



ICEM2022 – Valencia, Spain, September 5-8, 2022

Special Session on

Hairpin Windings in Electrical Machines for Transportation

Organized and co-chaired by:

Stefano Nuzzo, University of Modena and Reggio Emilia, Italy, stefano.nuzzo@unimore.it
Gerd Bramerdorfer, Johannes Kepler University Linz, Austria, gerd.bramerdorfer@jku.at

Call for Papers

Advances in electrical machines and power electronics are paving the way for lighter, more efficient, more reliable and more electric powertrains for transportation systems. In this context, an ever-increasing interest is given to form-wound technologies, such as hairpin windings. Nevertheless, such solutions often result in increased losses, as they are limited to solid bar conductors resulting in high alternate current (AC) losses. This limits their application at high operating speeds/frequencies, which on the other hand represent a key enabler for power density of components. Another bottleneck of hairpin windings is the limited flexibility of their manufacturing process. There is an urgent need for electrical machines' manufacturing to cope the gap with the demanding standard of the transportation industry, whose actual level of automation, capacity and repeatability is very high. Hence, new winding concepts are needed to mitigate AC losses, as well as automatized and sustainable processes are required to increase the flexibility of the manufacturing processes. This special session aims at collecting contributions of authors from both academia and industry working in the field of transportation electrification and who are dealing with hairpin technologies. Original research and practical contributions as well as surveys and state-of-the-art tutorials are welcome.

Topics of interest include, but are not limited to:

- Analysis, modelling and optimization of electrical machines featuring hairpin windings
- New winding concepts for increased fill factor, current density, and power density
- Analysis and modelling of high frequency effects in hairpin windings, including AC losses, voltage distribution and insulation reliability
- Alternative winding concepts for reduced AC losses and improved efficiency
- Thermal analysis and modelling of machines with hairpin conductors
- Thermal management and innovative cooling systems for high-efficiency electrical machines with hairpin windings
- New and more sustainable materials for hairpin windings
- Innovative winding manufacturing methodologies for improved flexibility, automation and sustainability
- Other topics related to hairpin technologies

Submission of papers: deadline follows the deadline for the regular papers. All the instructions for paper submission are included in the conference website: <http://www.icem.cc/2022>