The 27th International Conference on Electrical Contacts

ICEC 2014 Dresden, Germany

Program

June 22 – 26, 2014

International Congress Center Dresden (ICD) & MARITIM Hotel

www.icec2014.org

ETG
ITG

VDE

Welcome of the Chairs of ICEC 2014

The 27th International Conference on Electrical Contacts will be held from June 22 - 26, 2014 at the International Congress Center Dresden, Germany.

The first ICEC was organized by Dr. Ragnar Holm and Prof. R. E. Armington and held at the University of Maine in 1961. Since then, ICEC has been held in Germany three times (Munich, Berlin, Nuremberg).

The purpose of the ICEC 2014 in Dresden is to provide a forum for the presentation and discussion of the latest research and development in the field of electrical contacts and other related fields all while promoting an exchange of scientific and technical knowledge between specialists from all over the world.

Throughout its history, the ICEC has greatly contributed to the development of this field and to the promotion of international collaboration.

Sincerely yours

Univ.-Prof. Dr.-Ing. Frank Berger
TU Ilmenau, Germany

Welcome to the City of Dresden

On behalf of the city of Dresden, I congratulate you on your decision to carry out the 27th International Conference on Electrical Contacts (ICEC) in our beautiful city. You will notice – Dresden has a lot to offer. It is one of the leading business locations in Germany and has excellent prospects for further growth – a success which is based on courageous lighthouse policy. We have invested in high technology and in the research associated with it. And it has paid off.

Dresden is a top location in the key sectors of microelectronics, nanotechnology, new materials and life sciences. The world's leading enterprises such as GlobalFoundries, Glaxo SmithKline Biologicals, OF ARDENNE or Novaled operate in Dresden. Many companies from various industries are deeply rooted in the city. They take advantage of a cooperative local research milieu with excellent institution from Max-Planck, Helmholtz, Leibniz or Fraunhofer Society. The diversity of industries is a major reason for the sustained positive development of the economy of Dresden.

Not least impressive ”Elbflorenz“ with its unique quality of life: the Frauenkirche, the Semper Opera House, the Green Vault, the trendy district of New Town, the picturesque Elbe Valley – in Dresden, it is easy to keep the balance between work and leisure.

We are delighted that your international conference, combines culture and economy and connects your and our success story. We wish you a pleasant stay and useful new contacts.

Dirk Hilbert
Deputy Mayor, Head of Department of Economic Affairs

Organized by

VDE, Association for Electrical, Electronic & Information Technologies

ETG, the Power Engineering Society whithin VDE

ITG, Information Technology Society within VDE

Organizing Committee

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ICEC 2014 - Program Overview

Time	Plenary	Exhibition
Sunday, June 22, 2014		
17:00 - 19:00	Registration	Set up Exhibition
Monday, June 23, 2014		
8:00	Registration	
10:00	Opening Session	
10:30	01. Fundamentals	
12:30		Lunch
13:30	02. Materials I	
15:30		Coffee Break
16:00	03. Connectors	
18:00		Get Together – Poster Session with Buffet
Tuesday, June 24, 2014		
7:30	Registration	
8:00	04. Arc Interuption/DC	
10:00		Coffee Break
10:30	05. Contacts/Connectors	
12:30		Lunch
13:30	06. Materials II/Vacuum and Refractory Contacts	
15:30		Coffee Break
16:00	Albert-Keil-Ceremony	
17:00-19:00		Poster Session
Wednesday, June 25, 2014		
7:30	Registration	
8:00	07. Sliding Contacts/Fretting	
10:00		Coffee Break
10:30	08. Reliability/Environmental	
12:30		Lunch
13:30	09. Modelling and Simulation	
15:30		Coffee Break
16:00	10. Power Contacts	
19:00	Conference Dinner (Ball room Maritim)	
Thursday, June 26, 2014		
7:30	Registration	
8:00	11. New Technologies	
10:00		Coffee Break
10:30	12. Arc Interruption/Materials	
11:50	Closing Session	
12:00		Lunch
13:00-19:00	Technical Program (Tour)	

Conference ICEC 2014 Program

Monday, June 23, 2014

8:00 - 10:00

Registration

10:00 - 10:30 **Room: Plenary**

Opening Session – Welcome

W. Johler, Chairman of the International Advisory Group
F. Ruchay, stellv. Leiter des Amtes für Wirtschaftsförderung der Stadt Dresden
F. Berger, Conference Chairman

10:30 - 12:30 **Room: Plenary**

01. Fundamentals

Chairman: J. B. P. Williamson, Williamson Interface Ltd., UK
Co-Chairman: K.-H. Schröder, Germany

