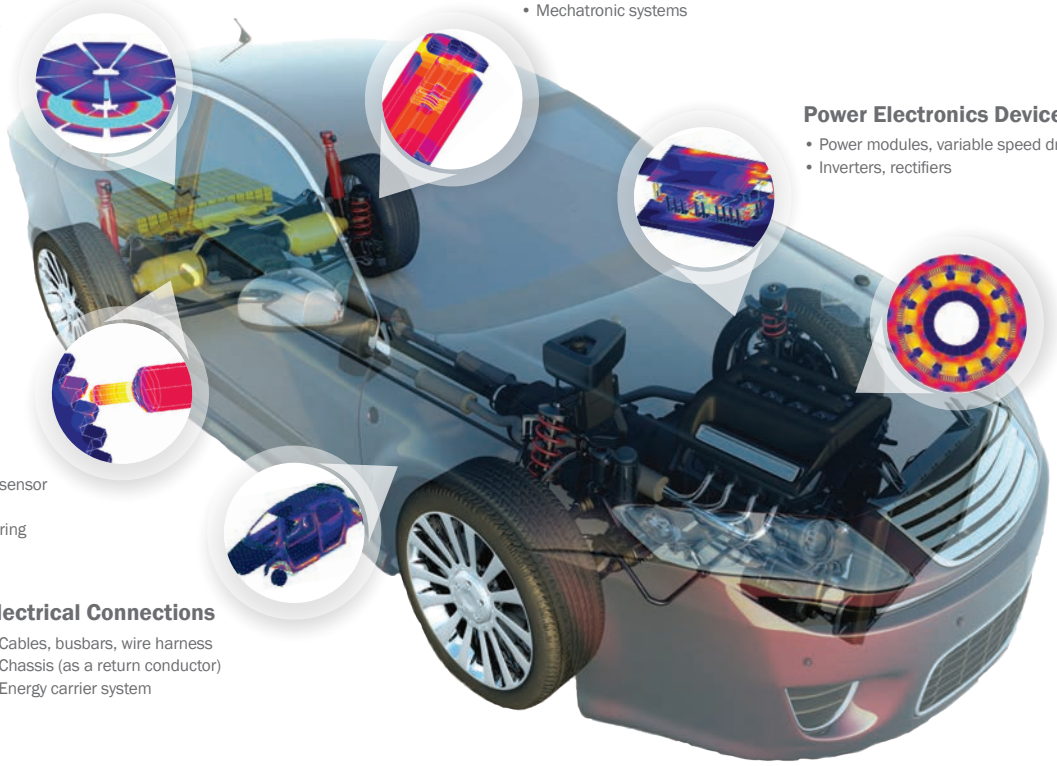
- Electrical, magnetic, thermal, multiphysics
- System-level, EMC, vibrations & noise

Wireless Charging

- Impedance computation
- Shielding analysis
- Evaluation of losses

Actuators

- Linear or rotating actuators, plungers, voice-coils
- Electromagnetic valves, circuit breakers, eddy current brakes, sparking systems
- Mechatronic systems



Power Electronics Devices

- Power modules, variable speed drives
- Inverters, rectifiers

Electric Motors

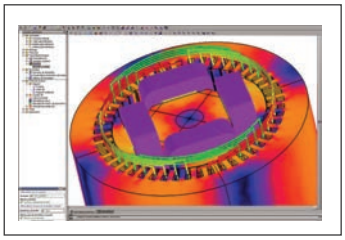
- Traction motors
- BPMM
- Any kind of motors in the car
- Machine drive and power electronic systems

Sensors

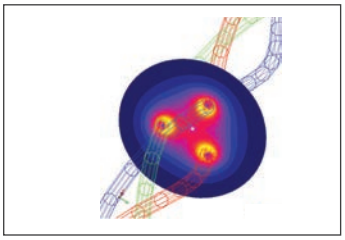
- Position & proximity sensor
- Speed sensor
- Temperature monitoring

Electrical Connections

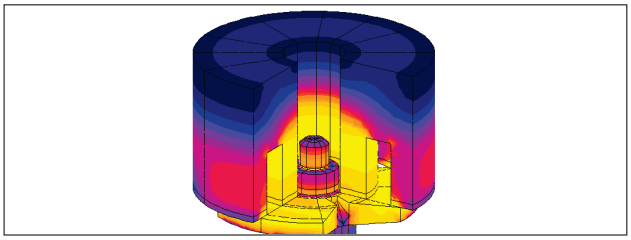
- Cables, busbars, wire harness
- Chassis (as a return conductor)
- Energy carrier system



Motor designed in Flux 3D



Twisted cables



Actuator designed in Flux 3D

Electric Motors

- Design sheet, performance, static and transient computations...
- Automatic thermal coefficients computation, temperature distribution...
- Equivalent scheme parameters values, magnetic and thermal quantities distribution, eddy currents, power losses, power balance, iron losses, flux density in the air gap, no load and loaded start-up, phase line-to-line voltages...
- Performance analysis: cogging torque, back EMF and load torque...
- Electrical quantities and losses of the power electronics drive control characteristics, mechanical quantities and losses...

Electrical Connections

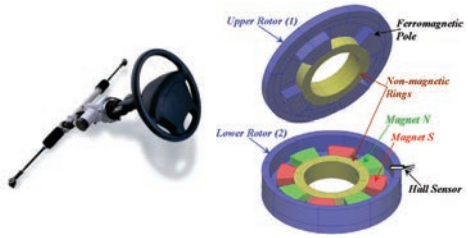
- Magnetic: radiated field, magnetic field, skin and proximity effects...
- Electric: breakdown electric field, current sharing...
- Thermal: heating based on skin effect, thermal networks...
- Parasitic behaviour of interconnects, of grounding and shielding systems
- Losses

Power Electronics Devices

- Parasitic behavior of electrical interconnections, of grounding and shielding systems
- Conducted and radiated emissions of electronic subsystems: power modules, variable speed drives, inverters, rectifiers
- Magnetic effects of electric energy installations on health: low-voltage substations, overhead lines...

Actuators

- Magnetic field distribution, currents and voltages versus time, mechanical quantities versus time (electromagnetic forces and torques, speed, position...), eddy current distribution, response time optimization...



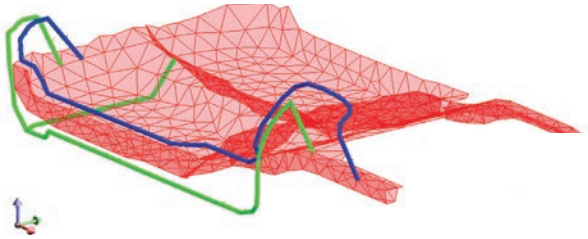
Position sensor designed in Flux 3D

Sensors

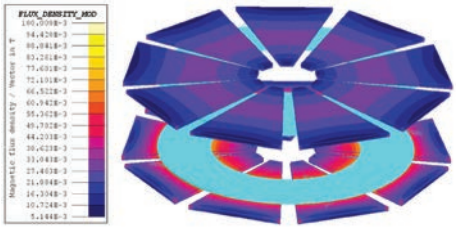
- Flux density and eddy currents distribution
- Currents, voltages, electromagnetic forces, speed, position versus time
- Temperature: color map distribution in the whole device, variation versus time
- Materials: visualize locally the evolution of properties (permeability, magnetic induction)

Wireless Charging

- Impedance computation, evaluation of losses
- Shielding analysis, radiated field calculation
- Determination of coupling factor, study of misalignment impact



Wire harness around the chassis of a car



Wireless charging device designed in Flux 3D

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