The Multinational Power Electronics Association

# PSMA Magnetics Committee Meeting

August 7TH 2025

**Ed Herbert, George Slama, Matt Wilkowski**
**Committee Chairs**

*PSMA is a not-for-profit organization and a CO-SPONSOR OF APEC*

# *PSMA Magnetics Committee Meeting Agenda*

- Introductions
- 2026 Workshop Planning
- 2026 Industry Session Planning
- Special Projects
  - Core Loss Database
  - Current Driven Core Loss
  - Electrical Parameters of Magnetic Materials – phase 2
- Magnetics Forum on PSMA Website
- Open Magnetics
- Power Technology Roadmap
- Next Meeting

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# *PSMA Magnetics Committee Meeting Agenda – 2026 Workshop Planning*

- ✓ Identify Themes
  - ➢ Overall Theme: Measurements and Data Trends to Achieve Better Analytic Models and Simulation Models Towards Improved Design Tools
  - ➢ AM Theme: Developing Analytic and Simulation Models from Measurement Data
  - ➢ PM Theme: Starting with Design Basics to Achieve Design Automation
- ✓ PSMA Special Projects Request
  - ➢ Approved by PSMA BOD on May 16, 2025
- ✓ 2026 Magnetics Workshop Banner
  - ➢ Draft available – May 20, 2025
    - ▪ Use for PSMA 2025 Q2 Newsletter article
- ✓ 2025 PSMA 2 Quarter Newsletter
  - ➢ Draft article submitted - May 27, 2025
- ❑ Next Steps (June 2025 thru August 2025)
  - ➢ Identify – Invite – Confirm Keynote presenters
  - ➢ Identify – Invite – Confirm Lecture presenters
  - ➢ Identify – Invite – Confirm Technology Demonstrations

# *PSMA Magnetics Committee Meeting Agenda – 2026 Workshop Banner*

# *PSMA Magnetics Committee Meeting Agenda – Milestone Schedule*

| AI # | Description | Target Date | Actual date | Comments |
|---|---|---|---|---|
| 1 | Compile post workshop survey results | 3/17/2025 | 3/17/2025 | |
| 2 | Identify themes for workshop | 4/9/2025 | 4/9/2025 | |
| 3 | Post final presentations from previous workshop to attendees only URL | 4/11/2025 | 4/10/2025 | |
| 4 | Identify theme for industry session | 5/7/2025 | 5/7/2025 | |
| 5 | Approve expenses for previous workshop | 5/1/2025 | 5/1/2025 | |
| 6 | Establish budget | 5/5/2025 | 5/6/2025 | |
| 7 | Create banner for the workshop | 5/15/2025 | 5/20/2025 | |
| 8 | 2ND quarter PSMA newsltter article | 5/23/2025 | 5/27/2025 | |
| 9 | Submit workshop proposal to PSMA BOD | 6/1/2025 | 5/14/2025 | Approved PSMA BOD on 5/16/2025 |
| 10 | Identify target keynote presenters | 6/18/2025 | | |
| 11 | Identify lecture presenters | 6/18/2025 | | |
| 12 | lidentify technology demonstrators | 6/18/2025 | | |
| 13 | Solicit keynote presenters | 6/30/2025 | | |
| 14 | Solicit lecture presenters | 6/30/2025 | | |
| 15 | Solicit tech demonstrators | 6/30/2025 | | |
| 16 | Solicit workshop partners | 7/1/2025 | | |
| 17 | Confirm keynote presenter | 8/1/2025 | | |
| 18 | Confirm lecture presenters | 8/1/2025 | | |
| 19 | Confirm technology demonstrators | 8/21/2025 | | |
| 20 | Submit 3RD quarter PSMA newsletter article | 8/22/2025 | | |
| 21 | Identify poster presenters | 9/12/2025 | | |
| 22 | Solicit poster presenters | 9/30/2025 | | |
| 23 | Confirm poster presenters | 10/15/2025 | | |
| 24 | Confirm partners | 10/15/2025 | | |
| 25 | Publish final presentations from previous workshop to public PSMA URL | 10/15/2025 | | |
| 26 | Tour facilities in conjunction with pre-APEC meeting | 10/15/2025 | | |
| 27 | Post tentative agenda on website | 10/22/2025 | | |
| 28 | Open registration | 10/24/2025 | | |

