

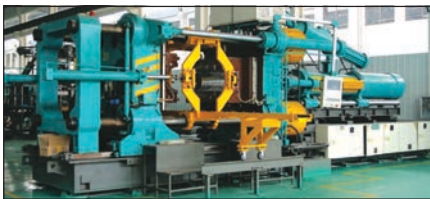
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Perspective Handle with Care



First application of hollow core composite insulators in Canada during 1990s saw them handled like porcelain.

When composite insulators first arrived on the scene over 40 years ago, they were sometimes touted as being indestructible. This may have seemed a reasonable assumption at the time given that pliable rubber housings better resist sudden impacts than ceramic materials.

By the early 1990s, however, it had already been discovered that mishandling composite insulators was actually a serious issue and a primary source of irreversible damage. The risk was all the more severe since such damage could occur to regions below the surface and remain undetected visually. In fact, Eskom, one of the first utilities to adopt composite insulators on a broad scale, soon began to document cases of damage from mishandling and even developed an internal Guide to instruct workers on how to prevent it.

Today, many power system operators installing composite insulators on overhead lines or at substations have their own protocols on how best to store and handle them in the field. For example, crews about to install

silicone insulators on the new ± 525 kV HVDC line being completed in south-west Norway have been issued specific guidelines on key aspects of handling to avoid risk of damage.

Much of the focus on mishandling composite insulators has been placed on long rod types due to their much greater population. But the problem extends to hollow core types as well. Ongoing examples of hollow core insulators that have sustained handling damage suggest that correct practices for these types of products are still not universally understood and respected.

Fortunately, most gouges and tears to the sheds of silicone housings do not signal irreversible damage and can in fact be repaired in the field following the specific instructions of their manufacturer. But such cases understandably remain an area of concern.

Even after more than two decades of rapid growth in application of hollow core composite insulators, it seems that no user should take for granted the need to always handle these products with the proper care.



Bushings with damaged composite housings received by utility in Middle East.



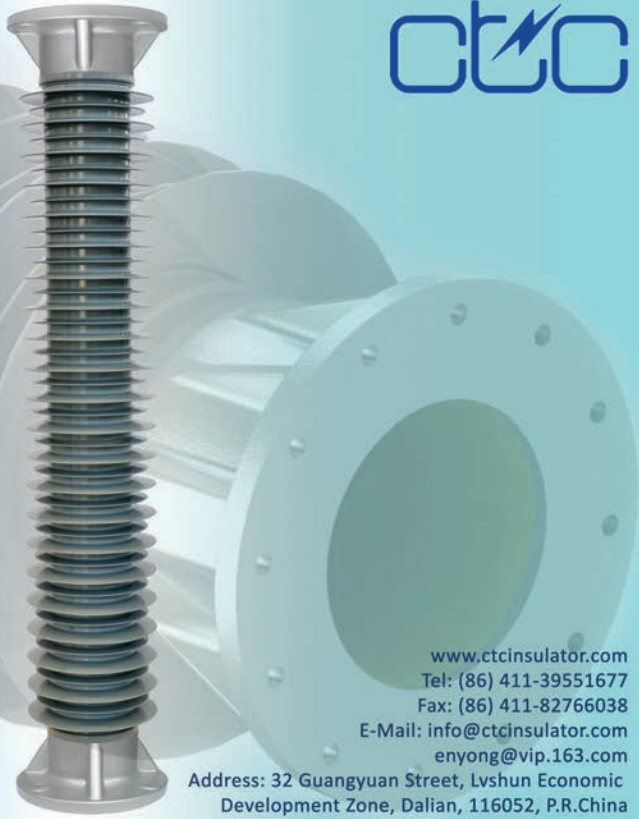
Damage to 800 kV bushing used at European-based test laboratory.

Ongoing examples of hollow core insulators that have sustained handling damage suggest that correct practices for these types of products are still not universally understood and respected.



Shed damage from mishandling.

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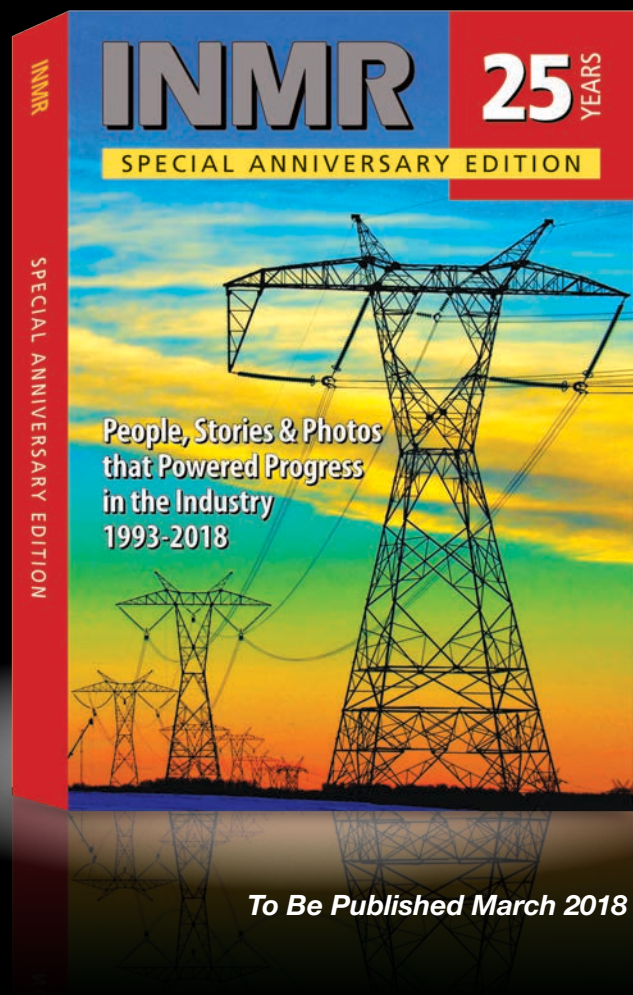
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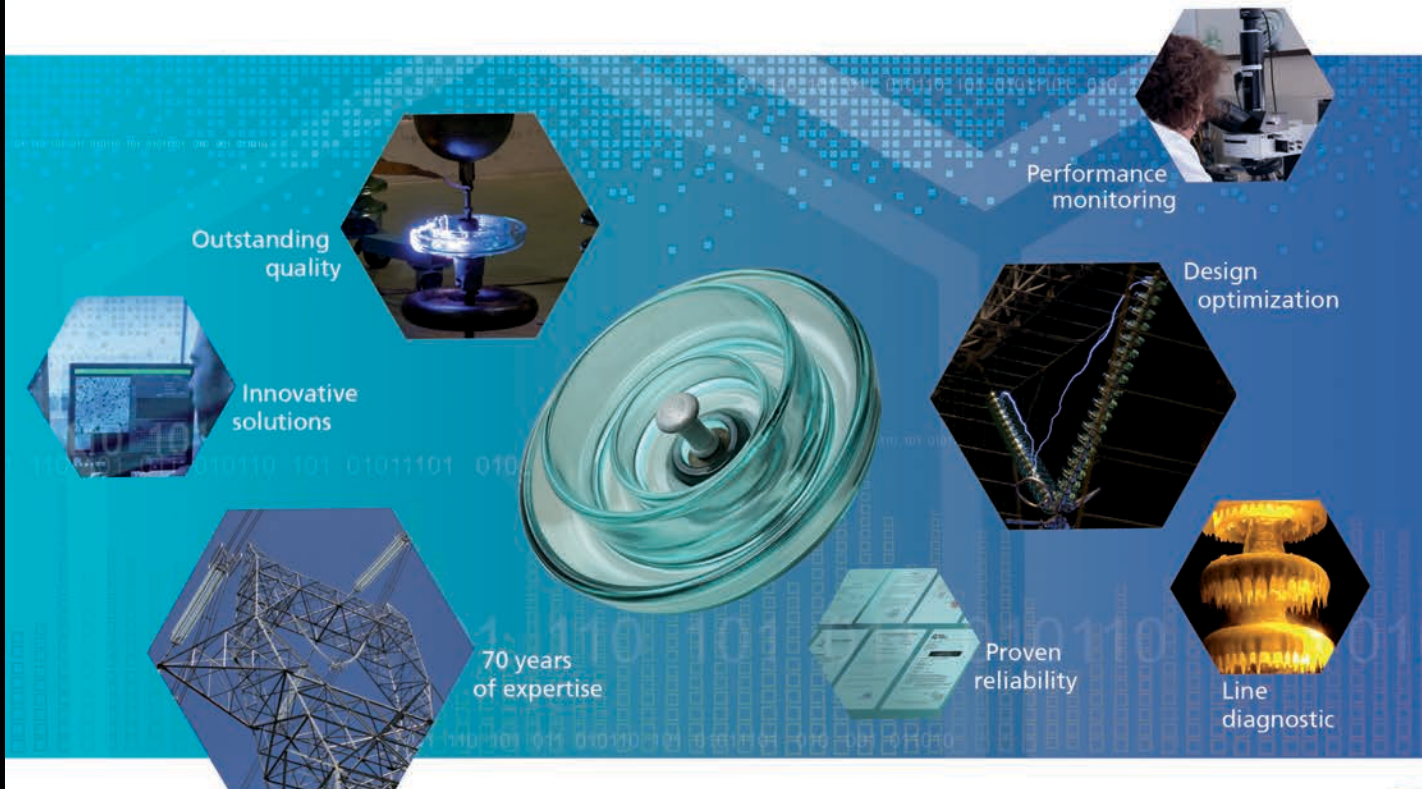
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Ahmad Al-Thagafi

