



Chapter Chatter

Todd Robinson, Associate Editor

Using ESD Guns to Settle Employee Disputes

We were young once, if not a little foolish

By Mike Violette

In the beginning of a company, work rules and policies don't always get well-defined. This is particularly true if you haven't held a real job yet and have no experience in organizational management. So it was with our early lab days and we've worked hard to improve (but some bad habits still exist: legacy, like a chipped tooth).

In the beginnings of commercial EMC, with the adoption of Docket 20780 (digging into a time capsule here), the landscape sprouted with labs. It was easier then; if you had a parking lot and fifty grand for a couple of antennas and a spectrum analyzer, you were in business.

So it was with us in the early days, and we froze our backsides in the snow in the winter and got wet when it rained and disassembled and dragged the antenna mast inside the building every night when we closed up because in the wild and reckless suburbs of Gaithersburg, one never could be too cautious. The weather was always a factor in this biz, as those with OATS know too well. And on the particular day in late August, the weather temporary broke the back of the local power distribution and we were left idle to gather in the front office and observe the lightning flashing and hard hail falling, dinging the ground and cars parked around our 3 m test site.

It was to be an electrically-charged day.

As I said, work rules were loose (*mea maxima culpa*) and our product safety/ESD test engineer "Vince", who liked to go barefoot in the summer (except when he was setting fire to products) leaned lazily against the metal frame of the front door, his shoeless feet (yes, OSHA, I know) on the damp carpet. The door was propped open to observe the full-fury of the late summer thunderstorm when suddenly lightning flashed a few hundred yards away. Vince yelped and jumped straight up, a victim of lightning ground currents and resultant "step voltage" (see: <http://www.emcs.org/acstrial/newsletters/spring09/ChapterChatter.pdf>). Vince stood at least 6'4" and when he leapt up, his head banged against the door closure mechanism. He howled again, landed and grabbed the top of his head.

"Scott", our FCC test guy, howled. Now Scott had the disposition of enjoying his job maybe too much, delighting in finding the odd spur that broke the FCC Class B limit; a bit sadistic, and a trait I've observed in more than one EMC engineer. Anyway, when Vince hit the ground again, bouncing, really, from the dual ignominy of the shock and the coup de tête, Scott doubled over in laughter.

Vince, not a happy camper, scowled and left the room, rubbing his pate.

Soon enough, the power came back. Vince put his shoes on and went back to the ESD testing that was interrupted when the juice went out. These were the days of the "IEC 801-2" specification, several years before CE Marking and all that good harmonization. ESD was a voluntary thing, but some manufacturers were aware that passing the test was a good idea.

Now, the Schaffner NSG 430 will always remain in my memory, fondly, as it was the first piece of test equipment that we acquired. This little beauty was built for a single purpose though: positive voltage, air discharge only (the notion of contact discharge hadn't been mid-wived by whatever committee was working it). Sixteen-point-five kilovolts of miniature lightning: it did the trick and it's still on a shelf, somewhere (we engineers loath to toss out any equipment, even when it's obsolete).

In any event, Vince and I were setting up to test a PC or something. The fog of time obscures all the small details. The NSG 430 was powered up and idling on the bench.

Scott, still in a state of reverie over Vince's double whammy a few minutes ago, was re-re-telling the story to Jane, who was trying to get some work done at her desk. He slapped her desk: "Hah, you should have seen it: Flash! Ow! Pow! YOW!"

Victor was now audibly growling as Scott came around the corner, beaming a big smile.

"Vince! How's your head? Hah! What hurts worse, your scalp or your feet? Hah hah! Did you see him jump, Mike?"

Vince, with the cool of The Stranger in *High Plains Drifter*, deftly hefted the NSG 430 as Scott approached, winding the knob on the ESD gun to maximum as Scott got within arms-length.

Vince's eyes flashed and locked onto Scott's, who suddenly froze. A coyote howled as the realization registered on Scott's face.

"Don't do it!"

In an instant, Vince landed the tip of the gun onto Scott's left shoulder, pulled the trigger and unleashed a bucket of coulombs.

"YOW! D&MN! You did it! BZ&*@&T#E!"

Score settled, Vince calmly blew the "smoke" from the barrel and holstered his weapon. Scott turned around, rubbing his shoulder and returned to his desk. He was quiet for the rest of the day and I enjoyed the peace that settles after a truce is struck.

Since then, we have implemented various work-policies: wearing shoes is mandatory and we only allow the use of ESD guns on humans during certain training involving interns and only rarely on customers.

Austria

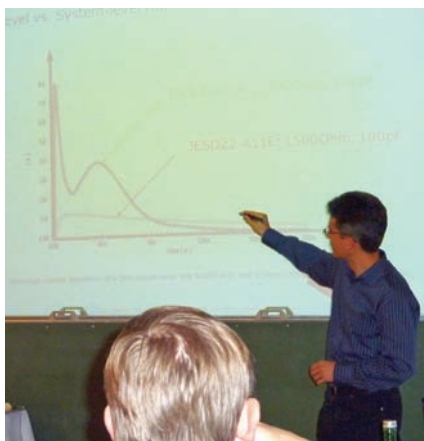
On October 28, 2010 the Austrian Chapter organized a technical meeting at the Johannes-Kepler University (JKU) Linz.

Gunter Winkler (Technical University Graz, Austria) and Bernd Deutschmann (Infineon Technologies AG, Munich, Germany) gave a presentation about the protection of electronic devices and systems against electrostatic discharges. Among all transient disturbances, ESD is still one of the most important reliability problems for the IC industry.

First, an overview of the typical sources and models for electrostatic discharges, such as Human Body Model (HBM), Machine Model (MM), and Charged Device Model (CDM) was given. The different ESD requirements at the IC- and the system-level were explained and discussed.

Commonly used protection elements such as a voltage dependent resistor (VDR), transient voltage suppressor (TVS), gas discharge tube, and RC filters were explained and analyzed in a live demonstration using ESD simulation with a gun ESD model. The attendees were able to see the differences in the responding and protection behavior of the demonstrated protection elements.

A very important topic, the right placement of the external protection elements on the PCB, concluded the 90 minute talk. After the presentation, the attendees used the opportunity for discussions during the coffee break.



Dr. Bernd Deutschmann (Infineon Technologies AG, Munich, Germany) explaining the differences between a system-level and an IC-level ESD pulse.

Brasilia

Several members of the IEEE EMC Society and members of the IEEE EMC



The IEEE EMC Society outreach event was held at Anatel in Brazil's capital city of Brasilia.

