EMC Conference Programme

Wednesday 29th April

Murdoch Suite

09:30 - 10:30 Academic #1

Chairman: Dr. Marco Klingler – Klingler International Consulting Services, France

09:30 - 10:00 **Measurement of the Transfer Impedance of Textiles for Electromagnetic Shielding**

Valencia Katherine[1], Boulzazen Habib[1], Ndagijmana Fabien[2], Bechir Nizar[3], Kadi Moncef[1], Lernon Xavier[3]

[1] ESIGELEC - IRSEEM, France [2] Laboratory G2Ela - University of Grenoble, France [3] Research and development - Tenneco, France

The following paper is about the determination of the transfer impedance measured in the 1 GHz triaxial cell with two different configurations for different types of sleeves. Indeed, being a very important subject, the design of a sleeve allows us to ensure better shielding efficiency against electromagnetic disturbances. The transmission parameters (S21) will be transformed into transfer impedance by using the passage formula and adapted to the structure of the triaxial 1 GHz cell. The comparison of the transfer impedance for both configurations was studied. The first configuration includes the 1 GHz triaxial cell with two matching systems (internal and external), whereas the second configuration includes an internal matching system with an external short-circuit.

10:00 - 10:30 **Lightweight Convolutional Neural Network for DC Series Arc Detection in Rail Applications**

Jack Larkin, Danny Seeley, Paul Evans, Minglei You, Peter Christopher, Steve Greedy
University of Nottingham, United Kingdom

Managing and responding to DC series arcs is becoming increasingly relevant due to the increased adoption of high-voltage electrified railway networks. In these faults, current flows through the air between conductors as high temperature plasma, posing significant fire hazard and safety risks. In our work we propose a shallow Convolutional Neural Network (CNN) that can differentiate between healthy and arcing current measurements with an F1 score of 0.94. We also measure computational complexity, 211 million Floating Point Operations, to anticipate implementation on single-board computer devices.

10:30 - 11:00 Coffee Break

11:00 - 12:30 Academic #2

Chairman: Prof. Alistair Duffy – De Montfort University, United Kingdom

11:00 - 11:30 **Novel Method for EMC Testing of Large Automotive Subsystems**

Mayur Yeola, Abhijit Mulay – Automotive Research Association of India (ARAI), India

The automotive industry is currently experiencing rapid technological advancements, particularly in the realm of electric vehicles (EVs). These vehicles represent intricate and dynamic systems, comprised of various components that interact in complex ways. As the number of EVs on roads continues to rise, manufacturers are compelled to innovate and develop practical features for electric vehicles. In this context, conducting Electromagnetic Compatibility (EMC) testing on all powertrain components under real-world conditions becomes critically important. This paper will propose EMC testing methodologies specifically for large EV subsystems, such as traction batteries, Battery Thermal Management Systems (BTMS), and HVAC systems. Additionally, it will highlight instances where results from real-world scenarios diverge from those obtained in bench-level setups, and will detail the testing methodologies for these large components, ultimately aiming to yield more accurate and applicable results.

11:30 - 12:00 **Methodology to Estimate the Probability of a Radiated Field Level on an Embedded Automotive Component**

Baptiste Hamard[1][2], Tristan Dubois[2], Geneviève Duchamp[2], Franck Guillemard[1], Marco Klingler[3]

[1] Stellantis, France [2] IMS - Université de Bordeaux, France [3] Klingler International Consulting Services, France

A first approach using probabilistic methodology is being introduced to estimate the failure probability of automotive electronic components under radiated EMI, targeting ASIL D safety levels. A semi-enclosed cavity model and decoupled field-component simulations enable efficient environment characterization. Enhancements including multi-angle excitation, high-resolution sampling, and statistical distribution fitting (Gamma, Weibull) allow extrapolation toward ultra-low failure rates with reduced computational cost.

