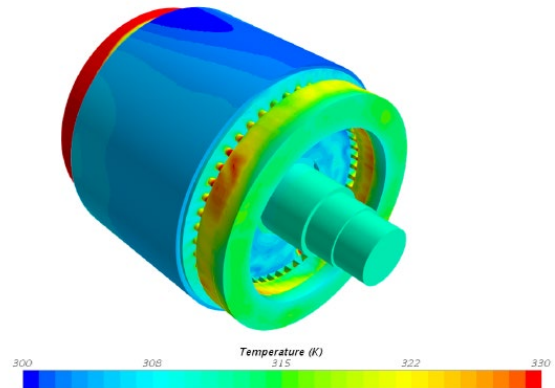


In-slot cooling of traction electrical machines



Goal:

To quantify the torque, power and thermal impact by using in-slot cooling of electrical machines instead of the traditional stator jacket cooling.

Background:

Electrified vehicles are today becoming more and more common. These are typically cooled via water channels in the aluminium frame of the machine. This limit the continuous current density in the machine to around 10 A/mm². A recent research work conducted at the division of Electric Power Engineering has proven that a new concept with oil cooling directly in the stator slots can reach 20 A/mm². Next step is now to compare the two design possibilities with each other.

Plan:

Study the thermal network of an ordinary stator-jacket cooled permanent magnet machine. Modify the network to be valid for an in-slot cooled machine structure. Determine the electromagnetic ability of the two machines using the same outer diameters. Quantify their performances in selected drive cycles. Perform cooling performance simulations of the proposed designs to identify possible problems and optimize the cooling circuit.

Execution:

Spring-2022, 1-2 students.

As this is a collaboration project between two departments, a possibility is to have one student from M2 and one from E2, however one/two M2 students will also work.

Main location is Chalmers campus Johanneberg, M2 department, VEAS division.

Contact persons:

Alexey Vdovin alexey.vdovin@chalmers.se,

Emma Grunditz emma.grunditz@chalmers.se.