


2021 Joint IEEE International Symposium On Electromagnetic Compatibility, Signal & Power Integrity, and EMC Europe:

Review of the Experiments and Demonstrations Program

By Robert Vogt-Ardatjew (above left) and Niek Moonen, Co-Chairs of the Experiments and Demonstrations Committee

Experiments and demonstrations (E&Ds) have always been a very special part of the EMC and Signal Integrity/Power Integrity (EMC+SIPI) symposia – and for a good reason. Within the broad range of technical presentations, workshops and tutorials, practical demonstrations deliver the unique opportunity to experience the variety of hands-on hardware and software applications, performed by EMC experts right there, right then. Witnessing the actual execution of an experiment from the first row provides a different type of learning quality expanding its fundamental understanding, teaching new tricks or solutions, or even for the sake of inspiration – after all, who doesn't enjoy seeing their favorite EMC concept being implemented in action?

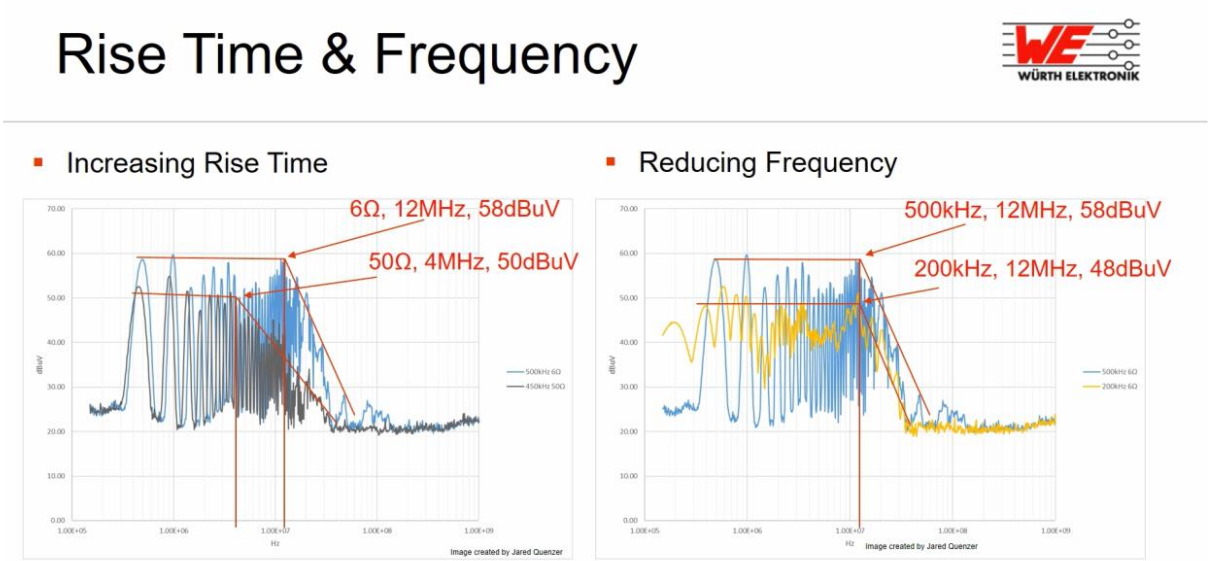
Similar to the previous year, the 2021 symposium was held virtually with the E&Ds presented in a video format as an on-demand resource available to the participants at all times, as an oasis for those seeking a change of pace amidst the other pre-recorded presentations, thirsty for the more practical content. Following last year's success where five out of eight E&Ds placed in the "Top 5 Best Attended Sessions", the average number of views this year remained on a similarly high level.

Although it has been commonly acknowledged that seeing such events in person is more immersive than watching them on a computer screen, the latter solution did unravel a range of hidden advantages that might have a significant effect on the future of the E&D program. Recording a demonstration is not an easy task; therefore, each of the presenters dealt with that in their own way, delivering a broad range of demos with different styles, techniques, and flavors, summarized below. We've included screenshots of the presentations to give you an idea of the excellent E&D program.