# *PSMA Magnetics Committee Meeting Agenda – Magnetics Workshop - AM Session Presenters*

- ❑ AM Theme: Developing Analytic and Simulation Models from Measurement Data
- ➢ Keynote:
  - Who – Helen Cui (University of Tennesee) or Maeve Duffy (University of Galway Ireland)
    - Analytic Models
- ➢ Lecture presenter 2:
  - Lucas Pniak – SAFRAN Research and Technology Center – Industry
    - Planar Transformers Electromagnetic Modelling Considering Capacitive Couplings Up to 100 MHz
- ➢ Lecture presenter 3:
  - Nick Kirkby – ASU – Research
    - (consider for student poster if Kirkby is still a student)
  - Miroslav Vasic/Danile Rios Linares – University of Madrid – Academia
    - Artificial Neural networks (ANN) and Digital Twin to optimize DAB transformer design
- ➢ Lecture presenter 4:
  - Thomas Guillod – Dartmouth – Research
    - Qualifying measurement data, eliminating bias

# *PSMA Magnetics Committee Meeting Agenda – Magnetics Workshop PM Session Presenters*

- ❑ PM Theme: Applying Design Basics to Achieve Design Automation
- ➢ Keynote:
  - Iosu Aizpuru Larrañaga – University of Mondragon – Academia
    - Core loss from the aspect of physics-based modelling
- ✓ Lecture presenter 6:
  - Alfonso Martinez – Wurth Elektronik
    - Analytical models for leakage and stray inductance
- ✓ Lecture presenter 7:
  - TBD – SIMPLIS Technologies – Industry
    - Simulation models
- ➢ Lecture presenter 8:
  - TBD – Frenetic – Industry
    - Excel spreadsheets to AI

# *PSMA Magnetics Committee Meeting Agenda – Magnetics Workshop – Tech Demo Presenters*

- Technology Demonstration Presenters
- Presenter 1:
  - Who – Rohde & Schwarz – Industry
    - VNA – S-Parameters
- Presenter 2:
  - Who - Hioki – Industry
    - Power analyzer, LCR meter, Impedance Analyzer
- Presenter 3:
  - Who - Affiliation – Industry
    - Dielectric Withstanding Voltage/Insulation resistance
- Presenter 4:
  - Who – PE Systems – Industry
    - Double Pulse Set
- Presenter 5:
  - Joaquim Tristan - UPITT – Academic
    - Automated Test Systems
- Presenter 6:
  - Who - Affiliation – Industry
    - Partial Discharge
- Presenter 7:
  - Marcin Kacki/Student - Hitachi Energy/University of Madrid – Industry/Academia collaboration
    - Impact of unequal flux distribution on power loss (potential poster)
- Presenter 8:
  - Jun Wang - Bristol – Academic
    - TPT
- Presenter 9:
  - Alfonso Martinez – Wurth – Industry
    - Core Loss Data Base
- Presenter 10:
  - Lukas Mueller - Micrometals – Industry/Academic
    - Current Driven Core Loss
- Presenter 11:
  - Michael Freitag - Yageo – Industry
    - TBD
- Presenter 12:
  - Who - Affiliation – Sector
    - TBD

# *PSMA Magnetics Committee Meeting Agenda – Magnetics Workshop – Student Posters*

- Presenter 1:
  - Nick Kirkby – ASU
    - NIST Standards – Error Analysis
- Presenter 2:
  - Who - Affiliation
    - TBD
- Presenter 3:
  - Who - Affiliation
    - TBD
- Presenter 4:
  - Who – Affiliation
    - TBD

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# *PSMA Magnetics Committee Meeting Agenda – 2026 Industry Session Planning*

- Previous Industry Sessions
  - Presentations from industry sessions of 2023, 2024 and 2025 are not indicated on Presentations" tab of the Magnetics Technical Forum
  - Action Item: John Horzepa to check with APEC Industry Session chairs if we can restart the practice of making the APEC industry session presentations available on the "Presentation" tab of the Magnetics Technical Forum of the PSMA website if we wait one year after each APEC to place the presentations of the technical forum.