Society Board of Directors traveled to Brasilia, the capital city of Brazil, following the EMC Society regional event in Buenos Aires (see page 12). Janet O'Neil, EMC Society Region 9 Event Coordinator, and André Kavalieris Galvão of AK Telemedia organized a one day seminar on Monday, April 4, 2011 at the AGÊNCIA NACIONAL DE TELECOMUNICAÇÕES (ANATEL). Anatel is a government organization similar to the FCC in the United States. As such, it is a hub of activity for EMC, antenna and wireless technology in Brazil. The seminar was graciously hosted by Anatel's Maximiliano Salvadori Martinhão.



Brasilia speakers and EMC seminar organizers included (front row from left) Perry Wilson of NIST, Maximiliano Salvadori Martinhão of Anatel, John Norgard of NASA, (back row from left) independent consultant Benjamim Galvão, Marcos de Souza Oliveira of Anatel, Vince Rodriguez of ETS-Lindgren, and Dennis Lewis of Boeing.

The topics presented included:

- **The Evolution of Complex Cavity Measurement Techniques from Precision Metrology Applications to Aircraft Electromagnetic Environment Assessments** by Mr. Dennis Lewis, *The Boeing Company, Seattle, Washington*
- **Current EMC Metrology Research at the National Institute of Standards and Technology (NIST)** by Dr. Perry Wilson, *NIST, Boulder, Colorado*
- **Half Power Beamwidth Measurements of Radiated Emission Antennas for EMC** by Dr. Vicente Rodríguez, *ETS-Lindgren, Cedar Park, Texas*
- **Tomographic Techniques (Microwave CAT Scans) for Detecting/Imaging Obscured Objects** by Dr. Johannes Nordgaard, *NASA/JSC, E3 Lab, Houston, Texas*
- **Concluding Remarks** by Maximiliano Salvadori Martinhão, *Anatel, Brasilia, Brazil*

Speaker Dennis Lewis noted electromagnetic reverberation chambers have been used for any years by the EMC community to measure the susceptibility and emissions for various electronic components and systems. His presentation described how these EMC tools were adapted as a metrology tool to generate precision electromagnetic fields used for field probe calibrations. The presentation also explained how these techniques were later applied to aircraft measurements to assess the aircraft electromagnetic environment, including wireless propagation and aircraft fuselage attenuation. He showed how, utilizing a precision network



Attendees at the EMC seminar in Brasilia included (from left) Saint' Clair Nunes, Tom Mullineaux of Milmega, Rávisson Amaral Almeida, and Achim Gerstner of Robde & Schwarz. The gentlemen in ties are with Fiat Automóveis S/A.



Anatel's administrative assistants tempted EMC seminar registration chair André Kavaliéris Galvão of AK Telemedia with many tasty desserts for the refreshment break.




The breaks during the EMC seminar in Brasilia encouraged networking amongst the attendees.

analyzer along with fiber optic port extenders, measurements of RF propagation from sources as varied as point source antennas to leaky coaxial antennas were obtained. These assessments were essential in the design and implementation of wireless systems on-board aircraft as well as ensuring aircraft system EMC.

Speaker John Norgard showed how enhanced remote sensing techniques are being developed to accurately detect and identify obscured objects. For example, microwave tomography is used to detect and image obscured objects. Tomograms (RF CAT Scans) of the obscured objects are formed using microwave spectral/temporal, spatial/angular, and orientation/polarization diversity. This imaging technique uses a distributed ring of sensors to detect radiated transmissions scattered from hidden objects. Three-dimensional imaging algorithms have been developed to detect, image, and characterize obscured objects. Ground Penetrating (GPEN), Building Penetrating (BPEN), and Foliage Penetrating (FOPEN) radars are used to irradiate the hidden objects. Distributed sensors are used to collect the tomographic data that are used to detect and image the objects. For examples, tomographic techniques are applied to find buried objects, targets under trees, and objects behind walls. Distributed transmitters and receivers, however, significantly increase unwanted mutual coupling and EM emissions that interfere with signal reception. Examples of objects behind walls and tunnel detection were presented.

Speaker Vince Rodriguez noted CISPR has recently required information on the half power beamwidth of emission



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John Norgard of NASA in Houston spoke on tomographic techniques for detecting obscured objects at the EMC seminar in Brasilia.



Vladimar Barbosa, the Standardization Manager in the Certification Office of Anatel in Brasilia, gave a presentation directed at the EMC and antenna communities.



Professor Terada and his former student, Monique Cruvinel, enjoyed the EMC presentations at Anatel.

measurement antennas. In his presentation, measured patterns for some of the most commonly used types of emission antennas were shown, including double-ridged horn, log periodic, biconical and hybrid type antennas. Dr. Rodriguez also discussed the effects of the near field and test set up on the half power beamwidth.

Speaker Perry Wilson updated the audience about a long standing research program in the Electromagnetics Division on metrology related to electromagnetic compatibility at the National Institute of Standards and Technology (NIST). His presentation briefly described some past highlights and then provided an overview of current research efforts. One focus area is field generation and measurement in high multipath environments, as simulated by a reverberation chamber. NIST is working on simulating repeatable multi-path environments over a wide range of K-factors for testing wireless devices, such as cell phones and MIMO systems. Reverberation chamber applications to material shielding measurements and to animal exposure studies were also mentioned. Recent NIST work on a quantum SI traceable field probe



Professor Carlos Sartori, from the University of Sao Paulo and a former member of the EMC Society Board of Directors, joined Janet O'Neil of ETS-Lindgren at the EMC seminar in Brasilia.

based on Rabi frequency measurements was also reviewed. The presentation concluded with a summary of NIST efforts in the areas of emergency responder communications and RFID standards.

Vladimar Barbosa, the Standardization Manager in the Certification Office of Anatel, also gave a presentation directed at the EMC and antenna communities. He talked about the "Antenna Regulatory Framework" in Brazil and efforts underway on IEEE Standard 149-1979: Test Procedures for Antennas. The increasing use of wireless devices has created a new set of challenges. He noted antennas traded and used in Brazil are based on international standards and are made in an open collaboration process with society; Brazil has adopted "Inter-

national References" to establish minimum requirements for antennas. Anatel is permanently fostering the Brazilian Laboratory Infrastructure, with evaluation by Anatel or accreditation by IN-METRO – the metrology laboratory of Brazil. He concluded his presentation by seeking collaboration with EMC and antenna engineers in achieving cost effective measurement techniques. This is most desirable for developing countries. Note: All Anatel's documents are available at www.anatel.gov.br

Some 50 engineers attended the conference from industry and academia. Many traveled from other parts of Brazil to attend the seminar. Lunch was provided in the Anatel cafeteria and generous refreshment buffets were available during the breaks. There was plenty of opportunity to network in the welcoming environment provided by Anatel. Thanks are due to Maximiliano Salvadori Martinhão for providing the Anatel auditorium for the EMC Society regional outreach event as well as to Hernan Urdiales of ETS-Lindgren, Benjamim Galvão, independent consultant, and André Kavaliéris Galvão of AK Telemedia, for their assistance in organizing this successful event.