Cable & OHL Engineer, Maintenance & Asset Management, Gulf Cooperation Council Interconnection Authority (GCCIA), Saudi Arabia

Testing & Service Experience with Insulators on GCCIA Network

Mr. Ahmad holds a Bachelor of Science in Electrical Engineering from the King Fahd University of Petroleum & Minerals (KFUPM) and has almost a decade of experience in the OHL maintenance. For the first 5 years, he was with the Saudi Electricity Company (SEC). Currently he is responsible for OHL maintenance in the GCCIA and managing the Al-Fadhili energized Pilot Test Station for outdoor insulators. He is author and co-author for several published papers.



Steve Aubertin

Managing Director, Goulden Reports, United Kingdom

Review of Market Development & Projected Future Trends for T&D Equipment: 2015 to 2025

Mr. Aubertin specializes in market research and data collection for the electrical power industry. Reports on the world markets for T&D equipment, including HV insulators and bushings, have been issued for over 20 years.



Andreas Bacher

R&D Manager for Polymers, Wacker Chemie, Germany

Achieving Proper Adhesion Between Silicone Elastomers & Various Substrates: The Chemist's View

Dr. Bacher received his PhD in macromolecular chemistry at the University of Bayreuth/Germany followed by a 2-year post doc assignment at the University of Sheffield/UK. He joined Wacker in 2000 as R&D Manager for Polymers where for the past 10 years he has been responsible for silicone elastomers for various applications, including electrical insulation and cable applications.



Tony Baker

Vice President, K-Line Insulators USA, United States

Combined Loading Guide for Composite Line Post Insulators

Mr. Baker received a BSE degree from the University of Michigan and an MSE degree from Wayne State University. He has worked for The Detroit Edison Company and been involved in the design and application of porcelain and polymeric high voltage insulators for over 40 years. He is active in the IEEE WG on Insulators and has chaired several task forces and published papers on insulator applications, including service loading limits, braced post insulators and insulators for use in high pollution environments.



Rainer Bantle

Head of Project Engineering, DESMA Elastomertechnik, Germany

Modern Process Control & Automation of Silicone Components for Power Systems

After completing his studies in mechanical engineering with focus on materials and surface technology at the University of Hull, in England, Mr. Bantle started his career in 1995 as Project Engineer at Klöckner DESMA Elastomertechnik. He worked in this position until 2001 and since then was appointed Head of Project Engineering for all DESMA operations worldwide.



Daniel Blanco

Lines Maintenance Engineer, Red Eléctrica de España, Spain

Resolving Problems With Insulation in High Pollution Service Environments

Mr. Blanco received his Electrical Engineering Degree from the Technical University of Madrid and a Masters in Renewable Energy in Electrical Systems from the Carlos III University of Madrid. In 2015, he joined Red Eléctrica de España, the Spanish TSO, where he has been working in the Lines Maintenance Department with responsibility for insulation inspection. As member of the insulation design group, he is also involved in defining design and installation criteria for overhead line insulation systems.



Jens Bothe

Product Manager, Streamer Electric, Switzerland

EasyQuench Technology, 20 Years of Innovation in Lightning Protection for Lines

Mr. Bothe has a Masters Degree in Industrial Engineering for Process and Energy Engineering. After his studies at Otto-von-Guericke University Magdeburg in Germany and the University Nice Sophia Antipolis in France, he joined Streamer in 2014. Apart from his Position as Product Manager, he is also responsible for the German, Austrian and Swiss markets.



Derrick Brydges

Thermographer, Linewise Aerial, Canada

Classification of Infrared, Corona & Visual Patrol Anomalies

Mr. Brydges received a Bachelor's Degree in Applied Sciences from the University of Guelph and also attained certification in power line maintenance from the Government of Ontario. He started as a Level 1 Thermographer and rose to Level 2 with Hydro One, the transmission grid operator in Ontario. He currently works in helicopter-based inspection of lines.



Jeff Butler

Business Unit Manager - Insulators, Hubbell Power Systems, United States

Line Post Loading Considerations in Braced & Unbraced Applications

Mr. Butler graduated from the George Institute of Technology with a degree in Mechanical Engineering before entering the power utility industry in 2006. Since then, he has had various roles including international and domestic responsibilities in engineering, sales, and marketing. He is an internationally published author and presenter and licensed professional engineer. In his current role, he is the Business Unit Manager for Insulators located at the manufacturing facility in Aiken, South Carolina.



Paolo Cardano

R&D Sr. Expert for Bushings, GE Grid Solutions, Italy

Development of UHV Bushings for Extreme Seismic Conditions

Mr. Cardano received his Doctoral Degree in Electrical Engineering from the Milano Polytechnic University. After graduation, he joined Passoni & Villa and has been working in various positions in the technical area. He is presently R&D senior expert for OIP, HVDC and gas bushings and also in charge of development of UHV AC bushings. He has been president of the Italian Committee 36A - Bushings and is active in several CEI/IEC working groups. He has published numerous papers at international conferences.



A.J. (Tony) Carreira

President, K-Line Insulators, Canada

Totally Insulated Framing Designs

Mr. Carreira received his Bachelors in Electrical Engineering from the Univ. of Waterloo. Prior to joining K-Line Insulators, he worked at Ontario Hydro in distribution and transmission design, planning, construction and maintenance. He is a member of CIGRE, CSA, CEA and a Sr. Member of IEEE. He has chaired the IEEE TF 15.09.04.01 "Guidelines for In-service Classification of NCI Damage" as well as ESMOL TF on IEEE Std 957 "Guide for Cleaning Insulators". He was also appointed an Associate Expert of WG 32 and an Associate Member of B2-AG-06. He sits on committees, working groups and task forces in these organizations.



William Chisholm

International Consultant, Canada

Topic 1: Using Satellite Maps of Pollution Flux for Improved Insulator Selection & Operation Topic 2: Achieving Long Service Life from Transmission Line Arresters

Dr. Chisholm is an expert in the effects of adverse weather on overhead power lines, including icing on insulators, lightning and grounding and thermal rating. He has been an IEEE Fellow for a decade – a distinction given after his long career at Ontario Hydro and Kinectrics. He combines his consulting worldwide with teaching and writing for INMR as well as Wiley & McGraw Hill and also volunteers in the IEEE executive rotation as Chair and Past Chair of the PES T&D Committee.