Conquering Radiated Emissions When Using Wide-Bandgap Devices

By Jared Quenzer, Würth Elektronik, United States

Utilizing the virtual symposium presentation format, this E&D attracted 121 viewers to address the EMC issues related to using Wide-Bandgap Semiconductors. These devices are not based on the conventional silicon but utilize silicon-carbide (SiC) and gallium-nitride (GaN). The demo discusses their benefits and drawbacks as well as showing various techniques of reducing radiated emissions and giving practical recommendations supported by experimental results.



Demonstrating the Combined Effects of Testing Radiated Immunity in Accordance with Edition 4.0 of IEC 61000-4-3 Using Multiple Signals

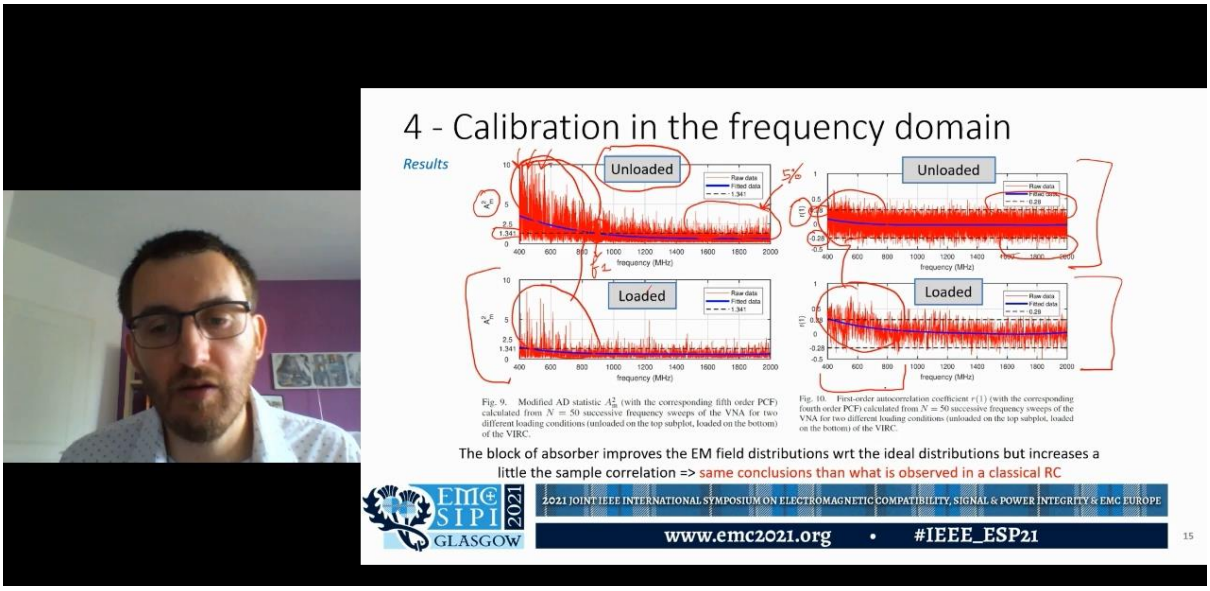
By Dean F. Landers, AR RF/Microwave Instrumentation, United States

Faithful to the traditional ways of performing hardware demonstrations, this E&D used the video format to bring the viewers to the virtual laboratory and show them the new IEC 61000-4-3 radiated immunity test system utilizing the multiple signal method, guide them through the whole measurement, as well as explain its whole concept using the other available hardware.

Frequency and Time-Domain Calibration of Vibrating Intrinsic Reverberation Chambers

By Guillaume Andrieu, Universite de Limoges Faculte des Sciences et Techniques, France