Buenos Aires

Gustavo Fano reports the Buenos Aires joint EMC and Antennas and Propagation (AP) Chapter organized a one day seminar on April 1, 2011 at the Instituto Nacional de Tecnología Industrial (INTI) in Buenos Aires, Argentina. The seminar's wonderful host, Edmundo Gatti, is the Director of the Electromagnetic Division at INTI, and was the first speaker of the event. He was followed by Francesca Maradei, President of the EMC

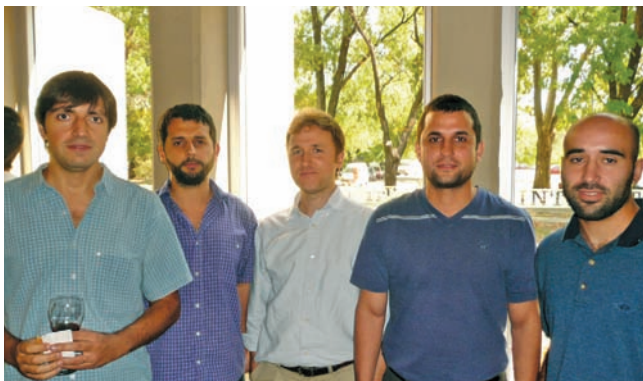


John Norgard of NASA is shown at the entrance of the Instituto Nacional de Tecnología Industrial (INTI) of Argentina, site of the March 31 EMC regional event in Buenos Aires.

BUENOS AIRES PHOTOS BY JANET ONEIL



Hernan Sineiro of INVAP, Horacio Adolfo Benitez and Pablo Perri of INTI talked about EMC issues during a break in the technical program. INVAP is located in the Argentine region of Patagonia, in the beautiful town of San Carlos de Bariloche.



CONAE sent several of its best and brightest engineers to the EMC seminar at INTI, including (from left) Javier Pariani, Sebastian Chiochetti, Pablo Marino, Dante Colantonio, and Santiago Spatolla.



Speakers and organizers of the EMC regional event gathered for a group photo, including (bottom row from left) Perry Wilson of NIST, Francesca Maradei of the University of Rome La Sapienza, Edmundo Gatti of INTI, Kenny Kirchhoff of Boeing (center row from left) Todd Hubing of Clemson University, Dennis Lewis of Boeing, Hernan Sineiro of INVAP, Janet O'Neil of ETS-Lindgren, Gustavo Fano of Universidad Nacional de la Patagonia San Juan Bosco, (top row from left) Vince Rodriguez of ETS-Lindgren, Valentín Trainotti of the University of Buenos Aires, and John Norgard of NASA.

Society and Gustavo Fano, the Chair of the Argentina joint EMC/AP Chapter, who welcomed the attendees.

The seminar was a full day, from 9:00 am to 6:00 pm, with coffee breaks and a lunch buffet of typical Argentinean dishes. The weather was a sunny and comfortable 28 C degrees. The small fee for registration covered the refreshments and lunch expenses. The expert speakers were gracious and donated their time to speak to the audience of some 80 attendees from the universities, private companies, corporations and Government institutes of Argentina. We even attracted an attendee from nearby Uruguay! Everyone agreed it was a great event with a high caliber technical program that provided many opportunities to network with other Chapter members, the speakers and guests.

The agenda is summarized as follows:

- The Evolution of Complex Cavity Measurement Techniques from Precision Metrology Applications to Aircraft Electromagnetic Environment Assessments by Mr. Dennis Lewis, The Boeing Company, Seattle, Washington
- How to Define RE Requirements for Radiometer Instruments by Mr. Hernan Sineiro, INVAP, Bariloche, Rio Negro, Argentina
- Current EMC Metrology Research at the National Institute of Standards and Technology (NIST) by Dr. Perry Wilson, NIST, Boulder, Colorado
- Half Power Beamwidth Measurements of Radiated Emission Antennas for EMC by Dr. Vicente Rodríguez, ETS-Lindgren, Cedar Park, Texas



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The regional EMC event in Buenos Aires was a big success thanks to the efforts of the EMC/AP Joint Chapter Chair Gustavo Fano (far left) and Edmundo Gatti (second from right). Speaker Hernan Sineiro (second from left) and attendee Fernando Hernández (second from right) from Uruguay appreciated their efforts on the event. Ing. Professor Hernández travelled from the ORT University in Uruguay to attend the event. He works at Uruguay's URSEC, which is similar to the FCC in the US. URSEC is the institution for regulations in telecommunications and radio communications systems.

- Mixed Analog/Digital Circuit Board Design and Layout for EMC by Dr. Todd Hubing, Clemson University, Clemson, South Carolina
- Tomographic Techniques (Micro-wave CAT Scans) for Detecting/Imaging Obscured Objects
- by Dr. Johannes Nordgaard, NASA/JSC, E3 Lab, Houston, Texas
- Numerical Simulations for EMC Compliance and Standard Development: A New Trend in European Standards by Dr. Francesca Maradei, Sapienza University, Rome, Italy
- Concluding Remarks by Edmundo Gatti, INTI, Buenos Aires, Argentina

The day before this event, a one day seminar was organized by the Antenna Measurement Techniques Association (AMTA). Several of the EMC speakers also presented at the AMTA seminar. Following the AMTA seminar, we took a tour of the INTI facilities, including the ten meter semi-anechoic EMC chamber installed two years ago by ETS-Lindgren. The chamber featured impressive instrumentation by Rohde & Schwarz as well as special antennas for testing to the EMC standards required by the local industry.

For those interested in the presentations, these can be download from the INTI website: <http://www.inti.gov.ar/electronicaeinformatica/emc/index.html>

You can also see many photos of this regional event on the INTI site as well.

It was a pleasure for us to meet all the speakers in Buenos Aires at these events in order to promote the IEEE EMC Society and AMTA technical activities in our South America region.



Bob Davis, IEEE EMC Society Membership VP, created the new EMC Society membership display which debuted at the Buenos Aires regional event.



IEEE EMC Society President Francesca Maradei prepares to start her presentation at the Buenos Aires regional event.



The Buenos Aires regional event included a tour of the 10 meter EMC chamber at INTI. Some of the regional event attendees posed for a photo following the tour.



All registrants at the EMC seminar in Buenos Aires received a certificate of completion as a lasting memory of a great day of excellent technical presentations.

Many thanks to Mr. Alberto Lombardi of the Precision Electronica Company for handling the registration process and to Professor Valentin Trainotti and the people of the INTI for their support of this event!