Alessandro Clerici

Trends in Energy & Electrical Power Worldwide & Impact on Development of T&D Systems

Dr. Clerici graduated in electrical engineering from the Milan Polytechnic Institute and has 50 years in the energy sector with participation in projects for power systems across the globe. He has had important positions in CESI, GE-Sae Sadelmi Group and ABB and now acts as Senior Corporate Advisor to CESI. In the area of OHTL, he has developed compact lines and upgrading existing line corridors and actively participated in engineering and construction of thousands km of OHTL's AC and DC. At IEEE, he introduced the concept of transforming AC to DC lines for substantial power upgrading. His positions in international associations include former Chairman of CIGRE and IEEE WGs and Director of the WEC Task Forces on Interconnections. He is author or co-author of over 350 papers.



José E. Contreras

Materials Researcher, Prolec GE & Celeco, Mexico

Development of Nanostructured Ceramic Insulators

Dr. Contreras received a PhD in Materials Engineering from the University of Nuevo Leon. Since 2006 he has worked in projects related to innovative concepts and new technologies for transformers and outdoor insulators. He is responsible for the Insulating Materials Laboratory at the Applied Research Center of Prolec GE (CIAPE), is member of the Mexican National System of Researchers (SNI, Level I) and author of "Nanotechnology applications for electrical transformers-A review" as well as author/co-author of other publications and patents. His main interests include nano-ceramics for HV applications and nanotechnology.



Jan Debus

Head of Product Care, Brugg Cables, Switzerland

Experience in Assessment of High Voltage Terminations

Dr. Debus studied Electrical Power Engineering at the TU Darmstadt and received his PhD in 2014. The topics of his thesis were possible applications for non-linear field grading system in electrical power apparatus. Since 2013, he has been working in the R&D department of Brugg Cables, with responsibility for condition assessment of high voltage components.



Michele de Nigris

Director, Sustainable Development & Energy Sources, RSE, Italy

Impact of Environmental Constraints on Electrical System Development & Insulation

Mr. de Nigris received his degree in Electric Engineering from the University of Genoa in 1983 and now serves as Director of Sustainable Development & Energy Sources Department at RSE. He was elected Chairman, IEA Technology Collaboration Program ISGAN (International Smart Grids Action Network) at the first Executive Committee Meeting in Seoul. An international leader in the study, research and testing of electrical components for more than 30 years, he represents Italy at international forums such as the former European Electricity Grids Initiative and the IEA End-Use Working Party. He is author or co-author of nearly 100 scientific papers and has been coordinator of the GRID+ project.



Héctor de Santos

R&D Engineer, La Granja Insulators, Spain

RTV Silicone-Coated Glass Insulators: Test Station Experience

Mr. de Santos received the Electrical Engineering degree from the Technical University of Madrid and he is currently working towards the Ph.D. degree at Comillas Pontifical University in Madrid, Spain. After three years working for different utilities as project engineer in the field of overhead lines, in 2014 he joined La Granja Insulators as R&D engineer. He is a member of Spanish IEC TC 36 "Insulators" and IEEE Power and Energy society as well as Dielectric and Electrical Insulation society.



Chris Engelbrecht

Sr. Consultant, EPRI International, Netherlands

EPRI R&D on Insulators & Arresters

Mr. Engelbrecht has been internationally active in the field of insulation co-ordination since 1990. He convened CIGRE WG C4.303 that completed the guidelines for selecting HVDC insulators with respect to pollution. He is Convener of CIGRE Working Group C4.23 as well as a member of IEC TC36 WG 11.



Ryan Freeman

Application Engineer, Hubbell Power Systems, United States

Performance & Revenue Enhancements Utilizing Transmission Line Arresters

Mr. Freeman received his Bachelor of Science in Mechanical Engineering from the University of South Carolina. He joined Hubbell Power Systems in 2011 as a Design Engineer. Since 2016, he has been an Application Engineer responsible for the design and market of distribution and transmission line arresters. He is a member of the IEEE 693 Seismic Design for Substation WG. He is also a member of CIGRE WG C4.39.



Javier Garcia

Hernandez Technical & Production Manager, La Granja Insulators, Spain

Insulators Requirements: Design Criteria, Operation Parameters and Standards Review

Mr. Garcia received the Electrical Engineering degree from the Polytechnic University of Madrid. In 1990 he joined La Granja Insulators. After 20 years working for different technical departments on insulators areas, from 2011 he is the responsible for the insulators technical and production management. He is the president of the Insulator IEC Committee (TC36), member of Spanish IEC TC 42 "High Voltage Techniques", member of Spanish IEC TC 210 "CISPR", member of different IEC WG's and CIGRE and IEEE member.



Jean-Marie George

Scientific Director, Sediver, France

Topic 1: Necessary Check Points & Testing for Quality Screening of Insulators

Topic 2: DC Pollution Performance: Current Approximations & Future Needs

Mr. George received his Electrical Engineering Degree from the HEI School in France and joined Sediver's R&D team as Research Engineer in 1986. After working as Production Manager for the Composite Insulator Division as well as Quality Manager and Technical Director for North America, he currently serves as Scientific Director, with a scope of responsibilities covering all R&D and technical assistance activities worldwide. His cross-functional positions together with more than 30 years of professional experience have given him extensive expertise in insulator performance as well as research and development. He has published and co-authored extensively on key overhead lines topics, with some 40 scientific papers and technical articles and he is also author/co-author of several patents and utility models. He is an active member of CIGRE, IEEE, NEMA, ANSI and CSA.



Dimitri Georgopoulos

Senior Specialist, Transmission Lines, AltaLink, Canada

Topic 1: Utility Perspective on Insulator Standards & Documentation Required to Assure Compliance

Topic 2: Real World Utility Experience with Compact Designs

Mr. Georgopoulos is a Senior Specialist Lines Engineer and his utility career spans +35 years. He has held technical and management positions in the areas of overhead and underground transmission lines in the domains of Projects, Asset Management and Maintenance Planning & Scheduling. He currently specializes in developing and implementing innovative and holistic approaches to structure and line designs.



Moritz Giessel

(in co-operation with Prof. Volker Hinrichsen)

PhD Candidate, TU Darmstadt, Germany

Electro-Thermally Coupled FEM Simulations of HV Station Arresters, With & Without Grading

Mr. Giessel received the Dipl.-Ing. degree in 2012 in Electrical Engineering from the Technische Universität Darmstadt. Since 2013, he has been working as a research associate towards a PhD degree with the university's high voltage laboratories. His main focus is on experimental and simulative investigations in regard to the thermal stability of high voltage surge arresters.



Jean-François Goffinet

Sr. Expert, Elia Engineering, Belgium

Experience with Design & Erection of Insulated Cross-Arms During the Stevin Project

Mr. Goffinet works in the Engineering Department at Elia, the Belgian TSO. He has over 15 years experience in the utility business, specializing in overhead line design as well as insulators and is a member of CIGRE Working Groups, Cénélec and ENTSOE. He has been involved in over 10 published papers.



Hansjörg Gramespacher

Technical Consultant, ec4ac, Switzerland

New Design Concept for Polymeric HVDC Cable Joints

Dr. Gramespacher studied physics and received his PhD from ETH Zurich. He has worked for more than 15 years at international companies in Germany and Switzerland in development of medium and high voltage cable accessories. One of his main research activities has been developing non-linear field grading material. In 2014, he founded a consulting company that offers technical support in high voltage cables and cable accessories for both AC and DC.



Ruben Grund

Product Portfolio Manager, Cable Accessories, Pfisterer, Germany

Cable Accessories as Enablers for the Future Grid

Mr. Grund has been working in the field of cable accessories for more than 10 years. He is a graduate of the University of Applied Science, holding a degree of Electrical Engineering. His professional career started as Project Manager for high voltage projects. Later he became responsible for Product Management of plug-gable dry type terminations. Since 2013, he has been in charge of R&D, Product Management and the high voltage laboratory for Pfisterer cable accessories, including joints, outdoor, GIS and transformer terminations.



Stanislaw Gubanski

Professor, Chalmers University of Technology, Sweden

Insulator Materials Toward Development of Insulators of the Future

Professor Gubanski leads the High Voltage Engineering Division at Chalmers University of Technology. His research activities over many years have concentrated on developing reliable, cost efficient and environmentally-friendly components for electric power networks by introducing new material solutions into insulation systems. New measurement techniques for evaluating performance and diagnosing condition of insulation have been another key area of his activity. Special attention has concentrated on HVDC insulation. He is a Fellow of IEEE and a distinguished member of CIGRE.