# *PSMA Magnetics Committee Meeting Agenda – 2026 Industry Session Planning*

- ✓ Identify Themes
  - ➢ Manufacturing Challenges and Directions
  - ➢ Magnetic Materials for Existing and Emerging Applications
  - ➢ Pairing Capacitors with Inductors to Create Better Solutions

- ❑ Next Steps (June 2025 thru July 2025 for August Submission to APEC)
  - ➢ Identify – Invite – Confirm presenters
  - ➢ Strategy 50/50 mix of industry and research presenters
  - ➢ PSMA to identify ten (10) industry sessions to sponsors other will need to be submitted outside of PSMA umbrella
  - ➢ APEC 2026 Industry Session Proposal submission deadline is August 15, 2025

# *PSMA Magnetics Committee Meeting Agenda – Industry Session Planning*

## ❑ Addressing Technical Manufacturing Challenges and Directions to Meet Emerging Market Demands

- ➢ Presenter 1:
  - Marcin Kacki - Hitachi Energy/University of Madrid – Industry/Research collaboration
    - Experimental data confirming analytical calculations and simulations to address challenges of transformer design for DAB
- ✓ Presenter 2:
  - Claudio Canete-Cabeza – Wurth – Industry
    - Transformers for 400V/48V scalable to 800V/48V power conversion for AI data centers
- ➢ Presenter 3:
  - Rudy Geisler – National Magnetics – Industry
    - Custom magnetic cores to meet Advanced technical requirements
- ➢ Presenter 4:
  - Peter Weiner - Norwe – Industry
    - 3D Printing and or Laser Direct Structuring
- ➢ Presenter 5:
  - Martin Kuo – ITG Electronics – Industry
    - Robotics factory to Improve Effciency of Magnetics
- ➢ Presenter 6:
  - Chris Riccardella – Standex – Industry
    - Automation Planar Magnetics
- ➢ Presenter 7:
  - Peter Guo – DMEG – Industry
    - New magnetic materials and production automation
- ➢ Backup Presenter:
  - Who - Affiliation – Industry
    - Molded versus Pressed Cores versus machined cores
- ➢ Backup presenter:
  - Martin Kuo – ITG – Industry
    - Solutions for High Power Motor Drives

# *PSMA Magnetics Committee Meeting Agenda – Industry Session Planning*

- ❑ Magnetic Materials for Existing and Emerging Applications
  - ➢ Presenter 1:
    - Lukas Ressenweber – Coburg University – Research
    - Peter Zacharius – University of Kassel - Research
      - Overview of relevant magnetic material properties for existing and emerging applications
  - ✓ Presenter 2:
    - Sai Pranesh Amirisetti – University of Florida (Gainesville) – Research
      - Electroplated Nanocomposite Magnetic Material
  - ➢ Presenter 3:
    - Toshio Hiraoka - Taiyo Yuden – Industry
      - Magnetic material for IVR applications
  - ➢ Presenter 4:
    - Hideki Oyama – Ajinomoto Fine-Techno – Industry
      - Magnetic powders and films
  - ✓ Presenter 5:
    - Abraham Solis MK Magnetics – Industry
      - Tape Wound Amorphous Cores
  - ✓ Presenter 6:
    - Tobias Trupp - Magnetec – Industry
      - Nanocrystalline Cores for EMI applications
  - ➢ Presenter 7:
    - Michael Freitag – Yageo – Industry
      - Nanocrystalline Cores for Power Applications
  - ➢ Presenter 8:
    - Reddy Andapally – CBMM– Industry
      - Embedded Actives to Improve Performance of Nanocrystalline Core
  - ➢ Backup presenter:
    - Who - Sandia – Research
      - TBD

# *PSMA Magnetics Committee Meeting Agenda – Industry Session Planning*

- ❑ Pairing Capacitors with Inductors to Create Better Solutions
- ➢ Presenter 1:
  - ✓ Simon Reuing – Yageo – Industry
    - ▪ A Practical Guide for Power Conversion
- ➢ Presenter 2:
  - ✓ Symon Pasko – Schaffner – Industry
    - ▪ The importance of magnetic and capacitive components in emc filters
- ➢ Presenter 3:
  - ✓ Jared Quinzer – Wurth Elektronik – Industry
    - ▪ Best practices for defining inductors for emi filters
- ➢ Presenter 4:
  - ✓ Bryce Hestermann – Utah State University – Academia
    - ✓ Performance of Common-Mode Chokes with Enhanced Differential-Mode Inductance in EMI Filters zincluding Capacitive Interactions
- ➢ Presenter 5 (alternative):
  - ▪ Arturo Mediano – HF Labs - Research
    - ▪ Shielding, Filter Locations