Chicago

Jerry Meyerhoff, Secretary, reports that the Chicago IEEE EMC Chapter Spring 2011 season started February 16, kindly hosted by the IIT Rice/Wheaton campus, featuring Roy Leventhal of Leventhal Design & Communications. Roy's talk "EMI-EMC Theory and Troubleshooting" illustrated practical applications, using his recent real-world case-studies. In one situation, Roy recognized inconsistencies between measurements and expectations from fixes. Ultimately by refining the spectrum analyzer settings, he resolved multiple sources, each of which required individualized fixes. The 25 attendees came away with several valuable techniques for their own tool kits. His talk is available from the Chapter website.

On February 26, Chapter representatives Bob Hofmann and Jerry Meyerhoff exhibited at the 27th annual Dupage Area Engineers Week Expo at the IIT Rice/Wheaton campus. There, hundreds of junior and high school students and their parents visited many booths covering all the engineering disciplines. The Chapter's demonstrations included radio noise from common home appliances, shielding effectiveness and the ever popular static buildup from a Van DeGraff generator.

The March 16 meeting was hosted by the IIT Mt. Prospect campus with a pizza dinner supplied by the Chapter. Speaker Roger Swanberg of DLS addressed 32 attendees on the best practices of PC board design and layout. Roger skillfully led attendees between theory, practical details and analysis techniques, using design cases from his decades of experience. Roger urged attendees to "think like an electron!" i.e. visualize and then provide the path it needs to get back home.

On April 20 at the IIT Rice/Wheaton campus, the Chapter started with a Chicago-style Corky's Buffet, sponsored by Electronic Instrument Associates (EIA). Then Bob Hofmann spoke on ANSI C63® standards. Bob explained the standards development process and where changes were an-



Speaker Roy Leventhal (standing far right) takes a question at the Chicago Chapter's February spring season kick-off meeting.

ticipated in the extensive documents. Bob shared examples of the detailed formal question and answer processes that helps users better understand the implementations. Attendees also enjoyed a few practical EMC problem solving "war stories" such as analyzing and mitigating emissions from a rural central office.

Chicago's spring session will peak with the 14th annual MiniSymposium on Tuesday, May 10 at the Itasca Country Club, again organized by Frank Krozel of EIA. Lee Hill of Silent will be the featured speaker delivering sessions with



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Bob Hofmann demonstrates Van DeGraff static at the Chicago-Dupage Engineering Expo.

demonstrations on both Measurement Tools and Product Design. Tom Braxton of Shure will start the day with his popular Fundamentals talk. Lunch, 20 table-top exhibitors, EMC-opoly and prize raffle drawings will add to the excellent technical program.



Speaker Roger Swanberg emphasizes PCB floor planning at the Chicago Chapter's March meeting.



Bob Hofmann (left) receives a speaker's plaque from Chicago Chapter Chair Jack Black for his April ANSI C63® talk.

Please check the Chicago Chapter website at www.emcchicago.org for more information.

Milwaukee

On March 22, the Milwaukee EMC Chapter sponsored their 11th EMC Seminar. Registrations totaled 176 paid attendees along with a 33 tabletop exhibitors. Overall, 40 companies were represented at the EMC Seminar.

Our speaker was Dr. Todd Hubing from Clemson University. Dr. Hubing's lecture was titled "Printed Circuit Board Layout for EMC Suppression." Leading the way with the most attendees were GE Healthcare, Rockwell Automation, Johnson Controls, DRS Technologies and Magnetek. The luncheon, emceed by Milwaukee EMC Chapter Chair Jim Blaha, was held for 260 people. As with previous Chapter Chatter submittals on this event, the photos tell the story. Enjoy the photos of this very successful IEEE EMC Chapter event.



Australian EMC Symposium 2011

Symposium, Workshops, Tutorials, and Exhibition
9-11 November, 2011, Perth, Western Australia

The Electromagnetic Compatibility Society of Australia (EMCSA: www.emcsa.org.au), with technical co-sponsorship of the IEEE EMC Society, will organise its 10th Symposium from 9-11 November 2011 in Perth.

- **Technical presentations** of theoretical and practical nature: These talks show the progress in EMC related research and development in respect to prediction, planning, measurement and testing, as well as other topics of interest to the EMC community;
- **Workshops, tutorials and practical demonstrations:** This part is aimed at novices in the EMC arena who need a thorough introduction to the field, as well as at engineers who have to tackle a particular problem and need a reliable source of information;
- **A trade exhibition:** This component of the event puts on show the tools of the trade, be they software, test instruments, EMC relevant hardware such as filters, shielding etc., or testing and consulting services.

Visit the symposium website at www.emcsa2011perth.org for further information.



Dr. Todd Hubing of Clemson University starts the Milwaukee EMC Seminar with a full house of over 180 people in attendance.



Jamal Shafii (left) of Hamilton Sundstrand, the Rock River Valley EMC Chapter Chair, sizing up an IN Compliance shirt from Sharon Smith.



Dr. Hubing (left) enjoying the morning break with Mackenzie O'Connell (center) of ARC Technologies and Sharon Smith of IN Compliance magazine.



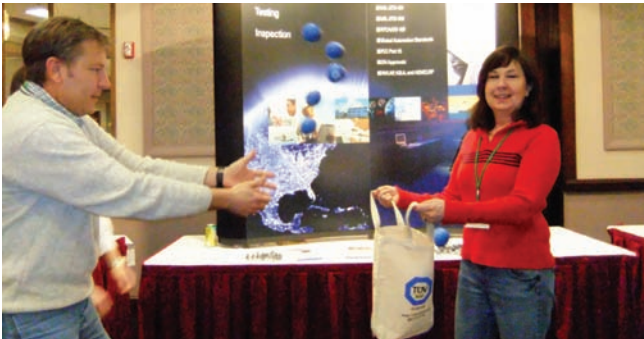
Ram Bhatia (left) of ABB Motor Drives congratulating Jim Blaba, Milwaukee EMC Chapter Chair, on another successful EMC Seminar.



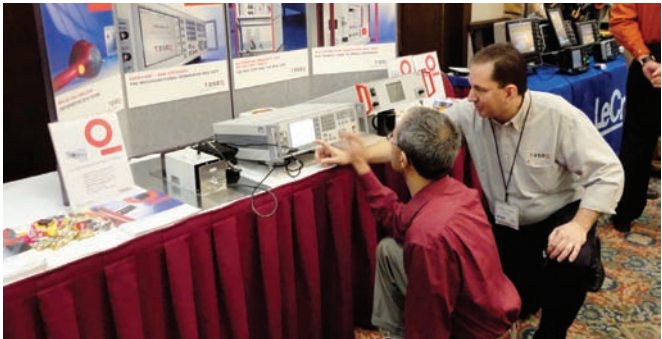
Ken Boston (right) of LS Research digging into Ron Zimmerman's International Compliance EMC Lab, "Bowl of Mints."