10:30 **The Threshold Welding Current for Large Area Closed Contacts with Two or Three points of Contact**
P. G. Slade, FIEEE, USA

10:50 **Enhancing the contact interface by matching the surface pressure and current density distribution**
M. Leidner, H. Schmidt, S. Sachs, S. Thoss, Tyco Electronics AMP GmbH, Germany; M. Myers, TE Connectivity, USA

11:10 **The Influence of Multiscale Roughness on the Real Contact Area and Contact Resistance between Real Reference Surfaces**
X. Zhang, R. L. Jackson, Auburn University, USA

11:30 **Increased contact resistance of switching contacts during current carrying**
M. Weis, AC²T research GmbH, Austria; W. Johler, TE Connectivity Solutions GmbH, Switzerland

11:50 **Oxygen diffusion process on the copper surface by contact resistance**
H. Kikuchi, I. Minowa, Tamagawa University, Japan

12:10 **Contact Blow-Apart Forces: Experience in Molded Case Circuit Breaker Contact Systems**
J. Ferree, Siemens Industry Inc., USA; M. Anheuser, L. Petrovic, Siemens AG, Germany

12:30 - 13:30 **Room: Exhibition**

Lunch

13:30 - 15:30 **Room: Plenary**

02. Materials I

Chairman: R. S. Timsit, Timron Scientific Consulting Inc., Canada
Co-Chairman: P. Braumann, Germany

13:30 **A Switchgear Manufacture's Perspective of Contact Material Requirements**
S. Kosse, W. Hartmann, N. Wenzel, C. Schuh, M. Anheuser, Siemens AG, Germany

13:50 **New microstructure investigations of arc damaged silver/tinoxide electrodes by means of FIB-technique**
C. Selzner, F. Mücklich, Saarland University, Germany

14:10 **Optimisation of material erosion and welding performance by metal oxides and magnetic particles**
E. Yee Kin Choi, C. Bourda, A. Vassa, Metalor Technologies, France; E. Carvou, J. B. Mitchell, University of Rennes 1, France; N. Benjemaa, Contelec, France

14:30 **An evaluation of Ag/W and Ag/Metal Oxide arcing contact combinations for circuit breaker applications**
C. Leung, T. Bergemann, Metalor Technologies, USA; C. Bourda, Metalor Technologies, France

14:50 **Contact Material Effects on Dynamic Contact Sticking**
T. Mützel, M. Bender, R. Niederreuther, Umicore AG & Co. KG, Germany

15:10 **Welding Behavior in Making and Breaking Operations of Electrical Contacts**
Q. Wang, C. Liu, Z. Li, D. Liu, L. Jinyou, Y. Xiaocheng, Huazhong University of Science and Technology, China; X. Wu, Wuhan University of Technology, China

15:30 - 16:00 **Room: Exhibition**

Coffee Break

16:00 - 18:00 **Room: Plenary**

03. Connectors

Chairman: P. van Dijk, PVDIJK B.V., 's-Hertogenbosch, Netherlands
Co-Chairman: I. Buresch, Wieland Werke AG, Germany

16:00 **Electrical behavior of golden automotive connectors under vibration tests**
S. Noël, A. Brézard-Oudot, Laboratoire de Génie Electrique de Paris Supélec, France

16:20 **Novel Silver-Palladium Electrolyte for Electrical Contacts**
F. Talgner, U. Manz, S. Berger, B. Weyhmüller, Umicore Galvanotechnik GmbH, Germany; A. Pfund, Forschungsinstitut Edelmetalle und Metallchemie, Germany

16:40 **Connector Level Performance Evaluation of a New High Speed Reel to Reel Electroplated Silver Palladium Alloy Contact Finish**
M. Myers, TE Connectivity, USA; H. Schmidt, TE Connectivity, Germany

17:00 **Prediction of Force-Displacement Relation of Stamped Spring of Copper-based Materials**
Y. Hattori, K. Furukawa, AutoNetworks Technologies, Ltd., Japan; H. Hamasaki, F. Yoshida, Hiroshima University, Japan

17:20 **Failure Mechanism of Sliding Electrical Contacts with Various Plated Materials**
Y. Zhou, B. Yao, S. Ge, C. Hong, J. Zhang, Beijing University of Posts and Telecommunications, China

17:40 **The electrical contact resistance endurance of heterogeneous Ag/Sn interfaces subjected to fretting wear**
O. Perrinet, J. Laporte, S. Fouvry, LTDS, Ecole Centrale de Lyon, France; O. Alquier, PSA - Centre Technique, France

18:00 - 20:00 **Room: Exhibition**

Get Together and Poster Session with Buffet
(please see page 20 ff. for poster title and authors)

