

Thermal Management Simulations within Power Engineering at ABB

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The area of thermal management is driven by miniaturization in industry e.g. power electronics, motors or transformers. It is a natural response to size restrictions as in automotive and robotics, to space excessive cost e.g. offshore applications or simply to industrial or comfort requirements. Besides that, unceasing market and technology demand for higher currents, higher voltages or higher power is inevitably leading to a substantial power density increase justifying large losses and generating important amounts of heat. Confined electrical systems, enclosures containing electrical components and other apparatus and devices can generate a lot of heat able to significantly reduce the life time of an installation if no appropriate thermal solutions were adopted. Cooling is also needed to provide the appropriate process or product quality with minimizing energy consumption and environmental impact.

An ever-increasing power density drives the need for more effective thermal management solutions where several phenomena e.g. electromagnetic, thermal and/or mechanical can be simultaneously taken into account. ABB is a leading company within power and automation technologies and to maintain its product quality and market penetration has always invested in acquiring state-of-the-art hardware and software tools to cope with its technology needs and ambitions. We are also building our own integrated multiphysics simulation methods able to develop accurate thermal solutions that account for the major interacting physical phenomena. This presentation can introduce you to our know-how in terms of numerical predictions of coupled systems and will also provide you with several examples of solutions where advanced simulations have been used.

Brief Bio

Rebei Bel Fdhila (male), Adjunct Professor in Process Modeling and Computational Fluid Dynamics at Mälardalen University since 2006. Got a PhD in 1991 from the National Polytechnic Institute of Toulouse, France “INP Toulouse/ENSEEIH” within multiphase flows and worked as a post-doc with EDF and CNRS in France followed by Twente University in Holland. Since 1995 he joined ABB Corporate Research in Sweden first as a researcher and today acting in his global role as a Corporate Research Fellow in Thermal Management. He has a large experience within the advanced modeling and simulation world. 30+ publications and 9 active patent families.