Ping Lee (left) of Rockwell Automation enjoying the company of Dr. Hubing.



Renee Kamptner (right) of GE Healthcare playing catch with "TUV Earth Balls" from Ken Kamptner, also from GE Healthcare.



Abtin Spantman (left) of Danfoss Motor Drives being tutored by Randy Johnson of Teseq.



Mary Ellen Blaba and Jim Blaba catching a brief relaxing moment during the seminar.



Jerry Trepanier (left) of GE Healthcare and Don Koller of Rockwell Automation serving as technical advisors and envelop stuffers to the 2011 EMC Seminar Committee.



Jim Blaba was presented the IEEE Region 4 - 2010 MGA Achievement Award during lunch from Sylvia Wrate, DRS Technologies, and current 2011 IEEE Milwaukee Section Chairperson.



The team that pulled it all together (from left) - Don Koller (Rockwell Automation), Jerry Trepanier (GE Healthcare), Dr. Todd Hubing (with an honorary degree of MC - Master of Cheese), Jennifer Blaba (IEEE Comic Relief), Mary Ellen Blaba (IEEE Groupie), Jim Blaba (GE Healthcare and Chairperson) and Jessica Blaba (Data Base Specialist).



Joseph Majeski (left) of LeCroy Instrument provides one last presentation to Rodrigo Rodriguez of GE Healthcare.



Dr. Todd Hubing (left) and Jim Blaba – One last picture after a long day of managing over 200 engineers.

Nanjing

Professor Xiaowei Zhu, Chapter Secretary, reports that in April, several professors, including Professor Ke Wu from

the University of Montreal, Professor Yang Hao from the Queen Mary University of London, and Professor Ke-Li Wu from the Chinese University of Hong

Kong, made a visit to the Southeast University in Nanjing, China. During their stay in Nanjing, the IEEE MTT/AP/EMC Joint Nanjing Chapter invited



A presentation on "Metamaterial Research" by Professor Yang Hao, Queen Mary University of London, was given at the Nanjing Chapter meeting.



Chapter Chair Mark Briggs (left) thanks Bob Stern of Agilent for presenting to the Oregon-SW Washington Chapter on the topic "Quality Considerations in Selecting a Calibration Supplier."



Dr. Philip Meyler, Publishing Director, Cambridge University Press, gave a presentation on "Scientific Publishing" at the Nanjing Chapter meeting.

them to give technical talks to our professional and student members. The Chapter is very appreciative of the time that was taken by these gentlemen to share their expertise and knowledge.

Oregon and SW Washington

Alee Langford, Chapter Vice-Chair, reports that the Oregon and SW Washington Chapter started the year with Darren McCarthy of Tektronix discussing EMI diagnostics using real-time technologies. The following month, Bob Stern of Agilent presented the topic of "Quality Considerations in Selecting a Calibration Supplier." Bob Stern cautioned the attendees to carefully scrutinize the capabilities of a calibration lab before using them. In many cases, only the OEM can make adjustments to modern instruments because the adjustments are done electronically using proprietary algorithms. Good cal-



Bob Scully of NASA during his March presentation to the Oregon-SW Washington Chapter on "EMI in Space."

ibration labs will provide potential customers with "sample data" on similar instruments for you to assess prior to contracting them. The application of the accreditation agency's logo to the data is a key indicator that the measurements are traceable to SI.

The Chapter welcomed Bob Scully of NASA in March to discuss EMI in space. Bob used a video from "Forbidden Planet" to illustrate how EMC is approached at times. We have the invisible monster and we throw lots of our "arsenal" at it. In some cases, we sacrifice someone to fix it to no avail. The current shuttle system is in its 36th year with a 10 year design! The latest project in EMC is the R2 robot system.

Mark Stefka (Distinguished EMC Lecturer) will present at the Chapter's April meeting with the topic of Automotive EMC. Meeting details and additional information can be found by visiting the Chapter website at <http://ewh.ieee.org/r6/oregon/emc/>



Darren McCarthy of Tektronix discussed EMI diagnostics using real-time technologies with the Oregon-SW Washington Chapter.

Ottawa

The EMC Ottawa Chapter reports that an IEEE technical presentation was hosted jointly by the Ottawa EMC Chapter and AP/MTT joint Chapter on June 21,

2010 from 3:00 PM to 5:00 PM. The speaker was Mr. Ghery S. Pettit. The topic was "Current and Upcoming EMC Standards for ITE and Multimedia Equipment." The event was held at FIDUS SYSTEMS Inc. (<http://www.fidus.com/>), a company specializing in high speed electronic product development. Pizza and soft drinks were served during the event.

Mr. Pettit is the EMC Regulatory Compliance Manager at Intel Corporation. He has been active in EMC and related subjects for the past 34 years, having previously worked for the US Navy, Martin Marietta Denver Aerospace and Tandem Computers. He is a member of a number of national and international standards development organizations and industry associations. He chairs ITI TC5 and CISPR SC I WG3. He was the Vice President for Conference Services of the IEEE EMC Society at the time of the presentation. He is an INARTE Certified EMC Engineer. He holds an Amateur Extra class amateur radio license with the call N6TPT and is a private pilot.

Ghery's presentation discussed the basic organization of CISPR SC I, existing standards maintained by CISPR SC I and new multimedia equipment standards that are presently under development. CISPR SC I is responsible for the maintenance and generation of a family of EMC standards for multimedia equipment. In the past, CISPR SC I wrote and now maintains standards for broadcast receivers and ITE (information technology equipment).



Ghery Pettit (left) receives a gift from Qiubo Yi, the Vice-Chair of the Ottawa EMC Chapter, in appreciation of his excellent talk.

Phoenix

Brent Treadway reports that the first IEEE EMC Phoenix Chapter meeting of

the 2011 season was held on February 15, 2011 at Garcia's Mexican Restaurant in Tempe, Arizona. Our speaker for the evening was Keith Peavler, Chief Engineer EMC for Honeywell Aerospace, who spoke on "Rod Antenna Grounding Issues for MIL-STD-461E and 461F." There have been various papers written on theoretical predictions of the active

rod antenna in configurations conforming to MIL-STD-461E and 461F, specifically to the counterpoise grounding. While developing and qualifying a product for a military helicopter, the RE102 limits were exceeded within the 20-30 MHz region. Further investigation ensued including the collection of empirical data for both MIL-STD-461E and



Keith Peavler, Chief Engineer EMC of Honeywell Aerospace, shows a rapt Phoenix crowd the incredible difference in E field levels as measured with MIL-STD-461E and 461F test setups below 30 MHz.

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Daryl Gerke (left) presents a copy of the Arizona Liar's Handbook to Dr. Vince Rodriguez as thanks for his presentation on antennas to the Phoenix Chapter.

