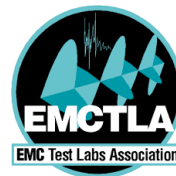


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# Conducted EMI of an Inverter Driven Electric Power Train

Dr Robert Kebel; EMC and Lightning Protection, AIRBUS, Germany

*IEEE EMC Society Distinguished Lecturer*

**Tuesday 16<sup>th</sup> May 2023, from 4.30pm**

*1<sup>st</sup> Floor, The Grandstand, Newbury Racecourse, United Kingdom*

Refreshments and Networking from 4.30pm, Presentation from 5.00pm

This is an In-Person event to allow for the networking, but the presentation will be given virtually

Due to the electrification in mobility applications, electric (high) power trains become an increasingly important subject of investigating EMI. This talk provides an overview about the systematic root cause of electromagnetic conducted emissions of a power train. Direct current (DC) power sources such as batteries or fuel cells provide the energy for propulsion. Alternating current (AC) electric engines drive the vehicle, because AC engines have advantages in maintenance and reliability. Pulse-width modulating (PWM) inverters convert DC into AC voltages. PWM technology can lead to significant electromagnetic interference (EMI) issues pending e.g. on power level and more electric parameters, which should be chosen early for mitigating the EMI risk. A simple predictive simulation model supports making integration decisions in view of the EMI risk.

Typical power levels for smaller aircraft power trains start at 100 kW; levels up to some 10 MW are necessary for the propulsion of large transport aircraft. Fast switching inverters converting high power levels imply a high  $dV/dt$  and a significant EMI potential in common mode (CM). This talk will also show how the choice of the inverter and the choice of the power system (IT versus TN network) limits or exacerbates interference. Crosstalk to wiring looms routed adjacently to power train AC cables will further illustrate the effects and provide options for an optimization of a power train from an EMI point of view.



Robert Kebel is an IEEE Senior Member and is a world renowned expert in EMC and lightning protection. He has been involved in various tasks for integrating electric and electronic systems into aircraft and has studied root-cause and impact of environmental electromagnetic factors on aircraft electric power systems.

Dr. Kebel works for Airbus in Hamburg, Germany since 2001 where he directs the aircraft wing integration, ensures lightning protection for aircraft, and oversees EMC and lightning protection. Prior to Airbus, Dr. Kebel worked for EADS Germany's military aircraft section where his responsibilities were in the field of signature technology. After receiving his diploma in electrical engineering from Hanover University in 1995, Robert joined the research group of Professor Heyno Garbe at the University's Institute for Basic Electromagnetics and Measurement Technology where he was a research assistant. In 1996, Dr. Kebel became a research assistant and was employed by the German Armed Forces University in Hamburg, now Helmut-Schmidt University Hamburg.

Dr. Kebel received his Ph.D. in 1999. He is the author of numerous publications in the field of electromagnetic compatibility and lightning protection.

This presentation is free to attend, and open to all, whether you are an IEEE member, EMC Society member, EMCTLA member, or not. Advance registration is not required, but it would aid in our planning if you can indicate if you plan to attend by visiting;

<https://events.vtools.ieee.org/m/360418>