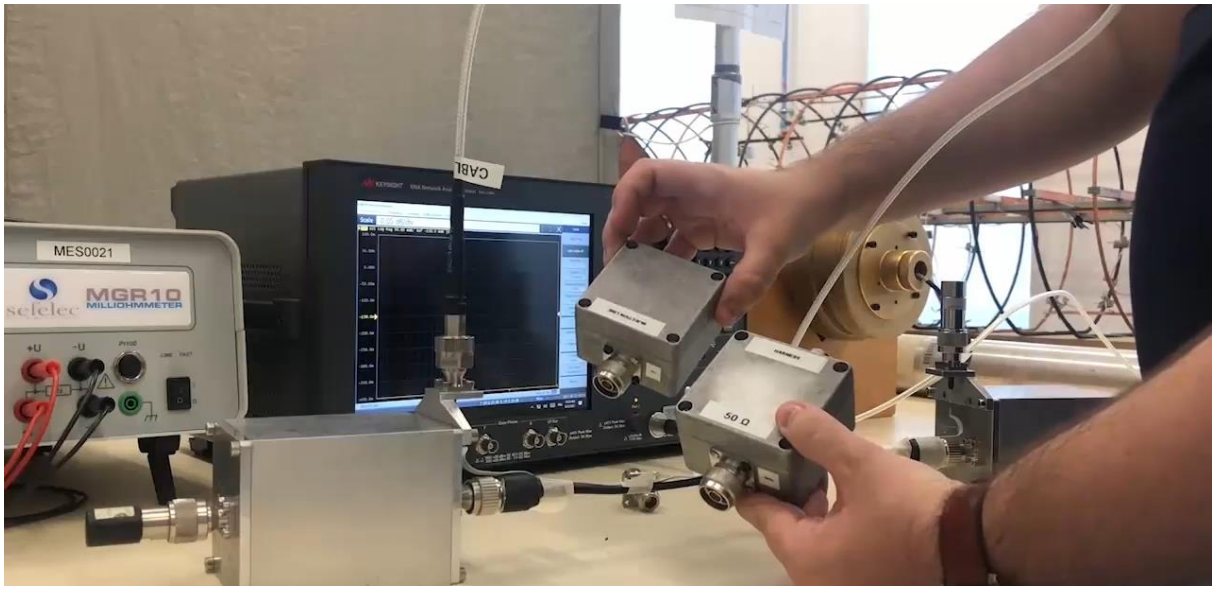
Combining a dynamic presentation describing the underlying theory with the video footage from the laboratory measurements, this E&D addressed the issue of characterizing a Vibrating Intrinsic Reverberation Chamber (VIRC) in both time and frequency domain according to a set of selected parameters. Guillaume introduced theory supported by measurements performed in the actual VIRC to present a complete image of the suggested characterization procedure in a convincing and practical manner.



Transfer Impedance Measurement, from Simple to Complex Setup

By Charles Jullien, Safran Electrical and Power, France

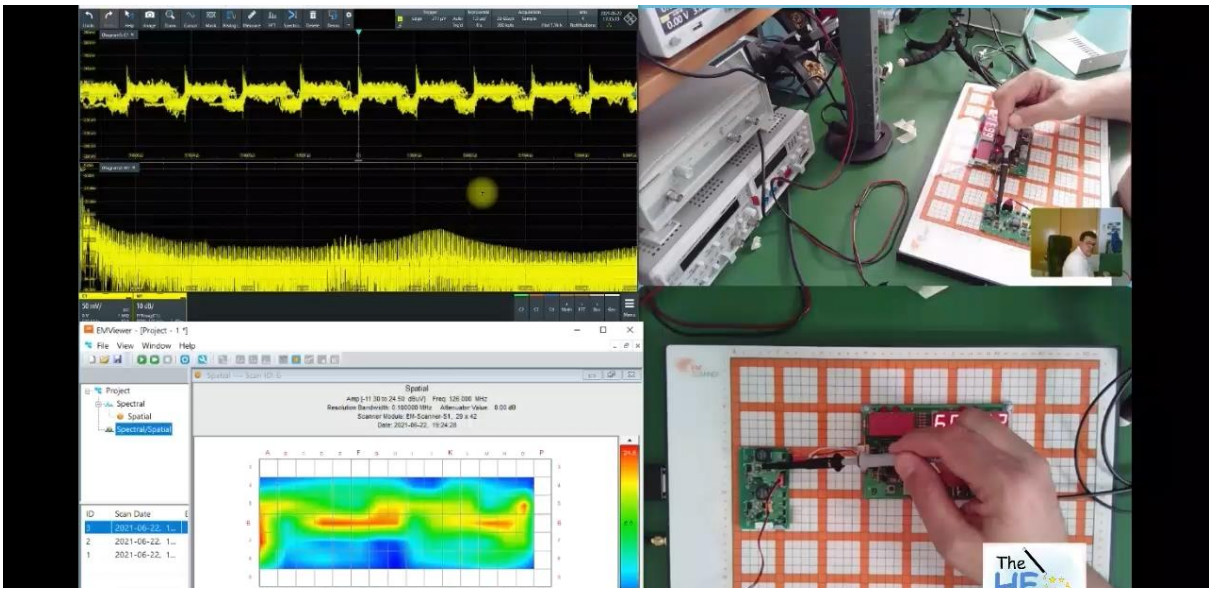
Similar to the previous demonstration, this E&D flawlessly executed the combination of presenting the theoretical aspects of transfer impedance in the slide format with multiple measurements performed in the laboratory, explaining each element of the setup step-by-step, providing the best of both worlds. Five different measurement techniques were shown and compared in terms of complexity, time-efficiency, accuracy, and frequency range. Such a combined approach was greatly appreciated by a large number of 167 viewers.