461F rod antenna configurations, while being referenced to a calibrated biconical antenna. To understand the issues behind using a rod antenna, Keith began by explaining the history of why the rod antenna was chosen, the distances that were picked for the measurement and the evolution of the Mil Spec to its current F revision. After many adjustments to his product to reduce the noise levels to no avail, he discovered the non repeatability of low frequency measurements when applying 461E. He described the empirical findings of his demonstration using the rod antenna and biconical in both the 461E and 461F configurations. He shared his results which showed improved measurement repeatability using the biconical down to 25 MHz and significant noise reduction when applying 461F. Keith was measuring 15dB lower at 25 MHz! He concluded by advising testing to 461F, but in the event that 461E is specified, then one should test using a biconical antenna.

The second IEEE EMC Phoenix Chapter meeting of the 2011 season was held in March when Dr. Vince Rodriguez of ETS-Lindgren spoke about "Antennas, Antenna Theory, Parameters and Antennas for EMC." Dr. Rodriguez is the Senior Principal Antenna Design Engineer and Antenna Product Manager for ETS-Lindgren in Cedar Park, Texas. Dr. Rodriguez began by breaking the antenna and antenna pattern into its parameters for easier evaluation and understanding. He defined the antenna and how it radiates, the antenna pattern, E and H planes,

and both omni and directional antenna patterns. He introduced half power beam width, gain, antenna factor, and both types of polarization, circular and linear. He then applied these parameters to typical EMC antennas such as the coil and loop, monopole, dipole and horn. What was particularly interesting was the animated graphics of each of the radiating antennas and how their wave fronts impinged on aspects of the typical EMC test setup using a copper bench.

Santa Clara

On February 8, 2011, Bill Imes, Sr. Fellow, Lockheed Martin, gave a presentation to the Santa Clara Valley EMC Chapter on, "Grounding Application for Space Systems." Grounding considerations result in the interaction of power and signal applications in major aerospace systems. Dr. Imes' talk discussed the theoretical and practical basis for how to design aerospace ground systems (including test systems) that maximize the probability of success. Fundamental concepts of stray voltage generation, impedance, current flow path control vs. frequency, stray magnetic field limitation, safety, electrostatic discharge prevention (via grounding), and primary and secondary power grounding approaches were presented. Handling of grounding and reference systems for both analog and digital applications in system were addressed. Power boundary and isolation techniques (and how to achieve them), and prevention, limita-



Dr. Bill Imes of Lockheed Martin delivered an excellent presentation to the Santa Clara Valley Chapter on grounding in space systems.



John T. Tengdin, Senior Partner and Cofounder, OPUS Consulting Group, gave a presentation to the Santa Clara Chapter on "EMI in Electric Power Substations."

tion of common mode concerns were also discussed.

Bill Imes is a Lockheed Martin Senior Fellow. He has 46 years experience as a senior engineer, with 44 of those years spent at LM. Bill provides detailed technical support on complex issues to all facilities, all lines of business, and management. He has been significantly involved with most LM programs in Sunnyvale and has made contributions to numerous others in Space Systems (GPSIIR, GPB, Lunar Prospector, SIRTF, DMSP, FBM, AIA, HMI, HIRDLS, RM20), and elsewhere in the corporation (Aegis, JSF). His specialties include analog and digital electronics design and analysis, systems design and analysis, electromagnetic compatibility, signal integrity, power systems, and power electronics.

Bill has received numerous technical excellence awards, including the prestigious LM Nova Award (2007), and acted as a

consulting engineer to several companies outside LM developing space systems and aircraft hardware, biomedical equipment development, software development, and developing and delivering training. He is also an adjunct professor at Stanford University and San Jose State University. Bill has presented numerous papers and is the co-author of a book on EMC in switch mode power supplies. He holds a BSEE from Northwestern University and a MSIT from Carnegie Mellon University.

On April 12, 2011, John T. Tengdin, Senior Partner and Cofounder, OPUS Consulting Group gave a presentation to the Santa Clara Chapter on, "EMI in Electric Power Substations." His presentation covered these main points:

- How found? What events triggered the research?
- What failures occurred? Component damage? False trips?
- What IEEE PES protective relay standards evolved as a result?
- What's in IEEE 1613?
- How the IEEE PES Substations Committee WG C2 built on that history to

create IEEE 1613-2003 in eleven months - from a blank page to a balanced "IEEE 1613 - Standard Environmental and Testing Requirements for Communication Networking Devices in Electric Power Substations."

- What was new then? Required serial and Ethernet communication (via copper and/or fiber - depending on the ports provided in the device) per prescribed communication profiles, and the added pass/fail criteria for loss of communication.
- What's new now - A PAR to extend the scope to "In Electric Power Facilities" and add a communication profile for communications via RF to be underway during each of the four transient tests, and - if necessary - tweaks to the pass/fail criteria.

John T. Tengdin, P.E (IEEE LF' 2007) received US Navy training as a radio technician, then served on the USS Kern (AOG-2) at the end of WWII. He graduated from Purdue University, West Lafayette, Indiana in 1949 with a BSEE degree (Power Major - Tau Beta Pi, Eta Kappa

Nu). His post college employment experience began with Dayton Power and Light Company in their Cadet Engineering Program. That was interrupted by a recall to active duty in the U.S. Navy during the Korean War as an Electronic Technician. At NAS San Diego, he developed a jeep mounted radio relay unit that automatically linked communications between HF and VHF voice channels - for use during front line close air support, and improved the design during field tests in North Korea. Upon return to civilian life, he joined General Electric Company as a field service engineer, later as an application engineer serving electric utilities and their consulting engineering firms. He worked for GE's Computer Department for three years until it was sold to Honeywell Information Systems in Wellesley, Massachusetts where he worked for two years. He returned to GE in 1972 as Manager of Product Planning for GE's protective relay business located in Philadelphia, Pennsylvania. Under his direction, GE's PROBE Project installed a minicomputer (Varian V72) in



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a Commonwealth Edison substation to explore the limits to pure digital solutions. In 1980, he was one of the founders of GE's Digital Systems Operation in King of Prussia, Pennsylvania. He began work as an independent consultant in 1986, and formed OPUS Publishing as a two man partnership specializing in substation automation and cyber security in 1999. It was the predecessor to OPUS Consulting Group, formed in 2007, where he is a Senior Partner and Co-Founder. He was one of the US members of IEC TC57 WG 10-11-12 that developed IEC 61850. He has received numerous awards from the PES Substations Committee and the PES Power System Relaying Committee for his work on technical papers and standards, and from the IEEE SA for rapid standard development. He chaired the IEEE PES Substations Committee Working Group C2 that developed IEEE 1613-2003 in eleven months. His 2007 Fellow citation was "for leadership in Ethernet local area network based protective relaying and control in electric power substations." He can be reached at j.t.tengdin@ieee.org.