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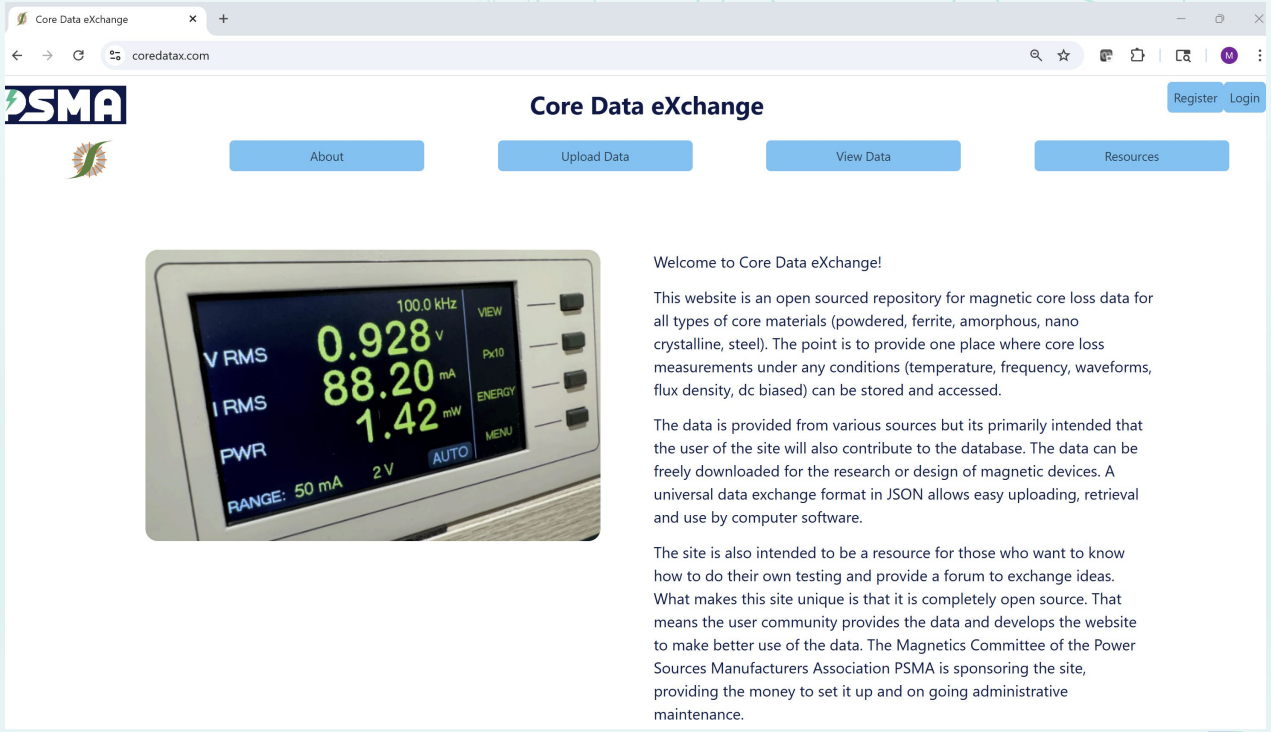
- Core Loss Database
  - on-line needs formatting/styling
  - URL: coredataX.com
  - URL: https://www.psma.com/magdb-test