Tuesday, June 24, 2014

7:30 - 10:00

Registration

8:00 - 10:00 **Room: Plenary**

04. Arc Interruption/DC

Chairman: B. Miedzinski, Wroclaw University of Technology, Poland
Co-Chairman: M. Anheuser, Siemens AG, Germany

08:00 **Hybrid switches in protective devices for low-voltage DC grids at commercial used buildings**
P. Meckler, F. Gerdinand, E-T-A GmbH, Germany; R. Weiss, Siemens AG, Germany; U. Boeke, Philips Group Innovation-Research, Netherlands; A. Mauder, Infineon Technologies AG, Germany

08:20 **Breaking performance of protection devices for automotive dc powertrains with a voltage of 450 V**
H. Köpf, E.-D. Wilkening, C. Klosinski, M. Kurrat, University of Braunschweig, Germany

08:40 **Electro-mechanical properties and welding characteristics of Ag/MoS_2, Ag/WS_2, Ag/CNTs and Ag/CdO materials for high-DC current contact applications**
J. Jaćimović, E. Giannini, J. Teyssier, Université de Genève, Switzerland; L. Felberbaum, Sécheron SA, Switzerland

09:00 **Break arc behaviors of Ag and AgSnO_2 contact pairs under different contact opening speeds in DC load circuits**
M. Hasegawa, Chitose Institute of Science and Technology, Japan

09:20 **Development of a compact Relay for High Voltage Switching of up to 1000 V and 40 A**
D. Volm, F. Winkler, Panasonic Electric Works Europe AG, Germany

09:40 **Development of arc-free DC300V/30A electro-mechanical devices using transient current switching circuits**
N. Wakatsuki, T. Kudo, D. Hara, Ishinomaki Senshu University, Japan

10:00 - 10:30 **Room: Exhibition**

Coffee Break

10:30 - 12:30 **Room: Plenary**

05. Contact/Connectors

Chairman: W. Johler, Tyco Electronics Logistics AG, Switzerland
Co-Chairman: H. Schmidt, Tyco Electronics AMP GmbH, Germany

10:30 **Electrical and Tribological Characteristics of Copper Containing Diamond-like Carbon Nano-composite Coating on Brass Substrate Sliding against Brass Ball**
R. Hombo, N. Kato, T. Nozu, N. Inayoshi, Denso Corporation, Japan; T. Takeno, H. Miki, T. Takagi, Tohoku University, Japan; J. Fontaine, M. Belin, LTDS, France

10:50 **Numerical Simulation and experimental verification for Contact Spot Temperature and Electrical Contact Resistance of Rivet contacts**
W. Ren, H. Zhi, S. Xue, G. Zhai, Harbin Institute of Technology, China; J. Song, Ostwestfalen-Lippe University of Applied Sciences, Germany

11:10 **Formation and properties of intermetallic compounds in an Al-Cu roll bonded connection**
E. Hilz, S. Dudziak, Robert Bosch GmbH, Germany; R. Schmid-Fetzer, Clausthal University of Technology, Germany

11:30 **Development of Tin-Seal Technology for Gold Reduction in Gold-Nickel Contacts**
G. J. S. Chou, TE Connectivity, USA

11:50 **Yellowishing of Tin Coatings at elevated Temperatures**
I. Buresch, Wieland Werke AG, Germany

12:10 **Analysis of temporal and spatial contact voltage fluctuation during fretting in automotive connectors**
S. El Mossouess, E. Carvou, R. El Abdi, H. Obame, Université de Rennes 1, France; N. Benjemâa, Entreprise Contelec, France; L. Doublet, T. Rodari, Entreprise Valeo, France

12:30 - 13:30 **Room: Exhibition**

Lunch

13:30 - 15:30 **Room: Plenary**

06. Materials II/Vacuum and refractory contacts

Chairman: P. G. Slade, FIEEE, USA
Co-Chairman: V. Behrens, Doduco GmbH, Germany

13:30 **Lifetime Improvement of Pd-Alloy Contact Pins with the New Design of Rounded Tip and Rh Plating**
G. Dandong, W. Xiaojun, L. C. Ping, G. S. Lee, Infineon Technologies Asia Pacific Pte Ltd, Singapore

13:50 **Doped Cu/Cr vacuum interrupter contact material enables increased short-circuit interruption performance**
R. A. Simon, T. Delachaux, T. Schmoelzer, M. Boehm, ABB Corporate Research, Switzerland; D. Gentsch, ABB Calor Emag Medium Voltage Products, Germany

14:10 **Correlation between microstructural features of the melt zone and switching behavior in CuCr contact material**
K. v. Klinski-Wetzel, M. Heilmaier, Karlsruhe Institute of Technology, Germany; C. Kowanda, F. E. H. Mueller, Plansee Powertech AG, Switzerland; T. Rettenmaier, V. Hinrichsen, Darmstadt University of Technology, Germany