12:00 - 12:30 **UNECE Regulation No.10: Technical View and Revision 07 Updates for Vehicle EMC**

Hacer Karagol – TOGG, Turkiye

UNECE Regulation No.10 (ECE R10) is an automotive regulation which establishes the EMC test requirements and test environments for vehicles and electronic sub-assemblies (ESA). The scope of this paper is to present a general aspect of the electromagnetic requirements and EMC regulation in the automotive sector. The focus is to present changes between version 6 and version 7, updated test conditions, and refined requirements for electrically propelled vehicles of the latest version.

12:30 - 13:30 Lunch Break

13:30 - 15:00 Academic #3

EMC at the Edge

Prof. Alistair Duffy – De Montfort University, United Kingdom

"EMC at the Edge" explores electromagnetic compatibility challenges in distributed IoT and edge computing systems. After clarifying "the edge" as a fuzzy buzzword, the talk examines unique EMC challenges (self-interference, dense deployment, standards gaps), then advocates for the EMC community to evolve beyond test-bench thinking toward real-world electromagnetic environment monitoring and adaptive mitigation—addressing safety, performance, spectrum efficiency, and long-term reliability in deployed edge systems.

15:00 - 15:30 Coffee Break

15:30 - 17:00 Industrial Forum in Hawking Suite

15:30 - 16:00 **Presentation of DENPAFLUX, Platinum Sponsor**

DENPAFLUX is a Munich-based EMC consulting company, backed by TDK, that helps hardware teams pass EMC testing without slowing down development. With 500+ analysis reports delivered, DENPAFLUX provides structured expert support from early design reviews through to lab testing and certification, with a 3-business-day turnaround and a guaranteed outcome for teams that need full EMC project delivery. Trusted by hardware teams across various industries, DENPAFLUX also contributes to the EMC community through its free masterclass series and technical resources.

Tolkein Suite

09:30 - 10:30 Workshop #1.1

Modeling and Optimization of EMC in Electric Vehicle Power Electronics #1

Dr. Bibhu Prasad Nayak, Dr. Jan Hansen – Graz University of Technology, Austria

With the proliferation of EVs, power electronics plays a key role in the powertrain. Submodules like converters and inverters are an integral part of any electric vehicle design. The functional challenge to achieve higher efficiency and lower losses pushes designs toward faster switching, which brings more electromagnetic (EMC) challenges. Before a vehicle comes to market, it must undergo EMC tests and meet emission and immunity regulations. To meet these standards, either multiple EMC lab iterations are required or EMC simulation must be performed before the prototype is ready, known as EMC frontloading. A key challenge of EMC simulation is accurately modeling the noise source and the noise propagation path. As subsystems consist of multiple PCBs, hundreds of components, metal housings, and test harnesses, the problem becomes very complex and time-consuming. This calls for EM-driven methods that are computationally effective, focusing only on critical coupling and propagation paths. In the first part of this session, we address how to build an EMC simulation setup in a full-wave, circuit-coupled environment. We demonstrate a conducted emission setup for an inverter driving a motor, from component-level modeling to the full system model. The second part focuses on source modeling, which is another critical aspect of EMC simulation. In power-

electronics-driven subsystems, MOSFET switching is a key EMC noise source, but manufacturers often do not provide EMC-relevant model parameters. We show which parts of the switch model are important and introduce a circuit-coupled full-wave approach to handle switching behavior. In the third part, we focus on optimization driven by machine learning. Machine-learning-based methods provide an alternative to traditional optimization, enabling faster design space exploration while avoiding repeated complex simulations.

09:30 - 10:00 **Component & Source Modeling**

This presentation starts with passive component modeling, showing how equivalent network models for capacitors and inductors can be derived from impedance measurements. It then demonstrates EMC-relevant switch modeling, highlighting critical source parameters such as rise/fall time and ringing that dominate conducted and radiated emissions.

10:00 - 10:30 **System simulation - Circuit**

Network-level system simulation is presented as a first step to estimate filter topology, component count, and volume. Below a few MHz, SPICE-level models are shown to be sufficiently accurate for conducted emission prediction, and a complete workflow for conducted emission analysis is demonstrated.