SE Michigan

On June 17, 2010, Arnie Nielsen gave a great presentation on the "Basics of PCB Design" and working with component specifications for the Southeastern Michigan (SEM) EMC Society Chapter. His presentation covered both the history and present day technology. Arnie retired from Visteon-Ford in 2005 with over 35 years experience in a number of disciplines. Since retiring, he has been active consulting on electronic design and EMC for over 20 companies (including electric vehicles).

In his presentation, Arnie described test anomalies that should be taken seriously and showed how Ford has been able to speed up the EMC test cycle by putting components under duress. Arnie discussed Ford's chattering relay as a great way to see how components deal with spurious signals across the frequency spectrum.

Arnie talked about Power Spectral Density (PSD) calculations and the effect of the PSD on testing decisions. He examined the different characteristics of diodes and those waveforms; his slides on this point were very illuminating and are on the SEM website. Arnie involved the group in considering ESD failures. Some

ESD events cause components to become vulnerable to other stress that would not normally cause failure. So he stressed the order of testing components.

Arnie Nielsen's presentation was amazing; check out our website at www.emcsociety.org to enjoy his slides and look at past meetings.

The Southeastern Michigan IEEE EMC Society Chapter on January 20, 2011 was graced as Kimball Williams spoke on "EMC Test Planning for Customers" or test plan planning. Kimball Williams is a Senior Manager at Denso Americas in Southfield, Michigan. He is the lead for the EMC laboratory. He obtained his BSEE degree at Lawrence Technological University in Southfield, Michigan. Kimball is well known in the industry as he has been involved in electromagnetics and EMC for over three decades.

Kimball spoke of the many pitfalls of testing handcrafted parts, too much solder, not enough solder, not made to manufacturing specifications. He said it was much better to wait for assembly line parts.

Kimball suggested telling the customer horror stories from the past to illustrate how much you need the customer's input. Explain to them that software may crash during testing and the results of a test, while the software is in soft recovery mode, may be very different from a standard test. It is very important, he said, to get the customer involved and to have ownership of the testing. He suggested involving the customer in a brain storming session to discover his or her goals.

Once the tests have evolved, the EMC test engineer should do a demo before running the test for the customer. Generate a test matrix for the customer that you will use with links to other records and relevant standards.

Kimball said once the testing starts, follow the plan. He suggested using tracking features of the test matrix. A lab should only deviate from the test plan with knowledge of the customers. Get records of their approvals. File everything. Kimball said to remember the customer owns the data and they can take all of it with them when the testing is finished.

On February 17, 2011, the Southeastern Michigan IEEE EMC Society Chapter welcomed Cyrus Rostamzadeh who presented, "ESD Behavior of Multi Layer Ceramic Capacitors." Cyrus Rostamzadeh is currently an EMC Technical Specialist at Robert Bosch LLC, in Plymouth, Michigan, where he has implemented an EMC

design and analysis process to facilitate product compliance at a lower cost. For the past 14 years, he has been responsible for providing product design support and EMC interface to North American, Asian and European automotive markets. Prior to joining Bosch, he worked in various EMC, electromagnetic and analog electrical engineering occupations.

Cyrus Rostamzadeh received a B.Sc. in Physics from Imperial College of Science and Technology, University of London (England) and an MS in Electrical Engineering. He is a senior IEEE member. He is a NARTE certified EMC and Product Safety Engineer. He is an active member of the IEEE EMC TC-9 Computational Electromagnetics committee. He has given numerous EMC seminars and training courses to Bosch engineering associates. He has published extensively at IEEE EMC, IEEE PAC and URSI. Cyrus was an invited guest speaker at the European Space Agency (ESA) in Florence, Italy, March 2009.

Cyrus Rostamzadeh discussed the utilization of Multi Layered Ceramic Capacitors (MLCC) in small package geometries (0603) for the protection and mitigation of Electrostatic Discharge (ESD) for the automotive printed circuit board application, which is a major concern. He said that MLCC geometries have diminished dramatically in the past decade. In addition, the cost benefit and economic merit of their use for the PCB connector area in highly congested modules (pin density in excess of 200) is attractive and cannot be easily avoided. Nonetheless, the EMC engineering community and experienced PCB design experts have only concentrated in various optimization of PCB mounting schemes, thus developing "EMC guidelines." If the ESD protection of MLCC is sufficient for PCB mounting strategies or capacitor value and its voltage rating, then you are in for a big surprise after an ESD event or an event caused by high temperature. His presentation provided us with the fascinating overview of the pre-ESD versus post-ESD behavior of MLCC devices. The physics of the mitigation device and their interaction with ESD phenomena was illustrated.

The Southeastern Michigan IEEE EMC Society Chapter presented "Using Smith Charts to Represent Key Parameters of Interest in Addressing EMC Problem Solving" by Gowry and Vino Pathmanathan on March 17, 2011. Gowry Pathmanathan received her BSEE from the University of Peradeniya in

Sri Lanka and worked as an electrical engineer in the health sector. Gowry then came to the United States and received her MSEE in 2009 from Oakland University in Michigan. She worked for A123 as an electrical hardware engineer and is currently working as a system electrical engineer for CNC Onestop. Vino Pathmanathan received his BSEE in 1994 and his MSEE in 1996 from Wright State University in Dayton, Ohio. He worked for ITT as an automation engineer and then as a controls engineer, before becoming an EMC test engineer in 1998. Vino then worked for Valeo. He next was in charge of the TRW EMC lab. Vino is currently working for ESG Automotive as a Senior EMC Systems Engineer and as an EMC consultant. Vino's spare time is spent with the lovely and intelligent engineer, Mrs. Gowry Pathmanathan, and their son, Prathossh.

Vino and Gowry went over the invention of the Smith Chart, an incredible early calculator created by Phillip H. Smith in 1905. They discussed how it

has evolved to date and helped engineering design and EMC. Their presentation demonstrated how to use the Smith Chart to represent key parameters of interest in addressing EMC problem solving. They covered the following:

- Black Magic Design of the Smith Chart calculator revealed
- What is the unity circle?
- Stability analysis
- Impedance
- Admittance
- Reflection coefficients
- Scattering parameters
- Noise figure circles
- Constant gain contours
- Region of unconditional stability

They discussed the many software packages available to plot the information on a Smith Chart (ex: Serenade and Smith 191). They showed and discussed the interpretation of data from the Smith Chart which requires a good understanding of AC theory and transmission line theory, both of which are prerequisites for an EMC and RF engineer.

