

Konferenzbeitrag 24. April 2014, Ansys Conference & 9. Cadfem Austria Users's Meeting 24.-25. April 2014 Wien

Simulation of a High Velocity Cooling in the Wire Head Room of Electric Engines with ANSYS CFX

Electrical engines are today more than 100 years old. As they are now widespread in the world there have developed some principal building principles to gain most effectiveness on the one side and most cost effectiveness on the other side to build such devices. What is only now possible is to bridge the gap between designs that are also optimized concerning the internal cooling flow in the engine and hence a resulting cooling for the engine. The effort of cooling is paid by losing effectiveness in power to effort which is only true from a conservative classical point of view. In a restricted environment, with physical room as restriction, the room energy density becomes more important for overall effectiveness. For example in applications for driving vehicles, air vehicles or even wind generator engines. A wind generator is causing only a few percent of the total wind harvesting investment and could be upgraded cost effectively by the presented method of inner side engine cooling, applied for patent [1][2] and simulated with ANSYS CFX. By increasing power in the same wind generator housing more kWh can be sold. The simulation shows how the heat flow is changing, the heat flux is altering the total heat equilibrium and the effective energy power density is increased systematically. The result is a total heat density increase having fundamental importance for a huge variety of electric engine applications of modern civilization.

[1] *Cooling of a Wire Head Room* in German, European patent office application: EP13195074.3

[2] *Wire Head High Velocity Cooling* in German, cooling method for improvement of cooling of electric generators/engines in the same volume, Austrian patent application: A1263-2012