10:30 - 11:00 Coffee Break

11:00 - 12:30 Workshop #1.2

Modeling and Optimization of EMC in Electric Vehicle Power Electronics #2

Dr. Bibhu Prasad Nayak, Dr. Jan Hansen – Graz University of Technology, Austria

11:00 - 11:30 **System simulation - Circuit coupled EM**

At higher frequencies, PCB layout and interconnect parasitics become critical and can significantly alter the EMC noise source. This presentation demonstrates circuit-coupled full-wave EM simulation as an effective approach to accurately capture parasitics and predict emissions in complex power electronic systems.

11:30 - 12:30 **Machine Learning & optimisation**

This presentation explores machine-learning-driven optimization techniques for EMC design. By learning from simulation data, these methods enable rapid design space exploration and performance optimization while significantly reducing the need for repeated full-wave simulations.

12:30 - 13:30 Lunch Break

13:30 - 15:00 Workshop #2

Emerging Trends in Automotive EMC and Antenna Testing

Janet O'Neil – ETS-Lindgren USA, Mark Reeve, – ETS-Lindgren EMEA

As automotive technology rapidly advances, electromagnetic compatibility requirements are evolving across regulations, test methods, and vehicle architectures. This workshop examines upcoming changes to UNECE Regulation 10, the growing need for hybrid EMC and antenna-measurement facilities, and the EMC challenges introduced by high-power electric powertrains and ADAS-integrated vehicles. Together, these topics highlight the industry's shift toward broader frequency coverage, multifunctional test environments, and dynamic, real-world operating conditions. Attendees will gain insight into regulatory developments, emerging test-facility concepts, and practical approaches for ensuring safe, compliant, and robust EMC performance in next-generation electric and connected vehicles.

13:30 - 14:00 **From R10.07 to R10.08: Preparing Manufacturers and Test Labs for the Next Regulatory Wave**

Mark Emery – HORIBA MIRA, UK

As vehicle technology continues to evolve and corresponding international standards are updated to compensate, so too must the directive that governs safe, compliant design. We explore the background to automotive legislation UNECE Regulation 10, the Type Approval regulatory certification process and the recently released changes within R10.07 along with the forthcoming supplements and future developments planned for R10.08. This presentation outlines what these changes mean for manufacturers, test labs, and type approval authorities.

14:00 - 14:30 **The Emergence of Hybrid EMC and Antenna Measurement Chambers in the Automotive Industry**

Ben Hodges – ETS-Lindgren, Finland

EMC testing has been a standard part of the certification and homologation process in the automotive industry for several decades, and in that time several standards have been developed to support the conducted and radiated emission and immunity measurement of components and full vehicles across a steadily increasing frequency range. More recently, the introduction of advanced driver assistance and communication systems has prompted the need for antenna pattern and over the air (OTA) communication measurements. In this presentation we will look at a developing trend toward the use of multi-functional facilities and the pros and cons of such an approach.

14:30 - 15:00 **Automotive EMC Testing Under Dynamic Driving Conditions**

Bennet Boeker – AVL Zöllner GmbH

Electric drive units generate significantly higher and higher frequency electromagnetic interference than combustion engines, with EMC strongly affected by operating conditions such as acceleration and braking. Modern vehicles must also integrate ADAS technologies that rely on sensitive RF electronics vulnerable to interference from high power electric components. To ensure vehicle safety, the EMC performance of key electric powertrain components must be evaluated in environments that replicate real driving conditions. This presentation reviews the main factors influencing EMC in electric powertrains and explores solutions for creating more realistic and representative test scenarios.