14:30 **Increase in contact resistance of vacuum interrupters after short-circuit testing**
E. D. Taylor, S. A. Baus, A. Lawall, Siemens AG, Germany

14:50 **The aging of the power contacts caused by switching current**
P. Borkowski, E. Walczuk, Lodz University of Technology, Poland; K. Frydman, D. Wojcik-Grzybek, Institute of Electronic Materials Technology, Poland

15:10 **Usefulness of laminated Cu-Mo Composite as a contact material for low voltage power contactors**
B. Miedzinski, P. Wojtas, J. Wosik, A. Kozlowski, Institute of Innovative Technologies, EMAG, Poland; A. Grodzinski, Tele and Radio Research Institute, Poland; N. I. Grechanyuk, Institute of Material Science, Ukraine

15:30 - 16:00 **Room: Exhibition**

Coffee Break

16:00 - 17:00 **Room: Plenary**

Albert-Keil-Ceremony

17:00 - 19:00 **Room: Exhibition**

Poster Session
(please see page 20 ff. for poster title and authors)

Wednesday, June 25, 2014

7:30 - 8:00

Registration

8:00 am - 10:00 am **Room: Plenary**

07. Sliding Contacts/Fretting

Chairman: L. Sjögren, Swerea KIMAB AB, Sweden
Co-Chairman: B. Martin, IMS Connector Systems GmbH, Germany

08:00 **Effect of contact force and velocity on copper sliding contact under inductive arcing**
H. E. Obame, E. Carvou, University of Rennes1, France

08:20 **Synthesis and tribo-electric characterization of copper-graphite-composites with interpenetrating microstructure for sliding contacts**
M. Klement, O. Lott, A. Nagel, Hochschule Aalen, Germany

08:40 **Nanoindentation analysis of cold welding effects in sliding contact systems**
C. Holzapfel, Schleifring und Apparatebau GmbH, Germany

09:00 **A wear tolerant slip-ring assembly individual spring-wire brushes in a v-grooved metal-graphite ring**
M. Grandin, U. Wiklund, Uppsala University, Sweden

09:20 **The role of microstructure and surface topography in the electrical behavior of Sn-coated Cu contacts**
K. E. Trinh, F. Mücklich, Saarland University, Germany; E. Ramos-Moore, Pontificia Universidad Católica de Chile, Chile

09:40 **Effect of Arc Discharge on the Wear Profile of Cu Impregnated Carbon Based Pantograph Contact Strip**
Y. Kubota, T. Hayasaka, T. Miyauchi, Railway Technical Research Institute Tokyo, Japan; H. Nozaki, T. Hirai, T. Matsumoto, Toyo Tanso Co. Ltd, Japan

10:00 - 10:30 **Room: Exhibition**

Coffee Break

10:30 - 12:30 **Room: Plenary**

08. Reliability/Environmental

Chairman: M. Runde, SINTEF Energiforskning AS, Norway
Co-Chairman: C. Holzapfel, Schleifring und Apparatebau GmbH, Germany

10:30 **From fretting to connector vibration tests: a "transfer function" approach to predict the electrical contact resistance endurance**
S. Fouvry, P. Jedrzejczyk, LTDS, France; P. Chalandon, O. Alquier, PSA - Centre Technique, France

10:50 **Failure Analysis at Electrical Contacts in Information Technologies: Part 1: Techniques**
B. Hagenhoff, Tascon GmbH, Germany

11:10 **Failure Analysis at Electrical Contacts in Information Technologies: Part 2: Examples**
W. Schmitt, V. Behrens, J. Schreiber, Doduco GmbH, Germany

11:30 **The Effects of Induced Defects on Pore Corrosion**
R. Martens, A. Loyd, J. Hemond, TE Connectivity, USA

11:50 **Reliability assessment and field failure predictions – a prognostic model for separable electrical contacts**
F. Ostendorf, T. Wielsch, M. Reiniger, Weidmueller Interface GmbH & Co. KG, Germany

12:10 **A Study on Effect of Small Relay Housing Seal on Contact Resistance at Inductive Load**
K. Miyanaga, K. Takahashi, S. Takano, Y. Kurata, T. Takano, S. Aoki, Fujitsu Component Limited, Japan

12:30 - 13:30 **Room: Exhibition**

Lunch

13:30 - 15:30 **Room: Plenary**

09. Modelling and Simulation

Chairman: F. Berger, Technische Universität Ilmenau, Germany
Co-Chairman: B. Gehlert, W. C. Heraeus GmbH, Germany