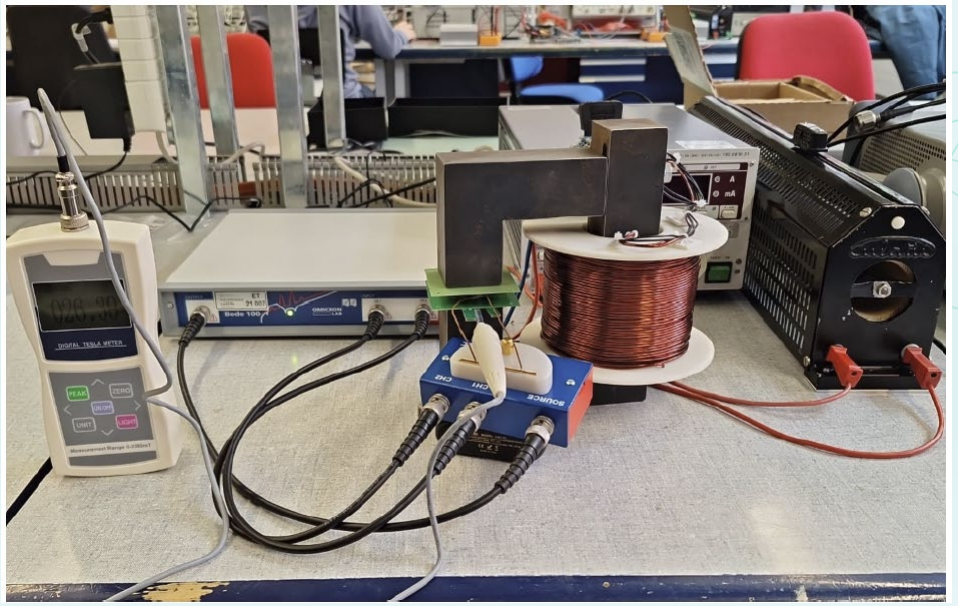
– Current driven core loss testing –

- Approved by PSMA BOD June 20, 2025
- Project can start upon receipt of 50% upfront gift payment
  - PSMA to submit gift form
  - Payment to University of Nebraska care of Jun Wang
- 50% final payment after approval of final report

Still waiting on payment from PSMA

– Electrical parameters of magnetic materials – phase 2
  - Final report available
  - Approved payment with additional contingency expenses
  - Need invoice from HSLU
  - Place accepted report on special projects tab of Magnetics technical forum
    – Add link to IEEE Xplore for associated APEC 2025 paper
  - KPIs
    – Data
    – Methodology

Action items
Invoice
Final report on website



- Pending
  - Steinmetz like approximation
  - Spice model
  - Propagation in magnetic materials

Address after APEC 2026 planning meeting in October

Potential special project
European - Scholarship grant to 15 PhD connected with electronic components
- Magnetic materials
- Modelling
- Holistic design

Hitachi 3 students
Identify some preliminary ideas
Link students with specific magnetic committee members