15:00 - 15:30 Coffee Break

15:30 - 17:00 Industrial Forum in Hawking Suite

15:30 - 16:00 **Presentation of DENPAFLUX, Platinum Sponsor**

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Thursday 30th April

Murdoch Suite

09:00 - 10:30 Academic #4

Electromagnetic Shielding - Principles and Reality

Prof. Andy Marvin – University of York, United Kingdom

A brief introduction to the principles of shielding effectiveness followed by a review of some practical issues and results. Finishing with an overview of shielding standards. “What is the Shielding Effectiveness (SE) of this enclosure?” is an easy question, but the answer is somewhat more complicated. In simple terms the SE of an enclosure is the ratio of energy coupled between a source and a victim (receiving antenna) without the enclosure to that with the enclosure present. The aim of this workshop is to help you understand the principles that underlie this complexity without too much mathematics. This is supported with examples of practical measurements that illustrate the effects discussed. Finally we will conclude with an overview of the SE measurement standards currently available and their applications.

10:30 - 11:00 Coffee Break

11:00 - 12:30 Academic #5

EMC Antennas: origins, applications and design

Dr. John Dawson – University of York, United Kingdom

Starting with a brief reminder of the fundamental performance metrics of an antenna, the presentation aims to give a review of a range of different antenna types used for EMC measurements, with a historical view of the development from dipoles to bilog; standard gain horn to ridged waveguide horn; along with probes & loops. Then some of the antennas we have modelled and designed at the University of York are presented, aiming to give some insight into the the use of computational tools to assist antenna design and some of the challenges we came across. Examples include the Bilog antenna, a broadband reverberation chamber antenna, and a suite of pulse antennas intended for testing equipment immunity to high level intentional interference.

12:30 - 13:30 Lunch Break

13:30 - 15:00 Academic #6

The challenges associated with the measurement of radiated fields from power system substations

Prof. David Thomas – University of Nottingham, United Kingdom

Multi-level converters are being increasingly used in power system substations as part of flexible AC transmission or high voltage DC. There is then a possibility of radiated interference due to the large physical size of high voltage substations. To date there are no standards for assessing substation radiated emissions, but CIGRE technical brochure 391 is generally used as a guide to ensure some sort of electromagnetic compatibility compliance. This workshop will discuss the philosophy behind the approach given in CIGRE technical brochure 391 and the potential challenges associated with completing the radiated electromagnetic emission assessment according to the guide.

15:00 - 15:30 Coffee Break

15:30 - 17:00 Academic #7

Computational Techniques in EMC

Prof. Christos Christopoulos – University of Nottingham, United Kingdom

The presentation will cover the advantages and limitations of numerical modelling, and emphasise the benefits of exploiting the synergies between simulation and physical experimentation. The main features of generic numerical tools will be discussed, and examples will be given of challenging multiscale problems.

Tolkein Suite

09:00 - 10:30 Workshop #3.1

Science-based Power Supply Design #1

Dan Beeker – System Solution Specialists, USA

From the basic concepts of electromagnetic field behavior to good design practices for power supply design, this webinar will help you to improve your product designs. It's all about the space!

09:00 - 09:30 **Electromagnetic Fields for Normal Folks: Show me the pictures and hold the equations, please!**

The material presented will be focused on the physics of electromagnetic energy basic principles, presented in easy-to-understand language with plenty of diagrams.

Attendees will discover how understanding EM field behavior can help design PCBs that will be more robust and have better EMC performance. This is not rocket science but an easy-to-understand application of PCB geometry.

09:30 - 10:30 **Effective PCB Design: Techniques to Improve Performance**

As IC geometries continue to shrink and switching speeds increase, designing electromagnetic systems and printed circuit boards to meet the required signal integrity and EMC specifications has become even more challenging. A new design methodology is required. Specifically, the utilization of an electromagnetic physics-based design methodology to control the field energy in your design will be discussed. This training module will review the development process and provide guidelines for building successful, cost-effective printed circuit boards. After introducing EM field behavior, this course will describe several effective methods for designing the spaces used to direct EM fields on a PCB. Simple rules for managing these fields will be described, based on one fundamental behavior. How fast does the switch change states? This defines the requirements for the power distribution and the geometry of the space between the output of the switch and the receiver. Several real-world examples of the use of these principles, both for designing compliant boards and for analyzing EMC failures are presented.

