

Organisational Information

Sign up at: www.ecpe.org/events

Registration Deadline:

22 April 2025

Participation Fee:

- € 670,- * for industry
 - € 520,- * for universities/institutes
 - € 180,- * for students/PhD student (limited spaces; copy of students ID required)
- * plus VAT

- The participation fee includes dinner, lunches, coffee/soft drinks and digital proceedings. The reduced (PhD) students fee includes all except for dinner (can be booked for an extra fee of € 50,-*)
- Digital proceedings will be provided by download link latest one day before start of the event. A printed handout is available on request (€ 50,-*).
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via email.
- 25 % discount for participants from ECPE member companies.
- 10% discount on university/institute fee for participants from ECPE competence centres.
- Further information (hotel list and maps) will be provided after registration and can be found on the ECPE web page.
- Cancellation policy: Full amount will be refunded in case of cancellation upon to 2 weeks prior to the event. After this date 50 % of the fee is non-refundable (replacement is possible).
- The number of participants is limited to 35 attendees.

20/01/25

Organisational Information

Organiser	ECPE e.V. Ostendstrasse 181 90482 Nuremberg, Germany www.ecpe.org
Technical Chair	Prof. Dr. Ger Hurley, University of Galway (IRE) Prof. Dr. Ziwei Ouyang, Technical University of Denmark (DK)
Technical Contact	Dr. Chris Gould, ECPE e.V. +49 911 81 02 88 – 21 chris.gould@ecpe.org
Organisation	Ingrid Bollens, ECPE e.V. +49 911 81 02 88 – 10 ingrid.bollens@ecpe.org
Venue	Clayton Hotel Cambridge 27-29 Station Road Cambridge CB1 2FB United Kingdom



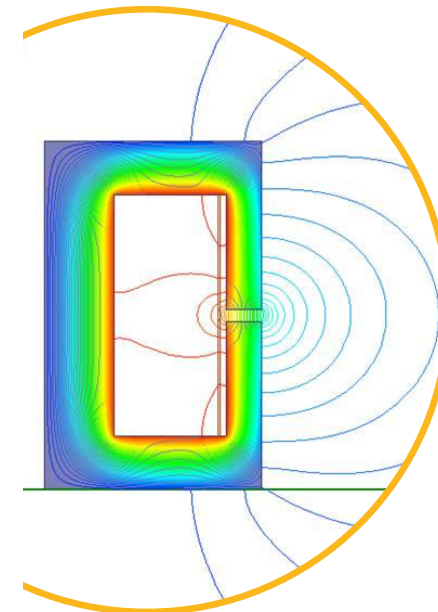
Source photo: Clayton Hotel Cambridge
Source graph front page: Ger Hurley, University of Galway



European Center for
Power Electronics e.V.

ECPE Tutorial

Passives in Power Electronics: Magnetic Component Design and Simulation



29 – 30 April 2025
Cambridge,
United Kingdom

Passives in Power Electronics: Magnetic Component Design and Simulation

29 – 30 April 2025
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Today, high efficiency and high power density converters are fundamental to the continued profitable growth of the telecommunications, automotive, aerospace and data processing industries. High-frequency operation can lead to a reduction in magnetics size and an increase in power density. The tutorial begins with the fundamentals of magnetic component design for inductors, including optimised design of multiple coil inductors such as the Forward and Flyback converters. Following this an in-depth overview and classification of industrially available permeable materials is given, with a focus on high frequency applications and case studies for core material selection. Design of optimised transformers considering core and winding losses will be introduced, by proper selection of the maximum operating flux density based on the core loss properties. Practical designs will include Push-Pull and LLC resonant converters. The winding is further optimized for high frequency loss with non-sinusoidal currents. Fringing, interleaving and litz wire will also be discussed as critical high-frequency design issues.

To further develop high power density converters, low profile geometries such as planar magnetics will be introduced and discussed. Planar magnetics fabrication processes have several advantages over conventional magnetics such as automated assembly and predictable parasitics. They also lend themselves to integrated magnetic solutions. Planar magnetic components are particularly suited to wireless power transfer because of their low profile.

The tutorial concludes with a simulation approach and the numeric models will be presented in order to allow an easy application of the tutorial contents to power magnetic component designs.

The Tutorial is chaired by:

Prof. Dr. Ger Hurley, University of Galway (IRE)
Prof. Dr. Ziwei Ouyang, Techn. Univ. of Denmark (DK)
Dr. Jesus Acero, University of Zaragoza (ES)
Dr. Maeve Duffy, University of Galway (IRE)

All presentations and discussions will be in English

Programme

Tuesday, 29 April 2025

09:30 Registration & Welcome Coffee
GMT

10:00 Welcome, Opening
GMT Chris Gould, ECPE e.V.

10:15 Magnetics Design - Part 1
Ger Hurley
- Review of fundamentals of magnetics
- Inductor design considerations
- Optimised inductor design
- Practical examples: Forward and Flyback converter applications

12:00 Lunch

13:00 High Frequency Materials for Advanced Magnetics
Maeve Duffy
- Review of fundamentals
- Magnetic material properties
- Choice of core material case studies

14:30 Coffee Break

15:00 Magnetics Design - Part 2
Ger Hurley
- Transformer design considerations
- Optimised transformer design
- Practical examples: Push-Pull and LLC resonant converter applications

16:30 Open questions from the 1st day

17:00 End of 1st Day

19:30 Dinner

Programme

Wednesday, 30 April 2025

09:00 Start of 2nd Day
GMT

09:00 High Frequency Considerations
Ger Hurley
- High frequency calculations for winding losses and core losses
- Fringing
- Interleaving
- Litz wire

10:30 Coffee Break

11:00 High Frequency Planar Magnetics for Power Conversion
Ziwei Ouyang
- Overview of planar magnetics
- High frequency eddy current effects: Interleaved windings, parallel windings
- High frequency leakage inductances
- Winding capacitances
- Magnetics integration

13:00 Lunch

14:00 Modelling and Simulation of Magnetic Components
Jesus Acero
- Modelling of inductors and transformers by means of electrical impedances
- Finite element simulation: assumptions, limitations and practical approaches
- Analytical-finite element mixed modelling
- Introduction to efficiency optimization
- Experimental verification, modelling and simulation of magnetic components

16:00 Final Discussion

16:15 End of Tutorial