Debugging EMI/EMC Problems in the Near Field

By Arturo Mediano, University of Zaragoza, Spain

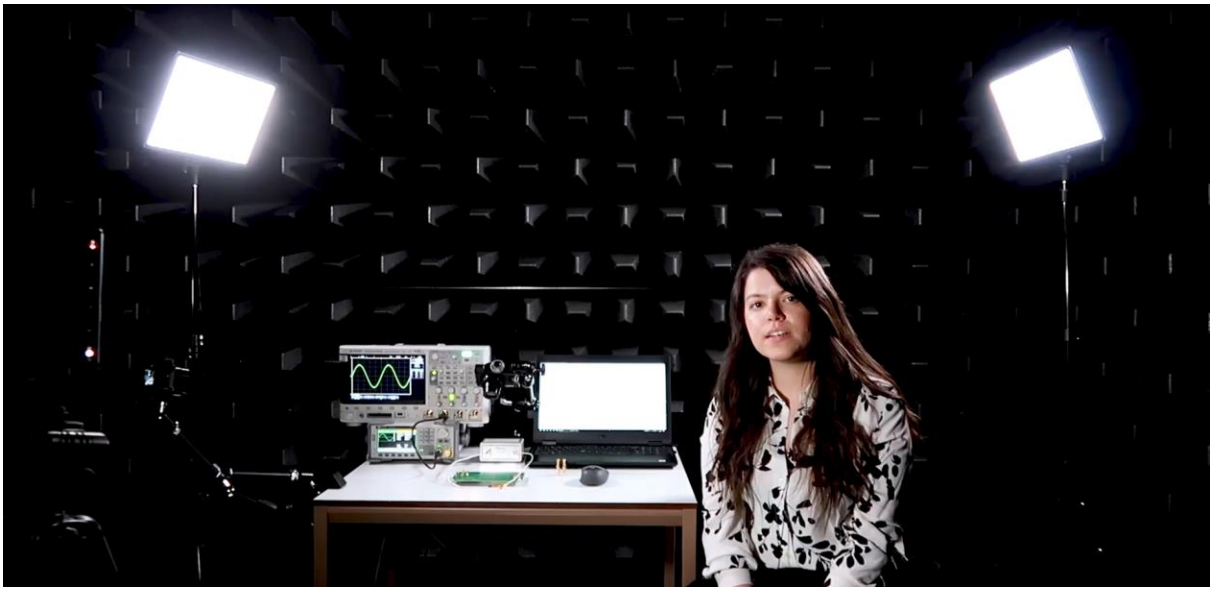
This E&D utilized introduction slides as well as multiple camera angles to capture the hardware, and synchronized result display in the dedicated software platform to show the process of EMI debugging performed by analyzing an example device using a near-field scanner. Various techniques to find and deal with EMI issues were shown and discussed. Since the measurements were performed on a small device, the split video allowed the 163 viewers to clearly see all the important elements in detail, which could otherwise be difficult when performed live at the symposium site.