10:30 - 11:00 Coffee Break

11:00 - 12:30 Workshop #3.2

Science-based Power Supply Design #2

Dan Beeker – System Solution Specialists, USA

11:00 - 12:30 **Novel Power Distribution System Design**

This presentation will present a simple EM physics and geometry-based approach to designing power distribution networks on PCBs. The simple rules discussed can be used to reduce power supply noise and improve EMC from the input power connection to the IC die. New research will be presented on the impact of discrete components on radiated and conducted emissions, with an emphasis on cost analysis.

12:30 - 13:30 Lunch Break

13:30 - 15:00 Workshop #3.3

Science-based Power Supply Design #3

Dan Beeker – System Solution Specialists, USA

13:30 - 15:00 **Feeding the Beast: Consumption-based PCB design**

This session is a step-by-step guideline for determining the PCB design requirements based on device energy consumption requirements. Wave cycle times and transmission line capacity form the basis of this philosophy. The session will begin with a review of EM field behavior and transmission line design, then outline a process for analyzing the real power delivery challenge posed by a high-performance microprocessor. Starting with the DC current specification, we will use the device package pinout to determine the necessary PCB networks required to support the delivery of power to the device. The course will center on the LS1043 Network processor, with a focus on the core power supply requirements (7 A/uS). The package pinout and clock frequency will be used to determine the real "coulombs per wave cycle" that the PDN must support. This will then be used to design both local storage requirements and connecting structures. A spreadsheet will be presented, which can be used to do a quantitative analysis of the transmission line capability based on the impedance and length, so the number of wave cycles needed to deliver the required charge. This perspective can be used in the initial design phase or to evaluate existing designs. EMC test results from a production design, MPC-LS-VNP-MOD, using this approach, will be presented.

15:00 - 15:30 Coffee Break

15:30 - 17:00 Workshop #4

Reverberation Chambers for EMC and Beyond

Martin Wiles – MVG Industries Ltd, United Kingdom

This session will first cover EMC standards status and development and changes in a number of organisations including IEC, ISO and CISPR especially Automotive standards ISO 11451-5 and ISO 114512-11 as well as CISPR emissions standards. The concept and the theory of a reverberation chamber will be introduced. Its advantages and disadvantages compared with conventional test facilities (such as an anechoic chamber) will be presented and discussed. Traditional methods for processing reverberation chamber data are not always well suited to emerging test regimes such as 5G/6G testing. This presentation explores techniques such as AI-assisted configuration, closed-loop channel emulation, and time-reversal techniques to achieve faster, standards-compliant testing.

15:30 - 16:00 **EMC Standards for Reverberation Chambers**

Martin Wiles – MVG Industries Ltd, United Kingdom

This session will first cover EMC standards status and development and changes in a number of organisations including IEC, ISO and CISPR especially Automotive standards ISO 11451-5 and ISO 114512-11 as well as CISPR emissions standards.

16:00 - 16:30 **Introduction to Reverberation Chambers**

Prof. Yi Huang – The University of Liverpool, United Kingdom

In this 30-min talk, the concept and the theory of a reverberation chamber will be introduced. Its advantages and disadvantages compared with conventional test facilities (such as an anechoic chamber) will be presented and discussed.

16:30 - 17:00 **Beyond Statistical Averaging: Signal Processing in Reverberation Chambers**

Prof. Alistair Duffy – De Montfort University, United Kingdom

Traditional methods for processing reverberation chamber data are not always well suited to emerging test regimes such as 5G/6G testing. This presentation explores

techniques such as AI-assisted configuration, closed-loop channel emulation, and time-reversal techniques to achieve faster, standards-compliant testing.