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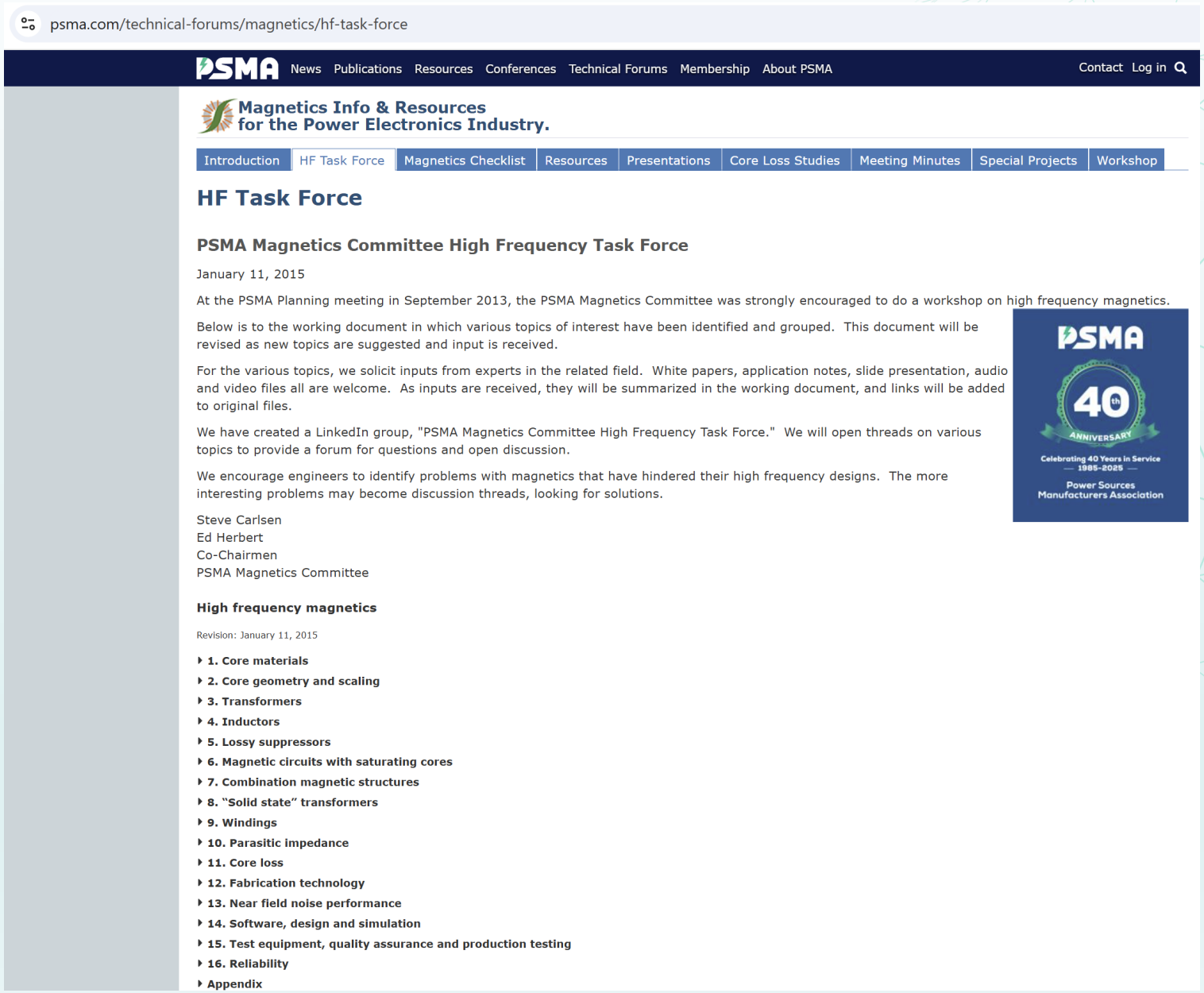
# *PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website*

- Completed in 2024
  - Section 1.3 Powdered metal
    - Proposal by Lukas Mueller has been accepted
    - Need to add to HF task force tab under magnetics Technical Forum on PSMA website
- Proposed additions/updates
  - Section 1 Core Materials
    - Sputtered (addition)
    - Electroplated (addition)
    - Section 1.4 Nanocrystalline and amorphous metals (populate)
  - Section 4 Inductors
    - TLVR inductors (addition)
  - Section 8 “Solid state” transformers (populate)
  - Section 12 Fabrication Technology
    - Section 12.3.2 Substrate embedded (populate)
    - Section 12.6 PSiP (populate)
    - Section 12.7 PwrSoc (populate)

Address
sections 1, 4, 8 and 12
after APEC 2025

# PSMA Magnetics Committee –Magnetics Committee Forum on PSMA Website

https://psma.com/technical-forums/magnetics/hf-task-force



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# *PSMA Magnetics Committee Meeting Agenda – Open Magnetics*

- What's next?
  - Proceed to integrate into PSMA webpage
    - April 25 – initial discussions with PSMA webmaster
    - May 8 – feedback from PSMA webmaster

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# 2025 Edition PSMA Power Technology Roadmap
# Magnetics Section

- 2025 Topics (Submitted)
  - Embedded Magnetics
    - Integrated Voltage Regulators (IVR)
    - Fully Integrated Voltage Regulators (FIVR)
    - Hybrid Integrated Voltage Regulators (HIVR)
    - Isolated Signal and Low Power Transformers
    - PwrSoC (Power Supply on Chip)
    - Power Systems in Package (PSiP)
  - Solid State Transformers (SST)
  - Trans-Inductor Voltage Regulators (TLVR)
  - Mother Board Voltage Regulators (MBVR)
    - Lateral Power Delivery (LPD)
    - Vertical Power Delivery (VPD)
    - Dual Phase Power Block (DPPB)
  - ~~Wireless Power Transfer (WPT)~~
    - ~~EV Charging~~
  - Core Loss Measurement Methods & Databases
  - Magnetic Material Alternatives Opportunities and Limitations

- 2026/2027 Cycle Topics (Need to identify)
  - Net Zero Bias TLVR
  - Solid State Transformers (SST)
  - Magnetic Materials
  - EV Charging
  - TBD
  - TBD

2025 PSMA PTR Released June 2025

Still in process of identifying chairs for the next cycle of the PSMA PTR?