Fundamental EMC Effects

By Dasha Nemashkalo, University of Twente, Netherlands

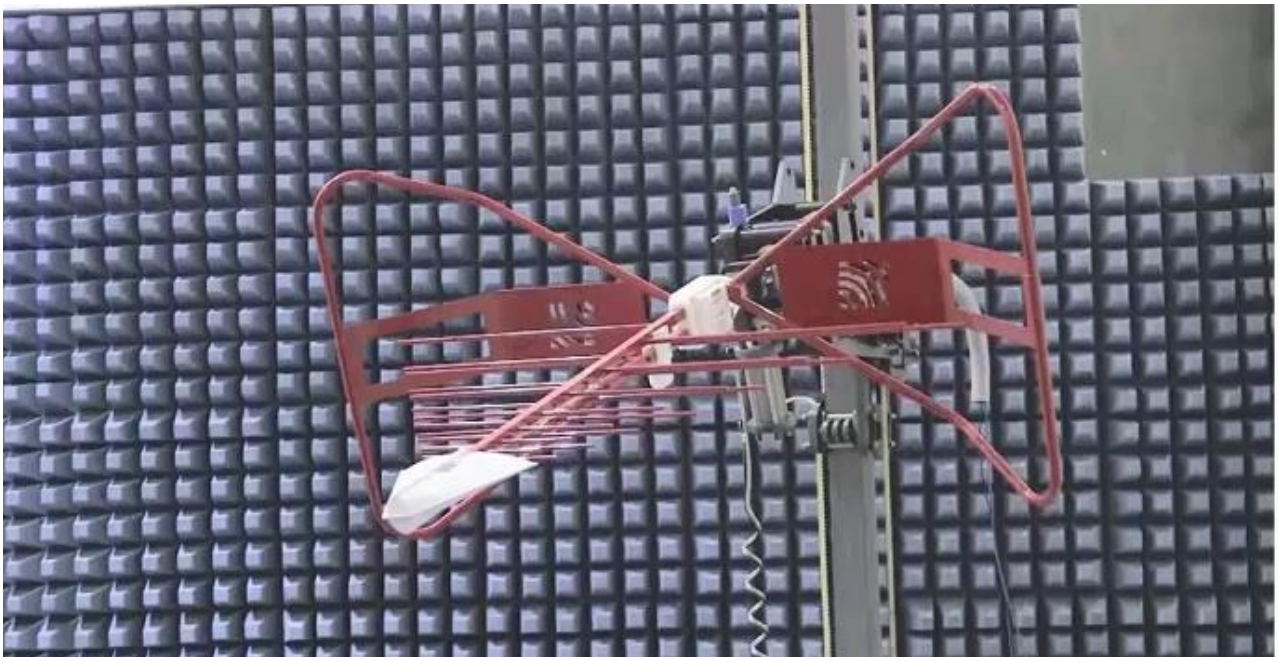
Instead of focusing on a single subject, this E&D consisted of six parts – each addressing a different fundamental EMC phenomenon such as self-inductance, crosstalk, discontinuities, parasitics, and transfer impedance, using a dedicated portable setup. Following the theme of teaching "by students, for students", the presenters discussed these basic concepts while performing simple measurements to attract, inspire, and educate the young generation of EMC experts. And it did work – not only did it have the highest number of interested IEEE Student Members, but it had the highest number of 219 views in total.