Friday 1st May

Murdoch Suite

09:00 - 10:30 Industrial #1

Chairman: Keith Armstrong – Cherry Clough Consultants Ltd, United Kingdom

09:00 - 09:30 **Co-Simulation Workflow between CST 3D and Schematic Design**
Dr. Abdulmajid Abdulmajid – SIMUSERV, United Kingdom

This presentation demonstrates a practical 3D–circuit co-simulation workflow using CST Studio Suite for conducted EMI analysis in power electronics. An industrial 3-phase inverter case study is used to show how PCB parasitics and fast PWM switching generate common-mode and differential-mode noise. By combining full 3D electromagnetic modeling with transient circuit simulation, the impact of EMI filtering is evaluated against EMC standard limits. The workflow highlights how co-simulation enables early EMC risk detection, reduces prototyping cycles, and improves design confidence before hardware implementation.

09:30 - 10:00 **Oval Cable Cores**
Tamás Horváth – Fair-Rite Products Corp., Germany

Oval ferrite cores offer several advantages over their round counterparts and can be used in a variety of applications. Oval cores are a prime geometry for common-mode chokes allowing for two cables to be run side-by-side. This shape is also ideal as a filter to attenuate unwanted frequencies and improve power and signal quality for high-current applications on busbars. Oval ferrite cores offer a combination of improved performance, flexibility, and efficiency, making them a valuable choice for a wide range of applications.

10:00 - 10:30 **Cyber Security RED, PSTI, CRA - 2026 State of Play**
Alexander Toohie – Element Materials Technology, United Kingdom

Compliance is evolving, and around the world product cyber security requirements are slowly becoming mandatory. This presentation explains the current mandatory requirements, how to address them, and the lessons we have learned from the last two years of market surveillance, as well as exploring what the future will hold. We cover the current requirements under RED and PSTI, as well as the upcoming CRA requirements, including the manufacturer’s reporting obligations which become mandatory in four months’ time.

10:30 - 11:00 Coffee Break

11:00 - 12:30 Industrial #2

Chairman: Dr. Marco Klingler – Klingler International Consulting Services, France

11:00 - 11:30 **EMC issues in DC-output power electronics**
Arun Khilnani – The University of Nottingham, United Kingdom

Growing renewable energy adoption is increasing reliance on fast-switching DC-output power converters. Integrating these converters with new DC grids within the existing AC infrastructure is introducing more EMI, both among DC converters and across AC–DC interconnections. Maintaining EMC then requires compliant design, filtering, and coordination to maintain power quality and system reliability. Yet, we do not have standards to regulate EMC within DC grids. This presentation look ats the immediate issues we need to research to ensure greater integration of DC converters into the DC grid.

11:30 - 12:00 **Tales and trends from the front line of EMC testing: pass rates, observed failures, and root cause analysis from 10 years of commercial laboratory operation**
James Pawson – Unit 3 Compliance Ltd, United Kingdom

EMC has a reputation as a difficult discipline and the outcome of testing is often uncertain. Most small and medium companies design equipment with little EMC knowledge and simulation tools are rarely used. EMC test failures are frequent, causes are poorly understood, and mistakes are frequently made or even repeated. Working extensively with such small companies, including EMC analysis and problem solving, has given Unit 3 Compliance a unique insight into the most problematic tests, common failures, and most effective fixes. This talk will give a simple statistical overview of the products we have tested over the last 10 years including category of equipment, failure rates per test, failures per product, root cause analysis of failures, specific examples from some of the work that we have carried out, the impact of simple EMC design reviews on test outcomes. This real world data and analysis would be of value to anyone designing equipment today.

12:00 - 12:30 **Control Electronics Design for a Three-Phase Powered Medical Equipment**
Artsiom Shchatsko – Artengi Ltd, United Kingdom

A case study of control electronics design for safety-critical medical equipment used to clean surgical instruments. It shows the filtering, protection and layout techniques used to achieve good EMC performance for three-phase powered equipment containing multiple inductive loads, high-voltage drivers and unshielded cables. Using mechanical features and software configuration to minimize electromagnetic emissions and increase immunity is considered as well.

