



AVL is the world's largest independent company for development of powertrains (combustion engines, hybrid systems, electric drive) as well as simulation and test systems for passenger cars, trucks and marine engines.

We offer a master thesis:

## Electro-magnetic field simulation of parasitic currents in shielded single core power cables

The target of the Master thesis is to model the electric and magnetic properties of a shielded single-core power cable and a minimum 3 wire system build with single-core cables. Furthermore, to simulate the electric and magnetic fields of such a cable system, used to supply speed variable electric motors, and to calculate the parasitic currents created by the electric and magnetic fields. Additionally, different cable-layouts in the cable tray shall be modelled (triangular and flat layout) and a system with e.g. 2x3 wires shall be analyzed. The thesis shall reveal electric parasitic currents induced in cable shields, provide a "simple" calculation method to estimate the expected parasitic currents (based on relevant parameters as: cable length, number of wires, current, power inverter switching frequency ...) and define the setup which creates a minimum of electro-magnetic disturbance and losses in the cable system.

### Task:

- Model the electric properties of a shielded single core power cable and 3 wire systems
- Model / calculate the parasitic electrical currents in the cable shields
- Provide a simplified calculation formula to estimate parasitic currents (in the cable shields)
- Verify the results on a real installation (within Graz area)

### Study:

- Electrical engineering

### Requirements:

- Ability to simplify the physical layout and to create a suitable model of the real-world installation
- Understand the working principles of electric motors and the power electronics for them
- Ability to execute verification measurements in cooperation with AVL

Remuneration: The successful completion of the thesis is a one-time fee of EUR 2.500, - gross remuneration

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