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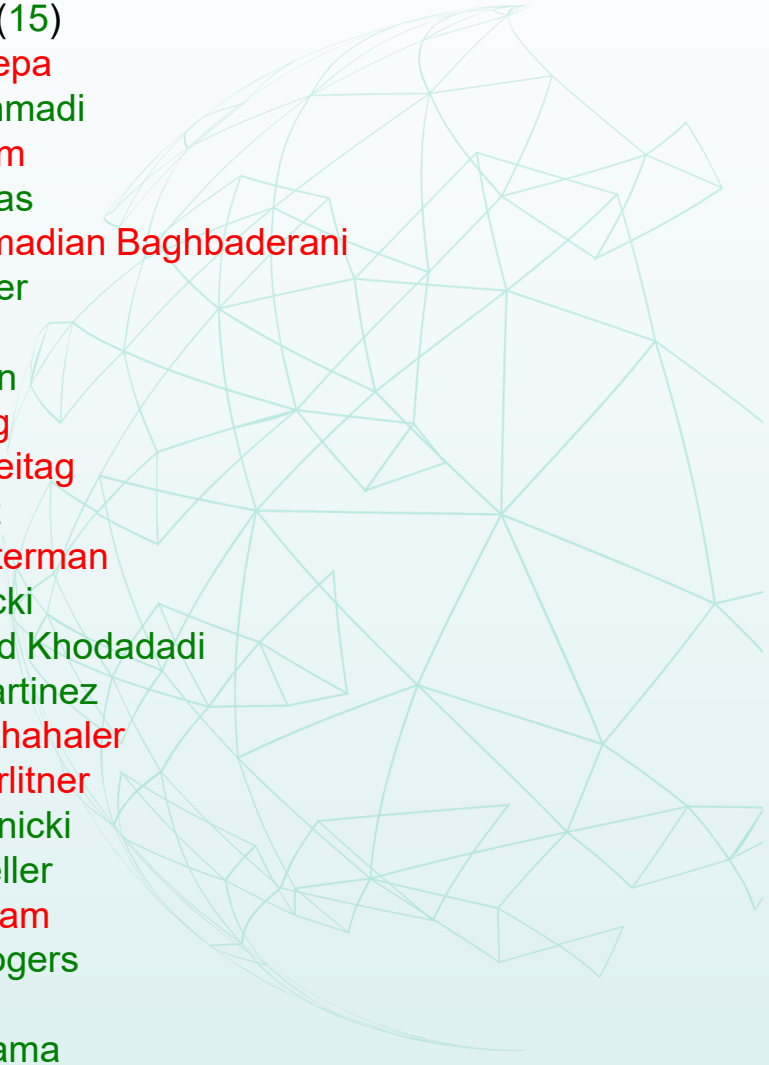
## *PSMA Magnetics Committee Meeting Agenda – Next Meeting*

- Thursday September  11 10:00 AM CDT – 11:00 AM CDT Virtual

# *PSMA Magnetics Committee Meeting*

- Attendance (15)
  - John Horzepa
  - Kamyar Ahmadi
  - Mike Arasim
  - Andres Arias
  - Hasan Ahmadian Baghbaderani
  - Alan Cooper
  - Jim Cox
  - Doug Eaton
  - Frank Feng
  - Michael Freitag
  - Ed Herbert
  - Bryce Hesterman
  - Marcin Kacki
  - Mohammed Khodadadi
  - Alfonso Martinez
  - Jonas Multhahaler
  - Frank Oberlitner
  - Paul Ohodnicki
  - Lukas Mueller
  - Mike Ranjram
  - Rodney Rogers
  - Ranajit Sai
  - George Slama
  - JC Sun
  - Tobias Trupp
  - Jun Wang – Bristol
  - Jun Wang - Nebraska
  - Ningning Wang
  - Matt Wilkowski



# Thank You