DEP MeshWorks

CHT analysis of an Electric Motor for Thermal Distribution and Pressure Drop

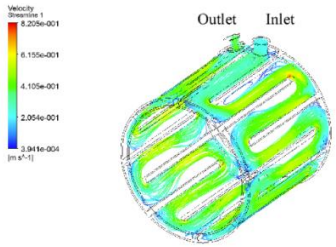
About the Client

The client is one of the leading Tier-1 supplier and electrical motor manufacturer with global operations.

DEP Edge

With the identified root cause for hotspots in motor components such as rotor core& coils , stator coils heat loss, stator core loss, rotor loss, rotor end plate, DEP team proposed solutions of oil cooling & coolant jacket optimization techniques. Also the rotor assembly was optimized to reduce the coil temperature.

Motor Cooling Jacket:



The objective

The requirement was to perform the CHT analysis of the motor to get the temperature distribution in the motor components.

DEP also needed to analyze the HTC's for the system modeling process on general duty cycle to ensure robustness and reliability while operating over a longer duration time scales. The need to do a correlated pressure drop study was also considered.

Additionally, the durability analysis was appended, to map the temperature distribution to the motor components and analyze them for durability.

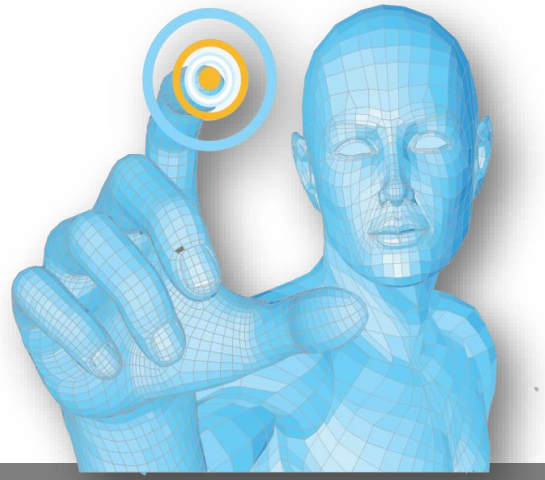
The Solution

The client provided inputs of motor speed, coolant flow rate, related material properties and the effective thermal conductive readings of the windings, stator &rotor core. The DEP team considered all the necessary boundary conditions including the stator coils heat loss, stator core loss, rotor loss, rotor end plate loss on all sides, and bearing heat loss.

The team used its expertise to calculate the temperature distribution and hotspots in the motor and pressure drop in the coolant channel. We experimented various design recommendations to minimize the coil temperature. With the above parameters, all the studies were undertaken and the CHT & durability analyses for the motors were successfully completed.

As a result of the performed analyses, we arrived at the temperature distribution chart and identified hot spot in the motor model.

Motor Temperature Distribution



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