13:30 **Low-voltage circuit breaker arc simulation including contact arm motion**
C. Ruempler, Eaton Corporate Research & Technology, USA; A. Zacharias, H. Stammberger, Eaton Industries GmbH, Germany

13:50 **Significance of resistances of switching contacts for the temperature rise of LV circuit breakers**
D. Siegel, M. Anheuser, Siemens AG, Germany

14:10 **Controlling the repulsive Holm force between fixed and moving contact members in a low voltage switching device**
G. Eriksson, E. Johansson, ABB Corporate Research, Sweden

14:30 **Impact of inhomogeneous material description for punched edges on the force-fitting simulation of copper high current connectors**
E. Aristizabal, F. Günter, Robert Bosch GmbH, Germany; P. Schaaf, Technische Universität Ilmenau, Germany

14:50 **A Mathematical Approach to Evaluate Arc Immobility Time in Low Voltage Circuit Breakers**
S. Chandran, B. Shankaranarayanamoorthy, V. Subramanian, Larsen and Toubro Limited, India

15:10 **Thermal inertia of direct current arcs at different contact material**
M. Streck, F. Berger, Technische Universität Ilmenau, Germany

15:30 - 16:00 **Room: Exhibition**

Coffee Break

16:00 - 18:00 Room: Plenary

10. Power Contacts

Chairman: J.-G. Zhang, Beijing University of Posts & Telecommunications, China
Co-Chairman: T. J. Schoepf, Eaton Corporation, USA

16:00 **Evaluation of Electrical Contacts Using an X-Ray CT 3D Visualisation Technique**
J. Swingler, C. Roussos, Heriot-Watt University, UK

16:20 **Effects of Temperature and Particle Orientation on the Electrical Conductivity of Heterogeneous Contact Materials**
E. R. Crandall, V. Behrens, J. Schreiber, T. Honig, Doduco GmbH, Germany

16:40 **Development of a Novel Highly Conductive Aluminum Particle based Filler for Low Density Conductive Composites**
D. Freckmann, M. Myers, TE Connectivity, USA; H. Schmidt, TE Connectivity, Germany

17:00 **Contact Resistance and Overtemperature Behavior of New and pre-Arced Power Engineering Contacts as a Function of Ambient Temperature and Contact Force**
J. Schreiber, V. Behrens, T. Honig, M. Finkbeiner, Doduco GmbH, Germany

17:20 **Impact of the Temperature-Induced Reduction of Joint Force on the Long-Term Behavior of Contact Elements with Material-Allocated Electrical and Mechanical Function**
M. Gatzsche, N. Lücke, S. Großmann, Technische Universität Dresden, Germany; T. Ledermann, G. Freudiger, Multi-Contact AG, Switzerland

17:40 **Measurement of the amount of liquid created by an electric arc: case of a copper anode. Assessment of the power balance**
R. Landfried, T. Leblanc, P. Teste, Université Paris, France

19:00 - 23:00 Room: Ball room inside Conference Center

Conference Dinner

Thursday, June 26, 2014

7:30 - 8:00

Registration

8:00 - 10:00 Room: Plenary

11. New Technologies

Chairman: H. Inoue, Akita University, Japan
Co-Chairman: P. Meckler, E-T-A GmbH, Germany

08:00 **Time-current tripping characteristics at series arcing for Arc Fault Detection Devices**
J.-M. Martel, M. Anheuser, Siemens AG, Germany; F. Berger, Technische Universität Ilmenau, Germany

08:20 **Arc Fault Detection – a Model-based Approach**
C. Strobl, E-T-A GmbH, Germany

08:40 **Digital Closed Loop Control Technology for the AC Contactors**
Z. Xu, T. Longfei, Fuzhou University, China

09:00 **Simulation-based Analysis of Inductance at Loose Connector Contact Boundaries**
T. Sato, Y. Hayashi, T. Mizuki, H. Sone, Tohoku University, Japan

09:20 **Micro-contact Resistance of Au-Au on Engineered Contact Surfaces using Gray-scale Lithography**
C. Stilson, R. Coutu, Air Force Institute of Technology, USA

09:40 **Lifetime Testing of a Development MEMS Switch Incorporating Au/MWCNT Composite Contacts**
A. P. Lewis, M. P. Down, C. Chianrabutra, L. Jiang, S. M. Spearing, J. W. McBride, University of Southhampton, UK

10:00 - 10:30 Room: Exhibition

Coffee Break

10:30 - 11:50 **Room: Plenary**

12. Arc Interruption/Materials

Chairman: N. Ben Jemaa, University of Rennes I, France
Co-Chairman: S. Großmann, TU Dresden, Germany

10:30 **Effects of switching speed on arcing and contact erosions in residential circuit breakers**
G. Yang, Siemens Industry, USA

