



Industrial Forum IF-3, EMC Zurich 2007

## **Correlation: A Key Issue in Automotive EMC Design**

*Organizer: Martin Aidam, DaimlerChrysler AG, Germany*

Thursday, September 27: 13:20-17:20

### ***Short Description:***

To ensure the EMC of vehicles test methods have been developed and standardized for full vehicle and for component or sub-assembly testing which may yield different test results. This problem of correlating different EMC test methods will be presented in detail highlighting the aspects of typical development processes, describing the state of the art and new developments in testing and simulation. In a panel discussion with leading automotive experts the relations and interdependences between these aspects and possible solutions to improve correlation will be discussed.

### ***Program:***

13:20-13:40

***Martin Aidam, DaimlerChrysler AG: Correlation. A Key Issue in Automotive EMC Design.***

This presentation introduces the term correlation in the context of automotive EMC testing and explains why it is an issue and why it will become even more important in the future.

13:40-14:00

***A. Marty, M. Klingler & A. Lecca, PSA Peugeot Citroën: Comparison Between Immunity Results Obtained in a Mode-Stirred Reverberation Chamber and a Absorber Lined Shielded Enclosure***

Mode-Stirred Reverberating Chambers (MSRC) are sometimes chosen as alternative facilities to test the immunity of equipment or systems. After a brief description of the electromagnetic principles of a MSRC and the characteristics of the two test facilities (MSRC and ALSE) in which were carried out the experiments, this presentation will expose the different immunity test setups and share the results obtained in order to evaluate their level of correlation. In particular, current measurements were performed through a 50ohms load connected at one end of a two-wire cable over a ground plane, then through a resistive load as part of a simplified equipment connected to the end of a 4-wire harness. Finally, the immunity level of a commercial piece of equipment was investigated in each test facility following EN 61000-4-21 and ISO 11452-2 and compared to each other.

14:00-14:20

***André Müller, AUDI AG, Mario Grimm, FTZ e.V. / EMV: The Electro-Magnetic Board: EMC-testing on system-level***

During the engineering-process of electronic control units for automotive applications often the problem occurs that the results of EMC vehicle measurements differ from the results on component level. This shows that the test procedure and the environment, in which the ECU has to work, have significant influence onto both, emissions and immunity. The problem for the developers of ECUs is increasing with decreasing availability of suited vehicles for EMC measurements. In the following, a complementary testing procedure – the ElectroMagnetic

Board (EMB) – is introduced, which closes the gap in the development process between component level and vehicle level.

14:20-14:40

**Michael Zerrer, Stefan Tenbohlen, University of Stuttgart:** *A Statistical Method to Improve Correlation of Automotive EMC-Measurements*

Comparisons and correlations of different automotive EMC-measurements are often difficult to accomplish. One reason for this is the large number of the measured data points, which hinders a fast and effective comparison. In addition to this, minor changes between similar or identical measurement setups cause unexpected deviations i.e. because of geometrical variations and jittering resonances. By means of statistical methods, one can reach a more stable result without losing the major characteristics of the original data. This makes comparisons and correlations of different measurements easier.

14:40-15:00

**Stephan Frei, University Dortmund:** *Predicting Full-Vehicle EMI-Levels by Using Component Measurement Data and Simulation Techniques*

15:00- 15:30

COFFEE BREAK

15:30-15:50

**Christian Lippert, Birgit Huneke, AUDI AG:** *Efficient EMC-simulation methods for a virtual car development process – state of the art and future challenges*

This contribution focuses on the simulation of radiated emissions of electronic automotive systems. The correlation of calculated and measured antenna disturbances will be discussed for several simulation approaches.

15:50-16:10

**J.C. Kedzia:** *The Virtual Try-Out Space for EMC*

For the industrial deployment of Numerical EMC in the early design stage of automotive vehicles, key issues are relying in predictivity, flexibility, and ease-of-use when managing fully equipped models. Together with PAM-CEM Solutions whose ability to reach these objectives has been clearly demonstrated for the electromagnetic immunity of the vehicle, ESI Group is proposing the Virtual Try-Out Space® allowing to go one step ahead on the road to Virtual Prototyping by accounting for realistic testing conditions.

16:10-16:30

**Udo Kappel, EMC Test NRW:** *Limit Conversion between different Radiated Emission Test Methods*

On the one hand, In today's normative standards, different test methods for assessing the radiated emissions of EUTs are described. On the other hand, only for the older of the test methods limits exist, which have proven to be reasonably set. Consequently, the question how to derive limits for the other, newer test methods becomes an interesting question. One possible answer to this question is to derive the limits for the new test methods from the existing limits of the old. Such an approach is presented and illustrated by one example.

16:30-16:50

**Roman Jobava, D. Topchishvili, EMCoS Ltd:** *Expert System for Automotive EMC*

Complete electronic system of the automobile, together with the complete cable harness are difficult to be analyzed in order to solve occurred EMC problems. Expert system is thought as a way of accumulation of knowledge about the problems and their solutions. Different sources of knowledge can be used: measurements, tests, simulations, previous experience, etc. EMC Expert System must provide convenient environment for handling necessary data and for gathering important knowledge. Presentation will show details about realization of such expert system.

16:50-17:20

OPEN DISCUSSION