Radiated Emissions Testing per CISPR 22/32 Using Remote Location

By Jack McFadden, ETS-Lindgren, Cedar Park, TX, USA

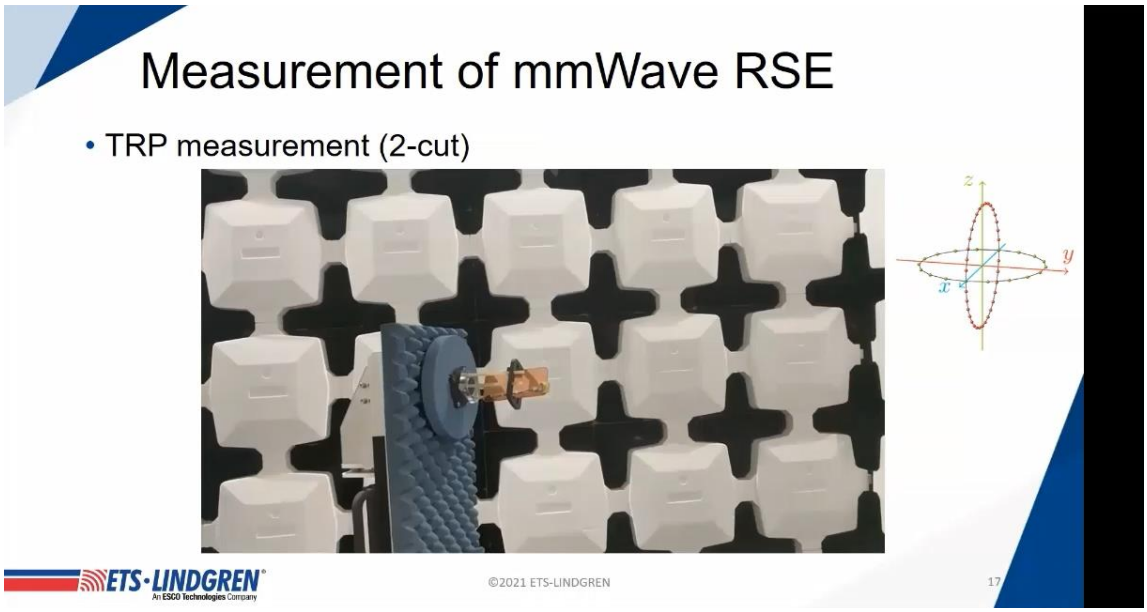
This demonstration took the virtual theme to the next level – not only it was presented at a virtual symposium, but also presented a technique to perform a CISPR22/32 radiated emission measurement in a remote 3-meter semi-anechoic chamber using test automation as well as vision-based software to illustrate techniques to increase quality and efficiency of such a measurement.



Measurement of mmWave Radiated Spurious Emissions

By Ross Carlton, ETS-Lindgren, Cedar Park, TX, USA

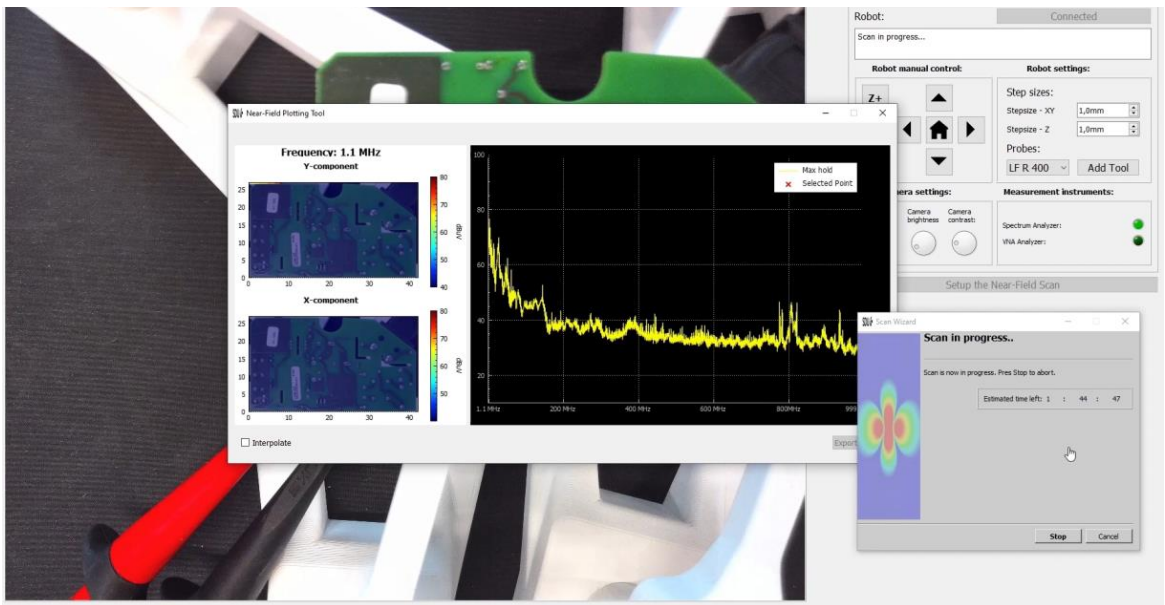
This E&D showed a technique to measure the millimeter wave (mmWave) radiated spurious emissions, introducing the requirements, showing and describing the test setup, and of course performing the measurement itself using footage from an anechoic chamber equipped with a precise positioning system.