10:50 **Re-ignition and Post Arc Current Phenomena in Low Voltage Circuit Breaker**
W. Hauer, Eaton Industries, Austria; X. Zhou, Corporate Research & Technology – Eaton, USA

11:10 **Ablation-Assisted Current Interruption in a Medium Voltage Load Break Switch**
E. Jonsson, G. J. Gjendal, Norwegian University of Science and Technology, Norway; M. Runde, SINTEF Energy Research, Norway

11:30 **Increased requirements on the switching behaviour of industrial switchgear caused by new high-efficiency motors**
A. Krätzschmar, W. Feil, R. Herbst, H. Klann, T. Viehauser, Siemens AG, Germany

11:50 - 12:00 **Room: Plenary**

Closing Session

12:00 - 13:00 **Room: Exhibition**

Lunch

13:00 - 19:00 **Technical Program**

Technical Program

Executive tram ride tour to „Gläserne Manufaktur Dresden“ (Volkswagen Transparent Factory)

Volkswagen plant completed in 2002 for finishing fabrication of the luxury car „Phaeton“, fascinating combination of technology and design as well as the world of processing and experience, place of many events. Spare capacity was also used to construct Bentley Continental Flying Spur vehicles destined for the European market until 2006, when all work was transferred to Bentley's plant in Crewe, England.

The guided tour includes a coffee break.

Afterwards an excursion with test demonstration of the high voltage station laboratory at TU Dresden is planned.

Departure: June 26, 2014 at 13:00.

Meeting point: in front of the Maritim Congress Center

Duration: 6 hours

Price: included in conference registration, students on request, limited space

Poster Session

P01 Fundamentals

P01.1 **Observation of copper oxide film destruction process by applied DC voltage and current measured by nonlinear distortion methods**
H. Kikuchi, I. Minowa, Tamagawa University, Japan

P01.2 **Electrical and thermal behaviour of electrical joints with normal- and superconducting materials at low temperatures**
K. Bäuml, Schneider Electric Sachsenwerk GmbH, Germany; A. Ramonat, S. Großmann, Technische Universität Dresden, Germany

P01.3 **Effects of Temperatures and Leadframe Surfaces on Wear Rate of the Palladium Alloy Contact Pin**
W. Xiaojun, G. Dandong, Y. Alfred, L. Benedict, Infineon Technologies Asia Pacific Pte Ltd, Singapore

P01.4 **Contact Resistance of Vacuum Interrupters for Electric Power Systems in Liquid Nitrogen at Direct and Alternating Current**
K. Golde, V. Hinrichsen, Technische Universität Darmstadt, Germany

P01.5 **HF Characterization of Low Current DC Arcs at Alterable Conditions**
M. Wendl, M. Weiss, Robert Bosch GmbH, Germany; F. Berger, Technische Universität Ilmenau, Germany

P02 Materials

P02.1 **Numerical microstructure analysis of Ag/WC/C contact material**
I. Streit, Siemens AG, Germany

P02.2 **Nanocrystalline Ag-Re composite as a potential material for electric contacts fabrication**
D. Kołacz, S. Księżarek, M. Czepelak, M. Staszewski, M. Kamińska, K. Rudnicki, K. Bilewska, Institute of Non-Ferrous Metals, Gliwice, Poland; J. Karwan-Baczewska, AGH University of Science and Technology, Poland; P. Borkowski, A. Sienicki, Lodz University of Technology, Poland

P02.3 **Solid-state impact sintering in vacuum of composites based on copper and silver**
A. Laptiev, O. Tolochyn, O. Khomenko, L. Kryachko, Frantsevich Institute for Problems of Materials Science, Ukraine

P02.4 **On the Temperature Dependence of the Photoelectric Work Function of Contact Materials**
M. Akbi, Laboratoire Arc Electrique et Plasmas Thermiques, CNRS, France

P02.5 **Characterization of Intermetallic Compounds in Al-Ag Bimetallic Interfaces**
S. Pfeifer, S. Großmann, Technische Universität Dresden, Germany; H. Willing, H. Kappl, Forschungsinstitut für Edelmetalle + Metallchemie, Germany

P02.6 **Long Term Behavior of Electrical Contacts with Crossed Rods under Various Environmental Conditions**
S. Dreier, N. Lücke, S. Großmann, Technische Universität Dresden, Germany

P02.7 **Comparison between nickel and silver as coating materials of conductors made of copper or aluminium used in electric power engineering**
T. Fuhrmann, S. Schlegel, S. Großmann, Technische Universität Dresden, Germany; M. Hoidis, ABB Switzerland Ltd., Switzerland

