

Ansys and volabo GmbH

“Ansys offers a broad set of tools that can reproduce any engineering problem in a simulation, find a solution and optimize the processes. The development of novel drive concepts such as volabo’s ISCAD requires a large number of examinations from a wide variety of disciplines. Ansys products, made available through the Ansys Startup Program, in conjunction with appropriate training, not only cover individual issues but also provide an interdisciplinary interface to generate substantial added value for every young company.”

Oleg Moros
Senior Developer E-Motor volabo GmbH

Benjamin Rubey
Senior Developer Power Electronics volabo GmbH

ISCAD – Intelligent Stator Cage Drive: The E-Mobility Revolution

The automotive market is developing and changing faster than ever. Many technology companies are trying to gain a foothold here. In order to be competitive you have to generate unique selling points and drive the development processes quickly and safely. Advanced technologies like ISCAD require advanced development tools, which enable engineers to handle more complex tasks in shorter periods of time.



/ Challenges

Volabo GmbH launched a novel product on the automotive drive market, making it the only company to achieve high performance with safe battery voltages of 48 V. Thanks to the high degree of parallelization, the overload capacity of the drive increases enormously. In addition, the power density increases significantly. This poses new challenges for both mechanical components and cooling.

/ Technology Used

Ansys Maxwell (2D/3D)/Electronics Desktop

Ansys Icepak

Ansys Mechanical

Ansys Fluent

/ Engineering Solution

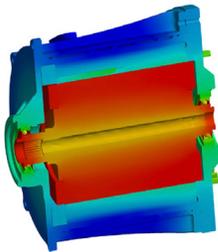
A power-dense integrated unit consisting of motor and power electronics requires interdisciplinary coupled investigations and optimization processes. Many input and output parameters affect the overall system in different ways. Electrical, magnetic, mechanical, thermal and other influences are taken into account in corresponding coupled components using Ansys simulation solutions provided through the Ansys Startup Program.

/ Benefits

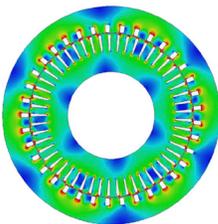
The most important feature is that the solution to any problem comes from just one vendor — Ansys — so there are no compatibility issues. This increases usability, increases productivity and reduces the usual time constants in development. At the same time, a reliable and well-maintained interface to customers, partners and contractors is formed, which simplifies communication and increases throughput. All parties benefit from the use of Ansys' comprehensive interdisciplinary solutions.

/ Company Description

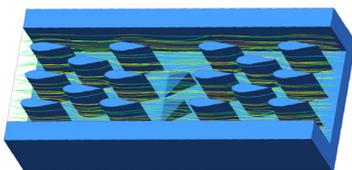
Volabo developed the first 48 V high power traction drive, which is 25% more efficient than conventional electrical drives and does not need rare earth magnets for production. What makes ISCAD unique is the virtual gearbox with which the motor can continuously adapt to the load profile and thus make better use of the battery capacity.



Thermal simulation of ISCAD motor. Rotor temperature is always critical in squirrel cage rotors. Modeling heat flow through the airgap is challenging but can be achieved with Ansys Fluent.



Electromagnetic simulation of the motor using Ansys Maxwell. Detail of the thermal simulation, focusing on the rotor. Detail of the thermal simulation, focusing on the rotor. Simulation of fluid flow in the power electronics cold plate.



So-called pin-fins are used to increase the thermal conductivity between fluid and cold plate. In- and outlets of cooling systems should be optimized thoroughly as they are crucial to the overall pressure drop inside the cooler.

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