Phase-Resolved In-House Near-field Scanner

By Morten Sørensen, Syddansk Universitet, Denmark

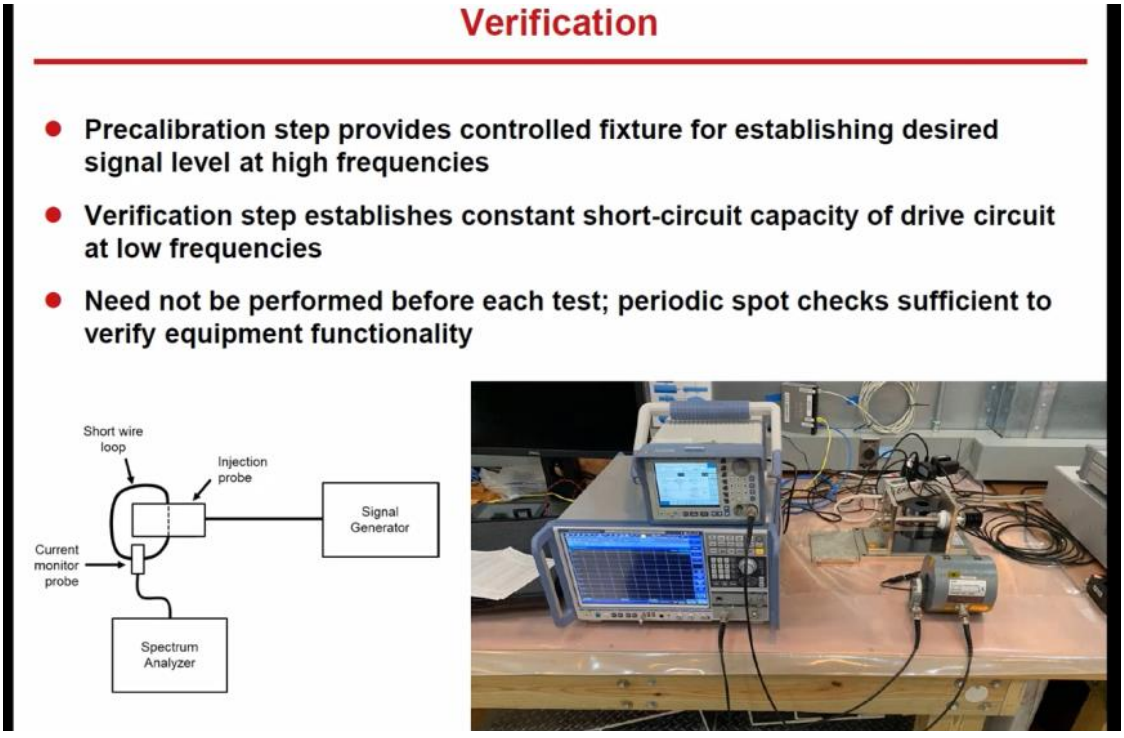
Once again, this E&D benefited from the possibility to utilize the convenience of combining a video recorded in a laboratory along with synchronized result display to present the procedure of setting up an in-house scanner and measuring the near-field emissions using a vector network analyzer (VNA) over a large frequency range.