P02.8 **Fundamental Study of Electrical Sliding Contacts Comprising a Au-coated Slip Ring and Au Brush**
T. Ueno, Nippon Institute of Technology, Japan; M. Aoyagi, K. Sawa, N. Morita, Motor & Carbon Brush Lab. Co. Ltd., Japan

P02.9 **Effect of Atmospheric Temperature on Contact Resistance of Sliding Contacts Using a Ag-Coated Slip Ring and a Ag-Graphite Brush**
M. Fuchimoto, K. Sawa, T. Ueno, Nippon Institute of Technology, Japan

P03 Connectors

P03.1 **Optimization of the Number of Contact Springs in a Connector by means of Analytical and Numerical Analysis**
M. Blauth, J. Song, Ostwestfalen-Lippe University of Applied Sciences, Germany; F. Berger, Technische Universität Ilmenau, Germany

P03.2 **Investigations on the threshold range of connectors in conditions of engaging and separating with electrical load**
A. Hornung, F. Berger, Technische Universität Ilmenau, Germany; G. Freudiger, D. Kummerer, T. Ledermann, Multi-Contact AG, Switzerland

P03.3 **Degradation Phenomenon of Electrical Contacts by a Micro-Sliding Mechanism – The comparison of the evaluated minimal sliding amplitudes under some conditions using the mechanism**
S. Wada, TMC System Co. Ltd., Japan; K. Sawa, Nippon Institute of Technology, Japan

P08 Reliability / Environmental

P08.1 **One early short circuit current detection (ESCD) method based on the energy change**
D. Feng, C. Weigang, J. Ma, Z. Yue, Siemens Ltd. China; M. Anheuser, Siemens AG, Germany

P08.2 **Reliability test and reliability evaluation methods of AC contactor**
W. Lili, Z. Yixuan, Hebei University of Technology, China; L. Bin, Suzhou Tianye Electric Appliance Co., Ltd., China

P08.3 **Mechanical Characterisation and Optimisation of Carbon Nanotube Composite Surfaces of Electrical Contact**
M. P. Down, R. Cook, L. Jiang, University of Southampton, UK; J. W. McBride, University of Southampton Malaysian Campus, Malaysia

P08.4 **A simple test method for the welding degradation of arcing contacts**
M. Böhm, P. Morin, T. Schmölzer, R. A. Simon, ABB Corporate Research, Switzerland; D. Gentsch, ABB Calor Emag Medium Voltage Products, Germany

P09 Modeling and Simulation

P09.1 **Nonequilibrium arc model for the description of arc-electrode interaction**
S. Gorchakov, M. Baeva, R. Kozakov, D. Uhrlandt, T. Schoenemann, Leibniz Institute for Plasma Science and Technology, Germany

P09.2 **Simulation of relay contact bouncing including a short arc model**
R. Haase, F. Berger, Technische Universität Ilmenau, Germany

P09.3 **Studies on the use of heat pipes in medium voltage switchgears**
G. Kitzrow, W. Wiebel, R.-D. Rogler, HTW Dresden, Germany; T. Schoenemann, University of Rostock, Germany

P09.4 **Analysis of electrode heating processes in the switching contacts of vacuum circuit breakers**
S. Gorchakov, D. Uhrlandt, K.-D. Weltmann, T. Schoenemann, Leibniz Institute for Plasma Science and Technology, Germany; X. Godechot, S. Chakraborty, S. Kantas, H. Schellekens, Schneider Electric, France

P09.5 **The initial contact stress in aluminum compression connections with high temperature low sag conductors**
C. Hildmann, S. Großmann, Technische Universität Dresden, Germany; T. Dockhorn, 50Hertz Transmission GmbH, Germany

P09.6 **Adaptive real-time DWT-based method for arc fault detection**
P. Qi, J. Lezama, S. Jovanovic, P. Schweitzer, Université de Lorraine, France

P09.7 **Time-dependent Contact Resistance in a Multi-scale Surface Model**
A. Goedecke, G. Bachmaier, Siemens Corporate Technology, Germany; R. L. Jackson, Auburn University, USA

P09.8 **Sheath layer modeling for switching arcs**
B. Barbu, F. Berger, Technische Universität Ilmenau, Germany

P11 New Technology

P11.1 **Reliability Evolution of Au-Au, Au-Ru and Au-RuO_2 Micro-Contacts**
C. Stilson, R. Coutu, Air Force Institute of Technology, USA

P11.2 **Arcing Detection at Home System Using Correlation analysis**
J. L. Calvo, P. Schweitzer, S. Weber, E. Tisserand, Université de Lorraine, France; P. Joyeux, Hager Electro SAS, France

P11.3 **Vehicle power supply cable with optical jacket monitoring and arcing interference detection**
M. Viehmann, C. Kloß, B. Lustermann, University of Applied Science Nordhausen, Germany