Igor Gutman

Sr. Expert & Manager Insulation, STRI, Sweden

Topic 1: Biological Growths on Composite Insulators

Topic 2: Innovative Test Techniques to Verify Corona, Pollution & Ice/Snow Performance of Insulation Structures

Dr. Gutman received his MSc and PhD in high voltage engineering from Leningrad Polytechnic Institute and has developed his professional experience over more than 32 years – starting at the Leningrad HVDC Power Transmission Research Institute where he worked as Senior Researcher. His subsequent work became closely connected with outdoor line and station insulation, particularly composite insulators. In 1994 he joined STRI where his main areas of activity are optimal dimensioning and maintenance of outdoor insulation intended to operate in clean and polluted environments; ageing characteristics and accelerated ageing tests. He has published extensively on these topics with more than 170 papers and is a Senior Member of IEEE since 2005. At present he is also a member of Swedish IEC TC 36 "Insulators", Distinguished Member of CIGRE and active in working groups within CIGRE/IEC/IEEE, being a Convener of CIGRE WG D1.44. In 2011, he became Honorary Professor at St. Petersburg Power Engineering Institute of Professional Development (PEIPK) and was also the 2012 recipient of the Claude de Tourreil Memorial Award for Lifetime Achievement in the Field of Electrical Insulators. He is the 2013 recipient of IEC 1906 Awards in recognition of his services to international technical standards and became a Distinguished Member of CIGRE in 2014. Manu Haddad



Manu Haddad

Prof. of Electrical Engineering, Cardiff University, United Kingdom

Distance Arrester Protection of Cables, O/H Lines & Transformers

Dr. Haddad received the Ph.D. degree in high voltage engineering in 1990 from Cardiff University in Wales, where he is currently a Professor of Electrical Engineering with responsibility for research in high-voltage engineering. His research interests are overvoltage protection, insulation systems, insulation coordination and earthing of electrical energy systems. He has published an IET-Power Series book

on Advances in High Voltage Engineering and serves on the scientific committees of several international conferences. Prof. Haddad is active in a number of CIGRE Working Groups, a member of BSI PEL1/2, IEC TC37 and a Fellow of the IET.



Klaus-Dieter Haim

Dean, Electrical Eng. Dept., Zittau-Görlitz University of Applied Sciences, Germany

Technology Trends in Cable & Connector Design & Impact on Accessories

Professor Haim studied Electrical Engineering at the University of Zittau earning his Doctor's degree in 1985 in the field of MV network design and optimization. His career covered a diverse range of assignments, from a research project for EDF to serving as a Professor in Algeria. Between 1994 and 2005, he worked as Head of Production for medium voltage cable accessories at Cellpack before assuming his current position. He is a Sr. Fellow for electrical power systems and networks and Dean of the Electrical Engineering Department at University of Applied Sciences Zittau/Görlitz.



Kjell Halsan

Section Chief, Transmission Dept., Statnett, Norway

Challenges & Lessons from the Western Corridor Project

Mr. Halsan received his Master of Science in Electrical Power Engineering from the University of Science and Technology in Trondheim and has been involved in transmission line engineering at Statnett since 1988. Active in various research projects on electrical components and development of engineering tools for designing transmission lines, he been Manager of Electromechanical Section since 2000. He has also served as Norwegian National member of CIGRE SC B2 (Transmission Lines) and is Convener of WG 47 'Remedial action for aged fittings and conductor repair'.



Hong He

DNV GL KEMA Laboratories, Netherlands

Ins & Outs of Testing 320 kV DC Cable

Ms. HE received her Master of Science in Electronic and Information Engineering from Xi'an Jiaotong University in China. After graduation, she gained much experience in inspection services for electrical equipment and joined DNV GL (formerly KEMA) in 2010 as an inspector for high-voltage cable and accessories testing. In 2013, she became a test engineer in KEMA Laboratories' high voltage laboratory where her work has focused on MV/HV cable, accessories and cable system type tests, power transformer and switchgear testing. Currently, she is involved in innovation projects for extending the company's testing activities, including HVDC cable and switchgear testing.



HE Jinliang

Chair of High Voltage & Insulation Technology Research Institute, Tsinghua University, China

Development & Applications of Surge Arresters with High Gradient and Low Residual Voltage

Professor He Jinliang received a PhD in high voltage engineering from Tsinghua University in Beijing in 1994. Currently, he is a Cheung-Kong Scholar Distinguished Professor of the Ministry of Education of China in the Department of Electrical Engineering, Tsinghua University and leads the university's High Voltage and Insulation Technology Research Institute. His research interests include lightning and overvoltage protection technology, advanced power transmission technology, sensor network and big data mining, nanodielectric materials for recycling HVDC cable and environment-friendly gas-insulated power transmission lines. He was Chairman of several international conferences, is Convener of CIGRE C4.26 and a Fellow of IEEE and IET.



Christoph Hippler

R&D Department, Tridelta-Meidensha, Germany

Impact of Superimposed Direct & 50 Hz Alternating HV Stress on Current & Voltage Distribution Along Surge Arresters

Mr. Hippler received his BSc degree in 2010 and started his career as project engineer for HIGHVOLT Prüftechnik Dresden in the field of high voltage measurement equipment. He obtained an MSc at the Brandenburg University of Technology Cottbus, Germany in 2013, graduating in the field of high voltage technologies. Currently, he works in research of high voltage surge arresters at the Ilmenau University of Technology and since 2016 also works for Tridelta Meidensha's R&D department.



Jorge Hollman

Specialist Engineer, Transmission & Stations Planning, BC Hydro, Canada

Mitigating Switching Surges Using Surge Arresters & Point on Wave Controllers

Dr. Hollman received his PhD from the University of British Columbia, researching power system modelling and real-time simulation. After working for Schlumberger and UBC, he joined BC Hydro, where he conducts analytical studies applied to transients, post disturbance analysis and also helps develop equipment specifications.



Lars Jonsson

Sr. Technical Specialist, ABB, Sweden

Changes to IEC 60137 & CIGRÉ Study on Transformer Reliability

Mr. Jonsson has been closely involved with transformer components and their applications for 25 years. His experience includes design, product development and a large number of field investigations. He is also the Convenor of IEC SC 36/JMT5, responsible for bushing standards IEC 60137 and IEC 62199. Mr. Jonsson has presented numerous technical papers related to bushings and on-load tap-changers at events such as INMR, CIGRÉ, IEEE and TechCon.



Gobi Kannan

Specialist Engineer (Transformers), Tenaga Nasional Berhad, Malaysia

Transformer Bushing Reliability Survey by ASEAN Utilities & Risk Mitigative Measures

Mr. Kannan holds a Bachelor of Electrical Engineering Degree from Western Michigan University and a Masters of Power Engineering from Tenaga Nasional University. He is a Registered Professional Engineer as well as Chartered Electrical Engineer (IET UK) with Tenaga Nasional Berhad's Transmission Division and represents the Malaysia National Committee in CIGRE WG A2. Currently, he is responsible for new technology assessment, diagnostics and equipment performance improvement for the Transformer Unit in TNB's Engineering Department. In his previous position, Mr. Kannan was responsible for Asset Management and Maintenance where he performed technical assessments of new technologies. He has been Secretary for the launch of the ASEAN Bushing Guidebook.



Wilhelm Kiewitt

R&D Engineer, 50Hertz Transmission, Germany

CompactLine Project to Develop & Implement a Highly Compact Double System 400 kV Line

Mr. Kiewitt holds a Diploma degree in Renewable Energy Systems from Berlin University of Applied Sciences as well as an MSc in Process & Energy Engineering from Berlin Technical University. He joined 50Hertz Transmission in 2012 gaining experience in strategic grid planning. Since 2013 he has been an R&D Engineer, a position where he is responsible for technical coordination and management of innovation and research projects, with special focus on overhead transmission lines.