Common Mode Conducted Susceptibility Testing – A Simplified Method

By John Cardinal McCloskey, NASA/Goddard Space Flight Center, United States

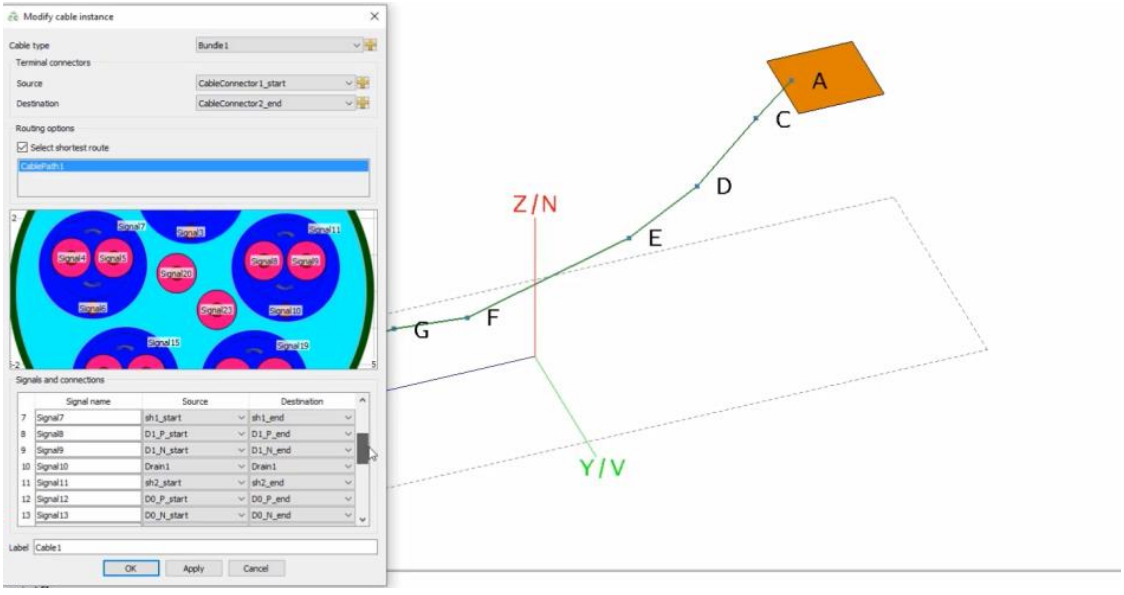
This E&D contains an extensive explanation of a common mode conducted susceptibility test comprising theoretical background as well as simplified practical implementation, supported by setup descriptions and measurement results.



Radiated Emission and Signal Integrity Analysis of PCBs and Cable Harnesses for Consumer Electronics Applications

By Jaehoon Kim and Smit Navin Baua, Altair Engineering Inc., United States

Since this was a software E&D, it could fully benefit from the virtual aspect of the symposium because presented content is indeed meant to be seen on a computer screen. This allowed the presenters to show the simulation models of the printed circuit boards and cable bundles, and analyze the associated radiated emission (RE) and signal integrity (SI) effects in great detail.



The high diversity of the experiments and demonstrations presented at the 2021 Joint IEEE International Symposium on EMC+SIPI, and EMC Europe shows that the E&D scene is growing and improving. The necessity to adapt to the virtual aspect of the symposium has opened a multitude of possibilities and solutions to access and spread knowledge, even on topics that are supposedly inherently practical. We believe that this step has been important also for the demonstrators, allowing them to master their craft, learn new and arguably better ways to present their work, and perhaps implement them in their future, perhaps live, but perhaps hybrid E&Ds. And the recordings will not only remain as memento of the virtual conference, but also a valuable resource for the years to come. We would like to express our gratitude to the contributors, acknowledging their hard work, and appreciating their efforts to make the symposium even more interesting, as well as encourage all to present their excellent demonstration in the next years' symposia. **EMC**

Call for Experiments and Demonstrations Proposals!

2022 IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity
August 1-5, 2022
Spokane, Washington
Proposals Due: March 7, 2022

Contributions are welcome for this popular feature of the annual symposium's technical program! To participate, please submit a proposal that includes the following information:

- Title of Experiment or Demonstration
- Abstract describing the experiment or demonstration with sufficient detail for the chairs to review
- List of presenters and affiliations
- A detailed listing of any test equipment required

For more information, visit www.emc2022.emcss.org or send an email to symposiuminfo@emcss.org