Singapore

Richard Gao Xianke, Chapter Chair, reports that Singapore held the first 2011 administrative meeting on 8 February 2011. Dr. Richard Gao Xianke, Chapter Chair, hosted the meeting and summarized the annual report of Chapter activities in 2010. Dr. Chua Eng Kee, Chapter Treasurer, updated the financial report and balance of the year 2010. The



*Professor Lei Zhao from Xuzhou Normal University, China, delivered a technical talk at the A*STAR Institute of High Performance Computing, Singapore, on 10 March 2011.*

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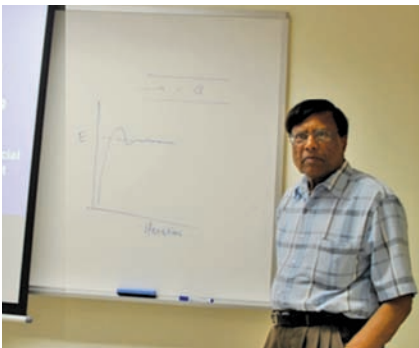
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*Professor Lei Zhao is shown with Singapore EMC Chapter members (from right to left) Dr. Weijiang Zhao, Professor Lei Zhao, Dr. Richard Gao Xianke, and Dr. Liu Enxiao, at Infuse of A*STAR, Singapore, on 10 March 2011.*



Professor Raj Mittra from Pennsylvania State University, USA, delivered a technical talk at the Temasek Laboratories, NUS, Singapore, on 10 March 2011.

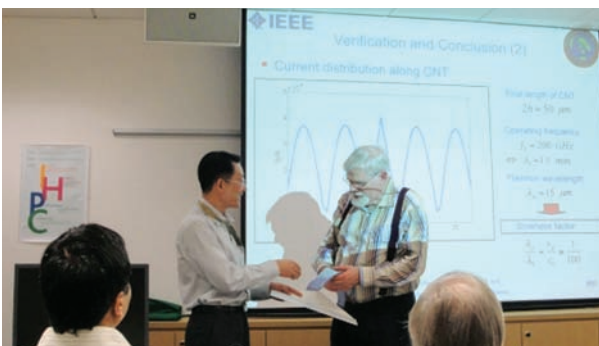


*Professor Peter Russer from Technical University Munich, Germany, delivered a technical talk at the A*STAR Institute of High Performance Computing, Singapore, on 21 March 2011.*

committee has passionately discussed the 2011 work plan, which includes organizing seminars/distinguished lectures, workshops, short courses, driving membership development, organizing Chapter social activities, sponsoring conferences, etc. On 28 January 2011, Professor Wen-Yan Yin, distinguished

lecturer of the EMC Society from Zhejiang University, China, delivered a speech with the title of “Multiphysics Method for High-Power Electromagnetics.” The DL talk took place at the Nanyang Technological University (NTU) with 34 attendees from universities, research institutes and industrial companies, 14

of which were IEEE members. On 10 February 2011, Chapter Chair, Dr. Richard Gao Xianke, attended the IEEE Singapore Section first general committee meeting at Suntec Singapore International Convention & Exhibition Centre. All general committee members discussed and reviewed the section reports for 2010. On 10 March 2011, Professor Lei Zhao from Xuzhou Normal University, China, delivered a technical talk entitled, “Research on Fast Assessment of Electromagnetic Exposure to Human Head by Mobile Phone,” at A*STAR Institute of High Performance Computing, Singapore. There were a total of 12 attendees. Professor Raj Mittra from Pennsylvania State University, USA, presented two topics, “New Strategies in Computational Electromagnetics for Solving Real-World Problems” and “Some Recent Developments in Meta-material-based Antennas, EMC/EMI, Plasmonics and Electromagnetic absorber Designs” in Singapore on 10 and 11 March 2011, respectively. The series talks were well attended with a total of 54 attendees, 25 of which were IEEE members. On 17 March 2011, Professor Natalia K. Nikolova from McMaster University, Canada, the distinguished lecturer of the IEEE Microwave Theory and Techniques (MTT) Society, delivered a technical talk entitled, “Microwave Near-field Imaging of Human Tissues: Hopes, Challenges, Outlook”, at the National University of Singapore, Singapore. There were a total of 25 attendees, of which 12 were IEEE members. On 21 March 2011, Professor Peter Russer from Technical University Munich, Germany, another distinguished lecturer of the MTT Society, gave a speech entitled, “Nanoelectronics-based Integrated Antennas” at A*STAR Institute of High



Professor Peter Russer (right) appreciated a speaker gift of a tie with IEEE and EMC logos presented by Dr. Richard Gao Xianke, chair of the Singapore EMC Chapter.



Participants listened attentively at Professor Peter Russer's seminar on 21 March 2011 in Singapore.

Performance Computing, Singapore. The lecture had an overwhelming response which was attended by 16 IEEE members and 17 guests.

Washington/Northern Virginia

The Washington/Northern Virginia EMC Society Winter Meeting was held on February 15, 2011 in the rumpus room at Washington Laboratories in Gaithersburg, Maryland.

The topic was, "Shielding Methodologies in Equipment Design" and featured a presentation by Praveen Pothapragada, Engineering Manager with Equipto. Mr. Pothapragada provided an overview of the challenges of shielding equipment

assemblies against a variety of threats. The presentation covered the fundamentals of shielding mechanism, including the performance of shield materials against magnetic, E-field and plane wave sources and compromises in equipment (and how to mitigate them).

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that provides excellent attenuation across a wide frequency range. Proper selection and design can provide attenuation up to 10 GHz and higher. EMC



PHOTO BY DICK FORD

Praveen Pothapragada and Mike Violette (right) with Equipto Demonstration Cabinet.

Invitation to 2011 IEEE EMC Chapter Chair Training Session & Dinner

The IEEE EMC Society is pleased to wholeheartedly extend an invitation to all IEEE EMC Chapter Chairs to attend the Chapter Chair Training Session & Dinner taking place in conjunction with the 2011 IEEE International Symposium on EMC in Long Beach, California, during August 14-19 at the Long Beach Convention Center.

CHAPTER CHAIR TRAINING SESSION Monday, August 15, 3:30 PM – 6:30 PM

The Training Session is intended to help Chapter Officers to be aware of the services provided to chapters by the IEEE and EMC Society.

Please note that this year the planned topics include a presentation delivered by an IEEE MGA Information Management Specialist on:

- Potential of vTools.Meetings and vTools.Voting
- Overview of the main features of SAMIEEE tool

CHAPTER CHAIR DINNER Monday, August 15, 6:30 PM – 8:30 PM

This dinner is a chance for the Chapter Chairs or their representatives to gather and share what they have been doing for the past year.



Contact information:
EMC-S Chapter Coordinator,
Sergio A. Pignari,
sergio.pignari@polimi.it



**2011 Chapter Chair Training
Session & Dinner**