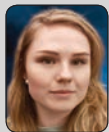


Thomas Klein

Managing Director, STRESCON, Germany

Specific Requirements & Techniques for Designing Dry-Type Cable Terminations

Dr. Klein received his PhD from the Institute of Power Transmission & High Voltage Technology at the University of Stuttgart. After working briefly at the surge arrester division of ABB, he became Research Assistant at his former university. In 2004, he was appointed Head of Product Management for cable accessories at Pfisterer, eventually rising to become Managing Director of Pfisterer Kontaktsysteme & General Manager of the Cable System Division. He is Founder of Strescon, a firm that develops technologies for cable accessories.



Ekaterina Koreneva

Presale Engineer, Streamer, Russia

Most Effective Lightning Protection of Lines with Diverse Modifications of LLPD

Ms. Koreneva graduated with an MS in Electrical Engineering and a BS in Power Systems Management. Her thesis described the interconnection between relay line protection and line lightning protection devices. She started her professional career as a researcher in a high voltage laboratory and joined Streamer in 2015.



Jan Lachman

Director, EGU – HV Laboratory, Czech Republic

Round Robin Dielectric Type Testing of 400 kV Insulator Set

Dr. Lachman graduated from the Czech Technical University in Prague, Faculty of Electrical Engineering where he later received his PhD degree. After graduation, he joined EGU - HV Laboratory as a test engineer. He has also had experience as a design engineer when working abroad. He is active in several IEC/CIGRE working groups and represents the Czech Republic in SC D1.



Jens Lambrecht

Manager, Application Engineering, Wacker Chemie, Germany

Overview of Silicone Elastomers, Gels & Auxiliary Materials for Cable Accessory Applications

Dr. Lambrecht studied radio and power engineering, earning a doctorate degree from Dresden University of Technology. Since that time, he has made his career as a development engineer for silicone cable accessories as well as a specialist in application engineering for silicones for both medium and high voltage applications. He has been with Wacker Chemie since 2005.



LEE Yanmin

Chairman, Shenzhen Square Silicone, China

Power System Applications of High Temperature Vulcanized & Addition Type LSR

Dr. LEE Yanmin graduated from South China University of Technology with a degree in polymer science and was awarded his DBA from the Université de Nice Sophia Antipolis in France. He founded Shenzhen Square Silicone in 2002, which became the first company in China to start local industrial production of addition type LSR. The company began supplying applications in the energy field in 2004. Dr. Lee was appointed Chairman in June 2016, after the company became a listed public company. As Chief Material Expert, he has been taking part in research of LSR use in high voltage cable accessories for DC as well as for anti-pollution coatings for glass insulators at the electrical technology laboratories of Tsinghua University Campus in Shenzhen.



LIANG Xidong

Professor, Electrical Engineering Dept., Tsinghua University, China

Topic 1: Key Issues for Development of Composite Insulators

Topic 2: Interface Resistivity – A New Method to Evaluate FRP Rod-to-Housing Interfacial Performance in Composite Insulators

Professor LIANG Xidong is China's pre-eminent researcher and expert in the field of composite insulators and also among the country's leading academics teaching power engineering at Tsinghua University in Beijing. With more than 25 years R&D experience in this field, he is influential in local standards setting bodies for insulators, represents China at CIGRE and has been closely involved with INMR Congresses going back to 2001.



Nancy Liu

International Sales Manager, Yizumi Rubber Machinery, China

Developments in Moulding Machines for Insulation Components

Ms. Liu has been International Sales Manager since 2009 and has had more than 11 years of experience in the rubber machinery industry. She has presented papers at international events, including past INMR WORLD CONGRESSES in Korea, Canada and Germany.



Frédéric Maciela

Project Manager, HV Power Generation Substation Equipment, EDF, France

Mitigating Ground Potential Rise on Towers Using Line Arresters

Mr. Maciela graduated in Electronics & Electrical Engineering from the Ecole Nationale Supérieure des Arts et Métiers and later in Advanced Computing from the Ecole Nationale Supérieure d'Electricité. He joined EDF's Les Renardières R&D Labs in 1993 as a research engineer in the field of polymeric-housed surge arresters for medium to high voltage networks. After conducting studies for 15 years in the fields of live line work, insulation and control of overvoltages on overhead lines and at substations, he is now Project Manager dealing with HV equipment at EDF power generation substations. He is a member of IEC TC37 MT4 and has been part of the French National Committee UF37 (surge arresters) since 1993.



Rui Manuel Martins

Area Director, EDP Labelec, Portugal

Overhead Line Inspection at Energias de Portugal (EDP)

Mr. Martins graduated in Electrical Engineering from Tech University in Lisbon and then completed his MBA at ISCTE. He has worked at EDP since 1995, first for Labelec where he was the responsible for implementing power quality monitoring as well as the HV laboratory. He later worked for the Investment Division in EDP Produção where he participated in investment projects. In 2010, he moved to EDP Valor in the Purchasing & Negotiation Business Area where he was responsible for the supplier qualification department, including auditing 700 suppliers. Two years later, he transferred to the Investment Projects Department before again returning to Labelec as Area Director for the Electrical Engineering Department, where he is responsible for electrical tests, insulating materials and overhead line inspections.



Massimo Marzinotto

Design Engineer, Terna, Italy

Line & Station Insulators in Transmission Systems: A Question of Confidence

Dr. Marzinotto received his Master and PhD degrees in electrical engineering at La Sapienza University in Rome, after which he joined the Electrical Engineering Department for several years. Since 2008 he has been with the Engineering Department of Italian TSO, Terna, with main interests in high voltage polymeric materials, power cables, insulators, applied statistics, insulation coordination and transients. He is a member of IEEE-DEIS, IEEE-PES, EPRI, CIGRE and the Italian Electrotechnical Committee and is active in different IEEE Committees and CIGRE WGs. He is also Manager of EPRI Technology Transfer for Terna and author of international publications on IEEE transactions and conferences as well as co-author of *Extruded Cables for High Voltage Direct Current Transmission: Advances in Research & Development* (2013).



Eric Moal

Director Engineering, Reinhausen Power Composites, Germany

Technical Design Requirements for Composite Hollow Core Insulators Regarding Pollution Performance Under AC & DC

Mr. Moal obtained an Engineering Degree from l'Ecole Nationale Supérieure d'Electricité et de Mécanique in Nancy, France and has worked for over 20 years developing both hollow core composite insulators for HV apparatus and composite line insulators. He is a member of IEC TC 36 Working Group dealing with composite insulators.



Joan Montanyà Puig

Associate Professor, Polytechnic University of Catalonia, Spain

Lightning Interactions & Damage to Wind Turbines

Prof. Montanyà received MS and PhD degrees in Electrical Engineering from the Polytechnic University of Catalonia. He joined the Electrical Engineering Dept. as Adjunct Lecturer and later Assistant Professor and did stays at the Univ. of Arizona, the Laboratoire d'Aérodynamique in Toulouse and MIT in Cambridge. He is author/co-author of 140 publications related to atmospheric electricity, transient luminous events and is interested in lightning protection of wind turbine blades with composite materials. He heads the UPC Lightning Research Group and member of international standardization groups for lightning protection as well as being Convener of EU CENELEC TC81X/WG5 for EN 50536 'Protection against lightning'. He is active in IEC TC 88 PT 24 and also in CIGRE SC C4 committees including WG C4.409.



Gerardo Montoya-Tena

Manager of Transmission & Distribution Dept., Instituto Nacional de Electricidad y Energías Limpias, Mexico

10 Years of Field Experience with EGLA Type Line Arresters at the Comisión Federal de Electricidad (CFE)

Mr. Montoya-Tena received a BS degree in Electronic & Communications Engineering from the Instituto Politécnico Nacional and later a Master's degree with honours in Electrical Engineering from the Universidad Nacional Autónoma de México. He began his career at the Instituto de Investigaciones Eléctricas (IIE) in 1986 and is author of more than 35 international publications as well as more than 100 technical reports about external insulation, overhead transmission lines, pollution and measurement of electrical variables. He holds the copyright of several systems, including a patent for leakage current measurement and has been involved in pollution flashover on external insulation as well as lightning protection of transmission and distribution lines.



