



ICEM'2022 TUTORIAL

TUTORIAL NAME:

Fundamentals and Latest Trends in Thermal Management of Electrical Machines

TUTORIAL PRESENTERS:

Rafal Wrobel, Newcastle University, rafal.wrobel@newcastle.ac.uk

BIOS OF THE PRESENTERS:

Rafal Wrobel (SMIEEE) received the M.Sc.Eng. degree from the Opole University of Technology, Opole, Poland, in 1998, the Ph.D. degree from the Lodz University of Technology, Lodz, Poland, in 2000, and the Habilitation degree from the Opole University of Technology, in 2013. He is currently a Principal Research Associate with Newcastle University, Newcastle upon Tyne, U.K. Rafal coordinates work of the Thermal Management Group, Advanced Propulsion Centre (APC) U.K., Electrical Machines Spoke and the U.K. Magnetic Society. His research interest includes multidisciplinary design for the application of electrical machines, transformers, and wound passive components.

ABSTRACT:

The tutorial on Fundamentals and Latest Trends in Thermal Management of Electrical Machines by Dr Rafal Wrobel has been compiled to provide a comprehensive overview of the subject and includes a combination of selected fundamental knowledge together with the latest research and developments. The tutorial starts with an introduction to the fundamental heat transfer mechanisms, which are presented in detail, in the context of a more reliable thermal design methodology. This initial section follows up with selected manufacturing and assembly aspects, which are challenging to accurately account for and significantly affect the machine's thermal behaviour. Here, the discussion on theoretical methods is supplemented with variety of standard and custom experimental techniques used to inform thermal design of electrical machines. The tutorial finishes with technology challenges associated with the next generation of electrical machines, with several examples of new thermal management concepts discussed in detail.