12:30 - 13:30 Lunch Break

13:30 - 15:00 Workshop #5

CE and CI Marking Legislation

Dai Davis – Percy Crow Davis & Co, United Kingdom

13:30 - 14:00 **Part 1: An introduction to CE and CI Marking Legislation**

In Part 1 of this course, we will explore the overall structure of the CE and CI Marking legislation and how the EMC legislation fits into that structure.

14:00 - 14:30 **Part 2: An overview of the Enforcement of CE and CI Marking Legislation; An Individual Engineers' Legal Responsibilities**

We will look briefly at the different approaches that EU countries have taken to enforcement of the legislation, with particular emphasis on the UK.

14:30 - 15:00 **Part 3: An overview of the Post Brexit Divergence of UK and EU CE and CI Law**

We will look at how a manufacturer who supplies in both the UK and the rest of Europe must in reality comply with two separate regimes.

15:00 - 15:30 Coffee Break

15:30 - 17:00 Industrial #3

Chairman: Ignacio de Mendizabal – Spectral Electronics, Spain

15:30 - 16:00 **Advanced low profile copper and ultra-thin laminate enable improvements in new PCB and package designs**

Bob Carter – Oak-Mitsui Technologies, USA

New designs are being pushed to change by AI and other new technologies. Miniaturization, more power, higher speeds, and more device complexity, power today's high speed devices. They require more efficient power delivery precise filtering, improved signals, and power with less noise. This discussion will focus on how the lowest profile copper foil and thin laminates can improve SI, EMC, and overall electrical performance.

16:00 - 16:30 **FFT Techniques Explored and their Effects on Quasi Peak and Average Detectors**

Warwick Barnes – Laplace Instruments Ltd, United Kingdom

The standards call for the use of Quasi-Peak & Average detectors. This makes conventional receiver and spectrum analysers measurements slow. With the advent of fast A/D converters Fast Fourier Transform techniques can be used to speed up test times and these come with their own problems. This presentation discusses the technical aspects of the FFT capture and what effect that has on the detectors.

16:30 - 17:00 **High Voltage High Current EMI Filters for High Power applications**
Ahsan Abbasi – Astrodyne TDI, Germany

This presentation introduces the EMI Filter Series RP395, the first safety-approved EMI filter on the market designed for 1000 VAC applications. Engineered for high-current systems of 2500 A and beyond, the RP395 addresses the growing demands of modern high-power and high voltage environments. The session will outline key design considerations for filtering at extreme voltage and current levels, including compliance, thermal performance, and mechanical integration. Particular focus will be placed on the availability of various Y-capacitance options, enabling designers to balance leakage current requirements with optimized attenuation performance depending on the specific application. Real world application scenarios will demonstrate how reliable and compliant operation in advanced power conversion systems.

Tolkein Suite

09:00 - 10:30 Workshop #6

DC/DC Converter EMC Considerations

James Pawson – Unit 3 Compliance Ltd, United Kingdom

The DC/DC converter power supply circuit is present in almost every single electronic device in some form or other. But with great power comes great responsibility. All sizes of DC/DC exhibit similar EMC problems with fast changing currents and voltages. Designing for low radiated or conducted noise becomes a challenge. We will look at common converter topologies and the EMC risks associated with them along with real world examples of typical problems. We will also look at other manifestations of the circuit topology and see how the lessons we learn from DC/DC converters can apply.

10:30 - 11:00 Coffee Break

11:00 - 12:30 Workshop #7

Practical EMC Design for AC Mains Power Electronics and Motor Drives

Dr. Min Zhang – Mach One Design, United Kingdom

Designing power electronics systems that meet EMC requirements can be challenging, particularly when AC mains power supplies and variable speed motor drives are involved. This workshop provides practical guidance for design engineers on how to reduce electromagnetic noise and improve EMC performance in such systems. Through real-world examples and live demonstrations, participants will gain a better understanding of noise mechanisms and learn practical design techniques to achieve more robust and compliant power system designs.