Konstantin Papailiou

Past Chairman, CIGRE SC Overhead Lines, Switzerland

Role of Composite Insulators in Innovative Tower Solutions, Line Upgrading & Upgrading

Dr. Papailiou received his doctorate degree from the Swiss Federal Institute of Technology (ETH) Zürich and his post-doctoral qualification as lecturer (Dr.-Ing. habil.) from the Technical University of Dresden. Until his retirement at the end of 2011 he was CEO of the Pfisterer Group, a company he has served for more than 25 years. He is past Chairman of the CIGRE Study Committee 'Overhead Lines' and has published numerous papers and co-authored the EPRI Book 'Wind-Induced Conductor Motion' as well as a monography on 'Silicone Composite Insulators'. He is also the Editor of the first CIGRE 'Green Book on Overhead Lines'.



Fabrice Perrot

Technology Programmes, Grid Solutions, GE Energy Connections, United Kingdom

Key Challenges of HVDC Insulation Systems

Dr. Perrot graduated in Electronics from the Université de Savoie, France, and then in HV Power Systems from Brighton Polytechnic before going on to obtain his PhD in ZnO varistors from the University of Brighton. He joined EA Technology Ltd. in 1994 in the field of accelerated ageing of HV outdoor insulation and since 1999 has been with Alstom T&D/Areva T&D/Alstom Grid/GE Grid Solutions – all in Stafford. His various roles have included R&D in HV technology, materials and nanotechnologies for both AC and DC applications. He is a member of IET Midlands Power Group, UHVNet, BSI, IEC, several CIGRE WGs and since 2005 has been Technical Chairman of INSUCON.



Alberto Pignini

Consultant, Italy

Shielding Electrodes for HVDC

Dr. Pignini received a Doctoral Degree in Electrical Engineering from the University of Milan. He worked for more than 35 years at CESI, first as a researcher, then as Research Manager and finally as Division Director, responsible for a number of aspects of HV electrical system, including environmental impact and generation. He is a Distinguished Member of CIGRE, Fellow of IEEE and active in various WG and Committees at these bodies. He now acts as a consultant to international clients and is a Columnist for INMR.



Philipp Raschke

Manager, Arrester Diagnostic Products, Tridelta Meidensha, Germany

Practical Experience with State-of-the-Art Surge Arrester Monitoring Devices

Mr. Raschke graduated with a Bachelor Degree in Electrical Engineering at the University of Cooperative Education in Gera. He began his career as product developer in 2009 and worked on overvoltage protection electronics for Gigabit Ethernet. He then received a Masters Degree in Electrical Engineering at the University of Applied Sciences in Leipzig. Since that time, he works in Tridelta Meidensha's surge arrester business and is responsible for surge arrester diagnostic products.



Iryani Mohamed Rawi

Senior Engineer (Overhead Lines), Engineering Dept., TNB Transmission Div., Malaysia

Arrester Technology Improves Transmission Line Performance: Experience in Malaysia

Ms. Rawi (P.Eng) received a bachelor degree in Electrical Engineering from Universiti Teknologi Malaysia. Since 2002 she has worked in the Engineering Department of the Transmission Division at Tenaga Nasional Berhad. She is responsible for design and innovation of transmission lines equipment and is also currently pursuing her doctoral study focusing on transmission line protection against lightning. Her main areas of interest include transmission line engineering & design, surge arresters and lightning protection on power systems.



Riaan Rossouw

International Marketing & Sales Manager, UVIRCO Technologies, South Africa

Discharge Detection Threshold for Corona Cameras

Mr. Rossouw has a broad experience base ranging from high value scientific equipment sales to development of custom image analysis routines. He has also been involved with product and training course development.



Frank Schmuck

Director of Strategic Research & Process Engineering, Pfisterer, Switzerland

Polymer Insulation for Today's Network Requirements

Dr. Schmuck has been working in the field of composite outdoor insulation for 30 years. In 1994 he became a member of various CIGRE and IEC Working Groups and runs the CIGRE Working Group "Insulators" since 2006. Since 2007 he writes as columnist for the INMR. He has co-authored a monography on 'Silicone Composite Insulators' in 2011 and contributed the insulator chapter to the first CIGRE 'Green Book on Overhead Lines' in 2014.



Jakob Emmel

Sr. Development Engineer Bushings, ABB, Switzerland

Application of Advanced Methods to Enhance Safety of Personnel & Increase Plant Reliability

Dr. Emmel received his MSc in Physics from the University of Mainz (Germany) and his PhD in Physics in 2013 from The University of British Columbia (Vancouver, Canada). Since then he is working in the R&D department for bushings at ABB in Zurich as Development Engineer and Project Manager for product development projects. He represents 'bushings' in CIGRE Working Group A2.55.



Jens Seifert

Managing Director, LIKE Business Unit, Lapp Insulators, Germany

Standards Follow Innovations: Reviewing Progress in Insulator Technology & Need for Standards

After obtaining his PhD from TU Braunschweig in 1998, Dr. Seifert joined CeramTec as Head of the Design Department and this role expanded to include the R&D function once the firm was acquired by Lapp Insulators. Since 2014, he is the firm's Managing Director and CTO. Dr. Seifert serves as Chairman of IEC TC 36 Insulators and is also Convenor of CIGRE Working Groups D1.58 and D1.59.



Rene Smeets

Service Area Leader, DNV GL KEMA Laboratories, Netherlands

High-Voltage Shunt Reactor Switching: Abundant Source of Overvoltages to be Assessed by Testing

Dr. Smeets received an M.Sc. degree in physics from the Eindhoven Univ. of Technology in 1981 and a PhD degree for research work on switchgear. In 1991 he worked at Toshiba developing switchgear before joining KEMA. In 2001 he was appointed part-time professor at Eindhoven University in the field of high-power switching and also became Adjunct Professor at Xi'an Jiaotong University, China. Dr. Smeets is Convenor and member of CIGRE WGs and SCs in the field of emerging HV equipment such as vacuum and HVDC switchgear. He is Convenor of two maintenance teams in IEC on high-voltage switchgear. He has three books and authored over 250 international papers on testing and switching in power systems. In 2008 he was elected Fellow of IEEE and is Chairman of the Current Zero Club. He has conducted international workshops on HV equipment including technology, application, requirements, testing & certification.



Alberto Rodrigues de Sousa

Senior Transmission Engineer, TAESA, Brazil

Case Study for Using & Monitoring Composite Insulators on Overhead Lines under Natural Pollution

Mr. Sousa received his Bachelor in Electrical Engineering from Pontifícia Universidade Católica de Minas Gerais (PUC Minas) and is also a specialist in Project Management from IBMEC, currently specializing in Geoprocessing at PUC Minas. With more than 10 years experience in transmission line maintenance, he joined TAESA in 2012 where he is responsible for providing maintenance solutions for OHL, including related R&D projects. He is active in CIGRE Brazil WG-B2-03 – Insulators.



Brian D. Sparling

Regional Manager, Dynamic Ratings, Canada

Detecting On-Line Partial Discharge in OIP Bushings & Oil-Filled CTs

Mr. Sparling has over 20 years experience in the field of power and distribution transformers during which he has been involved in all aspects of their on-line condition assessment. He has authored or co-authored numerous technical papers on topics dealing with monitoring and diagnostics of transformers. A Senior Member of IEEE, he has worked on guides and standards with the Canadian Electricity Association as well as IEEE and CIGRE A2 Transformer Committees.



Eros Stella

HV Laboratory & Testing Manager, GE Grid Solutions, Italy

Design & Testing Station Insulators from Icing Point of View

Mr. Stella graduated from Padua University as an Electrical Engineer and has worked since 2005 for Alstom Grid in several roles including R&D Project Manager. His current position is that of HV Laboratory and Testing Manager and he has been responsible for accreditation of the Alstom High Voltage Laboratory in Noventa di Piave. He is a nominated member of Working Group IEC TC 17/SC 17A/MT 49 and is also a member of the Italian Electrotechnical Committee. He is holder of three patent applications and, in 2014, was awarded Bronze Medal in the "Small but Smart" category of the Alstom Innovation Awards for his project 'Digital mechanism and wireless measurement system on HV disconnectors'.



Peter Swales

Business Unit Director, Insulators, Arresters & Cable Accessories, Hubbell Power Systems, United States

Leveraging Technology to Drive the Future of Surge Arresters & Insulators

Mr. Swales received his BSE degree from the Missouri University of Science and Technology and MBA from the Arizona State University. For the past 15 years he has been in various engineering, sales, marketing, and general management roles within Hubbell Power Systems.



Andrei Szabo

Marketing Manager, Wacker Chemie, Germany

Silicones Accompany Economic & Social Megatrends

Mr. Szabo received his MSc in Electrical Engineering from the University of Oradea and his MBA from the Budapest University of Technology and Economics. After several years spent at a leading chipmaker, he joined Wacker Chemie in 2005 and has since been fulfilling Sales and Marketing positions related to silicone rubber materials. In 2014 he was appointed Marketing Manager for Energy Applications in the Business Team Rubber Solutions at Wacker Silicones.



Bjarni Helgi Thorsteinsson

Electromechanical Section, Transmission Line Dept., Statnett, Norway

Electrical Design of New ±525 kV Line in Norway

Mr. Thorsteinsson graduated with an MSc in electrical power systems and high voltage engineering from Aalborg University. He has been working at Statnett since 2014, primarily on new OHL projects, where he has been responsible for electromechanical design of the new 525 kV HVDC line (Nord.Link) – part of the submarine interconnection between Germany and Norway. His main interests lie in insulation coordination and electrical field studies, primarily corona.



Pierpaolo Tucci

Market & Product Development, Testing & Certification, CESI, Italy

Safety Aspects of MV / HV Underground Cables & Accessories in Urban Areas (Part 1)

Dr. Tucci received his PhD in Electrical Engineering at La Sapienza University in Rome in 2008. He worked in Accenture S.p.a as consultant from 2008-2009 and 2009 at Enel Ingegneria e Innovazione S.p.a in planning and cost control. He joined CESI Group in 2012, gaining experience in testing services on electrical components mainly on cables and accessories, surge arresters, insulators, switchgear and circuit breakers. From 2015 on, he assumed the position of Market & Product Development for Medium Voltage Testing Services.



Ike van Cruyningen

Principal, LineSpect, Canada

Self-Driving Drones for Power Line Inspection

After completing degrees from Waterloo (BMath), Cornell (BMech) and Stanford (PhD Mech & Elec), Dr. van Cruyningen started four software companies in Silicon Valley. At his latest venture, LineSpect, he combines his software, engineering, and business skills to lead a team that is building self-driving drones.



Laura Vegazo

R&D Engineer, La Granja Insulators, Spain

Excellent Performance in Insulators: Type Tests & Sample Tests Requirements

Mrs. Vegazo received an Industrial Engineering degree from Nebrija University (Madrid) and an MSc in Renewable Energies from CEU University (Madrid). After two years working as part of the engineering team in the nuclear generation department of Iberdrola Engineering (Madrid), she joined La Granja Insulators in 2014 as R&D Engineer. She is a member of Spanish IEC TC 42 'High voltage test techniques'.



Uberto Vercelotti

Testing & Certification Div., CESI Group, Italy

Safety Aspects of MV / HV Underground Cables & Accessories in Urban Areas (Part 2)

Dr. Vercelotti received his PhD in Electrical Engineering from the Milan Polytechnic in 1984 and joined CESI in 1985. He has gained 30 years of experience in the cable sector where he has been engaged in testing different cables and accessories. He is also involved in standardization bodies such as CENELEC and IEC, has served as Chairman of IEC TC 89 'Fire Hazard Testing' and has written numerous papers on testing and certification of power components.



Bas Verhoeven

Director Business Development, Research & Innovation, DNV GL KEMA Laboratories, Netherlands

Focus on Manufacturers: Delivering Optimal Product Quality Under Cost Pressures

Mr. Verhoeven received an MSc degree in Power Engineering from the Eindhoven University of Technology before joining KEMA in 1991 as R&D specialist on digital protection systems for high voltage power networks. Starting 1995, he worked as a consultant on international projects for high voltage power network design and protection. He was appointed as manager of KEMA's High Voltage Laboratory in 2000 and under his guidance it grew to become the world's largest commercially operated laboratory. In 2011 he was appointed Director of KEMA Laboratories, including the High Power Laboratory and the High Voltage Laboratory. Mr. Verhoeven now holds the position of Director for Business Development, Research & Innovation. He is a member of the Board of the NEC, the Dutch IEC, as well as Chairman of the international Short Circuit Test Liaison (STL) and has authored numerous papers on testing and certification of power components.



Fabien Virlogeux

Technical Assistance Engineer, Sediver, France

Review of 20 Years of Sediver Silicone Coated Insulators in the Field

Mr. Virlogeux graduated from the Chemistry and Chemical Engineering School in Clermont-Ferrand-France, before joining German-based Dow Corning Corp, where he headed silicone rubber development and technical assistance across Europe. He joined Sediver's R&D team in 2011 as Material Science & Technical Assistance Engineer, overseeing materials development, qualification and monitoring performance for composite and silicone coated insulators. Over more than 15 years of professional experience, he has gained considerable knowledge in silicone materials characterization and research. He has been in charge of the toughened glass insulator product line for the past 3 years and is active in CIGRE Working Groups D1.58, D1.59 and WG B2.57.



Larry Vogt

Consultant, Florida Power & Light, United States

30 Year Performance Overview of Arrester Housing Materials

Mr. Vogt is a consulting engineer with an extensive background in both distribution and transmission systems. He received his BS in Electrical Engineering from the University of Missouri-Columbia and is a registered Professional Engineer in the State of Florida. Over the past 35 years, his career at Florida Power and Light has focused on high voltage equipment and systems and he spent 14 years as the distribution product engineer for arresters, transformers, OH hardware, grounding systems, capacitor banks, network protectors and Insulators. During that time he coordinated a study for FPL on condition assessment of distribution arresters using thermal imaging. He has also been the lead engineer for bulk transmission substations and T&D Supervisor. Mr. Vogt has been a member of the IEEE Surge Protective Devices Committee for more than 15 years and retired from FPL to devote more time to independent projects in power systems.



Jonathan Whitmore

Vice President, Global Transmission, MacLean Power Systems, United States

Using E-Field Modeling to Improve Performance of Transmission Lines

Mr. Whitmore graduated from the University of Arkansas in Fayetteville with a BSIB degree in International Finance & Management. He has been involved in the design, study and application of all mediums of insulation in distribution as well as high voltage insulators since 1998, having held international and domestic roles with responsibilities for application engineering, sales and marketing. In his current role, he is the VP of Global Transmission and reports out of the York, South Carolina facility.



Dan Windmar

Vice President, STRI, Sweden

Trends & Demands from TSOs Driving New Investment in High Voltage Laboratories

Dr. Windmar received a Ph.D. degree in high voltage engineering from Uppsala University in Sweden. His professional experience includes extensive work in such areas as insulators (production, testing, materials), high power testing, high voltage testing and dielectric insulation. He has held several management positions at ABB and since 2009 has served as Vice President, Testing at STRI.



Jonathan Woodworth

Founder, ArresterWorks, United States

Applying Transmission Line Arresters to Mitigate Lightning Induced Damage to Co-located Pipelines

Mr. Woodworth is founding partner of ArresterWorks, a 10-year old independent consulting firm. His areas of specialization include insulation coordination studies, surge arrester design and application issues and arrester forensic analysis. He has written more than 35 columns and articles for INMR on surge arresters since 2008 and is Convenor of IEEE Working Group and co-Convenor of IEC Working Group responsible for High Voltage Arrester Test Standards. He has been active in this industry since 1980 when he first joined Cooper Power Systems.



Dong Wu

Sr. Specialist, ABB, Sweden

Innovations, Developments & Remaining Challenges for UHV Insulator Design

Dr. Wu has had a long career with extensive experience including research in the area of high voltage insulation and power electronics at China EPRI, the Royal Institute of Technology and STRI. He joined ABB HVDC in Sweden in 1998 where he is responsible for the company's insulation design on HVDC and UHVDC projects. He is active in several IEC and CIGRE Working Groups dealing with high voltage insulation.