12:30 - 13:30 Lunch Break

13:30 - 15:00 Workshop #8

Military/Defence – The challenges of employing COTS equipment in secure infrastructure and meeting platform level EMC requirements

Gavin Barber – QinetiQ, United Kingdom

This Military/Defence session introduces and discusses some of the challenges of using Commercial Off The Shelf (COTS) equipment in secure infrastructure. In addition, this session covers some of the 'real' challenges with meeting platform and equipment level test requirements, employing High Level Radiated Susceptibility (HLRS) techniques and also the complexities of performing T-PED testing onboard military platforms, adopting commercial aircraft test guidelines.

13:30 - 14:00 **Transmitting Portable Electronic Device (TPED) Testing for Military Plateforms**

Adrian Monk – BAE Systems, United Kingdom

With the proliferation of portable personal devices with wireless access capabilities, operators need to be assured of the safety and performance of platforms when these devices are being carried. This tutorial presents a method for this assessment based on civil aviation guidance.

14:00 - 14:30 **The challenges of performing high level E-field susceptibility testing for Defence/Military Equipment**

Gavin Barber – QinetiQ, United Kingdom

This presentation will introduce the techniques used to perform high level E-field testing of Defence/Military equipment specifically to Defence Standard 59-411, Part 3, Military Standard 461 and will also introduce techniques for testing aircraft equipment to the high pulsed E-field requirements of RTCA DO-160. The use of alternative methods such as the reverberation chamber technique, employing mode stirred or mode tuned methods will also be discussed.

14:30 - 15:00 **COTS in National Security Infrastructure – EMC Challenges and Opportunities**

Richard Hardy – TUV SUD, United Kingdom

In these uncertain times National Infrastructure and National Security projects are under pressure to perform on time and on budget like never before. The increasing reliance on Commercial Of The Shelf or COTS equipment in these systems presents challenges and opportunities across the EMC / RFI / NEMP / RADHAZ and TEMPEST domains, where resilience often has to be built-in at a later stage rather than being assured from the manufacturers and suppliers. Richard Hardy has over 30 years of experience in these exacting projects and now leads the EMC response to these challenges through the Advisory Services group of TÜV SÜD Product Service UK.

15:00 - 15:30 Coffee Break

15:30 - 17:00 Workshop #9

A brief overview of the application of Def Stan 59-411 EMC tests

Chris Nicholas – Threysus, United Kingdom

Rapid advancement of modern electronics and the widespread availability of high-performance consumer technologies have significantly influenced the design and deployment of equipment in military and defence environments. The boundaries between traditional military-grade hardware and commercial electronics have become increasingly blurred. This shift has been driven by the performance, availability, and cost advantages offered by Commercial Off-The-Shelf (COTS) technologies, which are now frequently incorporated into systems that must operate within mission-critical defence platforms. We look at the Mil/Def standards and a risk assessment method for comparison.

15:30 - 16:15 **Understanding the need for Def/Mil EMC Tests**

Chris Nicholas – Threysus, United Kingdom

Introduction to the Def/Mil EMC tests and why they are different. Military and Defence EMC (Electromagnetic Compatibility) testing is significantly more rigorous than the commercial standards. While commercial rules focus on interference and immunity, Def/Mil standards are designed to ensure equipment survivability in high-threat environments where equipment failure is not just an inconvenience.

16:15 - 17:00 **Managing the risks of using COTS equipment**

Richard Hardy – TUV SUD, United Kingdom

Boundaries between traditional military electronics and commercial electronics have become increasingly blurred. This is driven by the performance, availability, and cost advantages offered by COTS technologies. These now are incorporated into systems that must operate within mission-critical defence platforms. Integrating COTS into military platforms creates a "compliance gap." While the performance is high, the electromagnetic assurance is low. To manage this without the extreme cost of full military redesign, a Risk Assessment Method is used to determine if the commercial equipment can survive the mission.