Marvin L. Zimmerman

Publisher, INMR & Chairman of 2017 INMR WORLD CONGRESS, Canada

Reviewing 25 Years' Development of the World's Insulator Industry

Mr. Zimmerman holds a BSc in Chemistry and also an MBA in International Business from McGill University in Montreal. After a 15-year career as Principal of a firm of consultants specializing in international marketing, in 1993 he founded INMR – a technical journal covering the field of insulators and other network components used on lines and at substations. He is INMR's Editor and Publisher and also organizer of the INMR WORLD CONGRESS, held every two years since 1995.



Raouf Znaidi

T&D Consultant, Tunisia

Optimizing RTV Silicone Application Techniques in Harsh Service Conditions

Mr. Znaidi has had a long career at STEG, the power grid operator in Tunisia, where has been responsible for setting up and monitoring insulator test stations across the country. Through this work, he has become an expert on the comparative performance of different insulator types and designs in desert, maritime and industrial environments. In recent years, he has visited power companies across the Middle East and North Africa on behalf of INMR, reporting on service problems as well as remedial solutions used to combat pollution flashover. He is active in CIGRE and has organized local meetings to teach power engineers about insulator selection for contaminated service conditions.



Dates & Registration

The 2017 INMR WORLD CONGRESS will start on Monday, Nov. 6 at 08:00 and conclude on Wednesday, Nov. 8 at 18:00. Registration and pick-up of badges as well as Conference materials will take place on Sunday, Nov. 5 between 13:00 and 18:00 and continue again on Monday, Nov. 6 from 07:00 to 10:00.

Venue & Hotel

The 2017 INMR WORLD CONGRESS (Conference as well as PRODUCT & TECHNOLOGY EXHIBITION) will take place at the large Congress Center of the Meliá Sitges Hotel

Special arrangements have been made for attendees to reserve hotel rooms at a reduced rate. Those planning to attend this event are urged to make reservations as soon as possible to ensure availability of rooms. To reserve hotel rooms:

1. Please visit www.inmrworldcongress.com
2. Click on menu link, RESERVE HOTEL ROOM
3. You will be transferred to the Meliá-Sitges Hotel Reservation System where you can book the type of room you want for the duration of your stay. The hotel will send you confirmation of your reservation.

About Sitges

Sitges is a marvelous seaside town just 40 minutes drive south of Barcelona, with convenient and frequent train access. It is also only a 30 minute drive from Barcelona's International Airport. The town has a long history and contains interesting sights as well as a lively old town with narrow cobblestone streets full of museums, tapas bars, restaurants, shops and galleries. The town enjoys a special microclimate due to its protection by surrounding mountains and is typically always a bit warmer and sunnier than Barcelona.

Welcome Reception

All persons duly registered for this event will receive an invitation to participate, without cost, at a special Welcome Reception scheduled for Sunday, Nov 5 at 20:00 in the outdoor pool and garden area of the Meliá Sitges. Beverages, hot and cold canapés as well as entertainment will be provided.

Registration Fees

Includes access to all conference sessions, access to Exhibition, copy of Conference PROCEEDINGS, lunches, coffee breaks and invitation to Welcome Reception.



General Registration	Euros 595. per person
Special Group Registration (min. 3 people from same company register and pay at same time)	Euros 495. per person
Special Reduced Registration for Delegates from Electric Utilities (must be TSO, DSO or other power supply utility)	
Utility Delegate Registration	Euros 495. per person
Group Utility Registration (min. 3 people from same utility)	Euros 395. per person

Registration Form

General Inquires – Telephone: 1-514-939-9540 • Telefax: 1-514-939-6151 • E-mail: info@inmr.com
Attention: Marvin L. Zimmerman, Conference Chairman, P.O. Box 95, Westmount Station (Montréal), Québec, Canada H3Z 2T1
Registration can also be made at: <http://inmrworldcongress.com/register-to-attend.html>

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Company/Utility: _____

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City _____ Country _____ Postal Code _____

E-mail: _____ Tel.: _____ Fax.: _____

CANCELLATION POLICY: Registration fees paid in advance are fully refundable upon written confirmation prior to Sept. 15, 2017. Fees will not be refunded for cancellations received after that date. Substitution of delegates is permitted at any time. The organizers reserve the right to cancel this event if necessary and will, in this event, make a full refund of any registration fees paid in advance irrespective of date. No liability is assumed by INMR for changes in venue, content or speakers.

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INMR Issue 116 www.inmr.com

ISSN 2290-5472, E-mail: info@inmr.com

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Editorial

People Who Drove Progress in Insulators

We are already busy creating our 25th Anniversary Special that comes out in March 2018. This beautiful 300+ page edition will be INMR's only print publication next year and contain 18 chapters. The focus will be on overhead lines and substations, with special emphasis on insulators, surge arresters, bushings and cable accessories. One of the early chapters salutes some of the people we believe contributed significantly to *progress* in this industry and achieving today's high levels of reliability for these components.

But while compiling this list, it soon became obvious that the first step would have to be to define what is meant by 'progress'. Unfortunately, in the insulator industry this is not as straightforward as one might expect.

In the computer industry almost everyone measures progress by increased memory and speed while maintaining or even reducing price. In the automobile industry, it is universally measured by more safety, less maintenance and greater economy of operation. But when it comes to items such as insulators, there is still no industry consensus regarding what has constituted real progress. In fact, it's hard to think of many other industries where technological advancement is perceived to have widely different interpretations.

Perhaps the best explanation for this is that insulators are a long established industry that has evolved more around materials than around function. Manufacturers of electrical porcelain, for example, measure progress by benchmarks such as reducing production lead times, less material waste, optimizing weight or combining porcelain with other materials for specialized applications. Similarly, suppliers of toughened glass insulators view progress as improved designs that for example better resist pin corrosion or feature silicone coatings to improve flashover performance in severe environments. Finally, manufacturers whose background does not involve either porcelain or glass regard progress as replacing ceramic materials with high-performing polymers.

Given these differing views, perhaps the only objective way to define progress when it comes to insulators is by assessing it from the user point of view. How have power utilities responded to the broadened choice among alternative insulator technologies? From this perspective, the most evident change over the past 25 years has been the growing application of composite insulators on overhead lines and at substations. It should be noted that the rate of this growth has not been the same across the globe.

Insulators are a long established industry that has evolved more around materials than around function.

Places such as Japan have seen little acceptance of non-ceramic insulators. By contrast, countries such as China have witnessed such a dramatic shift toward silicone insulation that it now dominates the market. Still, in spite of regional differences, composite insulators have represented the fastest growing segment of the overall global market. No one can dispute this since it is a fact. So, using the marketplace to measure what users regard as technological advancement, growing application of composite polymeric insulators has been what most power engineers regard as progress.

The driver for development of non-ceramic insulator technology goes back over half a century to the advent of the age of plastics. Like ceramic materials that are inorganic, polymeric materials based on carbon chains offer excellent insulation properties. They can also be molded instead of shaped. This makes them attractive from a manufacturing viewpoint since, depending on voltage, one can produce an entire insulator string in a single step.

The challenge was to find some way to also meet mechanical requirements. The elegant solution was to use an internal fiberglass-reinforced rod or tube to provide for needed strength. Combining the polymer with this FRP element created the 'composite solution' – the internal component providing strength and the polymeric

housing offering external insulation performance.

A range of polymeric materials were proposed over the years as ideal for housings – from PTFE (Teflon) to EPDM, from EPR to silicone, among others. Silicone rubber, in particular, seemed a fascinating material due to its inherent and permanent resistance to becoming fully wetted. Also, it possesses the unique ability to transfer this hydrophobic property to whatever pollution layer builds up over it.

But developing and perfecting non-ceramic insulator technology was only one challenge. The other, equally daunting, was to convince a conservative power industry to experiment with and eventually adopt it. In this regard, exceptional people emerged who were driven by talent, by passion and by personality to develop, test, standardize, commercialize and apply this new technology. Since being founded in 1993, INMR has had the good fortune to meet many (but unfortunately not all) of these people.

Our 25th Anniversary Edition, among its other chapters, will pay homage to people who appeared in our nearly 120 issues over the past quarter-century and who we believe truly stood out for their individual contribution.

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