P12 Arc Interruption / Design

P12.1 **Current Communication in High Voltage Switchgear Contacts Under High Currents**
C. Fnineche, O. Aitken, W. Grieshaber, Alstom Grid, France

P12.2 **Arcing Behaviours in the HV Gas-blast interrupters near the downstream contact with cavity**
S. Averyanova, V. Frolov, E. Tonkonogov, Politechnical University, St.Petersburg, Russia

P12.3 **New Deion Chamber for Encapsulated Switchgear**
A. Ehrhardt, S. Beier, DEHN+SÖHNE GmbH+Co. KG, Germany

P12.4 **Observations on switching characteristics of arc chutes in DC contactors**
J. Jebramcik, F. Berger, Technische Universität Ilmenau, Germany

P12.5 **Analysis of Selectivity Concepts for Moulded Case Circuit Breakers**
Y. Zhu, M. Hein, W. Erven, M. Anheuser, Siemens AG, Germany

P12.6 **Visualisation of arc running on divergent electrodes and extinction in the arc splitter chamber**
C. Drebenstedt, M. Rock, Technische Universität Ilmenau, Germany; A. Ehrhardt, S. Beier, DEHN + SÖHNE GmbH + Co. KG, Germany

P12.7 **Application of the CCS-RTOS in the self-correction intelligent control module of AC contactors**
T. Longfei, Z. Xu, Fuzhou University, China

P12.8 **Arc Blowing for Different Shape Silver-Tin Dioxide Contacts using External DC Magnetic Field**
Y. Kayano, H. Inoue, Akita University, Japan

P12.9 **Magnetic Switch Mechanism for Circuit Breakers**
E. Bindl, H. Neubert, J. Lienig, Technische Universität Dresden, Germany; A. Krätzschmar, S. Beyer, Siemens AG, Germany

P12.10 **Optimising the magnetic field system of a high voltage relay without protective gas**
R. Pimenta, L. Hofmeister, E-T-A GmbH, Germany

P12.11 **Dynamic Analysis of a Drive Unit for Molded Case Circuit Breakers with Electromagnetic Repulsion Forces**
I. C. Ahn, J. S. Kang, B. D. Kim, Hyundai Heavy Industries, Co., Ltd., South Korea

P12.12 **Spark gaps for DC applications**
A. Ehrhardt, S. Beier, DEHN+SÖHNE GmbH+Co.KG, Germany

P12.13 **Fundamental Arc Characteristics at DC Current Interruption of Low Voltage (<500V)**
K. Sawa, M. Tsuruoka, S. Yamashita, Nippon Electric Control Equipment Industries Association (NECA), Japan

P12.14 **Laser imaging technology for analysis of electric arc behavior in low voltage circuit breakers**
H. Chen, T. Martin, J. Bennett, Siemens Industry, Inc., USA

P12.15 **A Study of Electrode Mass Change and Arc Energy of AgNi Contacts for Electromagnetic Contactor**
K. Yoshida, K. Sawa, Nippon Institute of Technology, Japan; K. Suzuki, K. Takaya, Fuji Electric FA Components & Systems Co., Ltd., Japan

P12.16 **SAXS Measurements and Mapping of Particle Size Distributions of Nanoparticles Formed in Arcs between $AgSnO_2$, Ag and Carbon Electrodes**
E. Carvou, J. L. Le Garrec, E. Yee Kin Choi, J. B. A. Mitchell, University of Rennes, France

General Information

Contact

For detailed information please contact:

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Website

Visit the ICEC 2014 homepage for getting the latest information related to the conference:
www.icec2014.org

Registration

Please visit www.icec2014.org for registration and information regarding the registration.

Payment

Payment for registration, including bank charges and processing fees, must be made in Euro.

The conference fee has to be fully paid in advance.

Proceedings

All papers/posters accepted for presentation at the conference will be published as CD ROM and included in IEEE Xplore. The CD ROM will be handed on-site to all participants attending the conference. In case you would like to have a printed proceeding, please book it in advance through the additional booking link (price/each 100,00 €)

Proceedings will also be on sale during the conference (upon availability).

Badge

Delegates will receive badges for the conference showing their name and company. All participants are kindly requested to wear their badge throughout the conference and exhibition, even at social events. Lost badges will not be replaced.

Hotel Reservation

For room reservation please check our Website
www.icec2014.org → Accommodation.

Dresden

Dresden is an important center of culture business and research in the east of Germany. The city of Dresden, known as a “baroque city”, has world famous landmarks, the church “Frauenkirche”, the Semper Opera House and the Castle. Forty museums and many private galleries mainly dedicated to contemporary art have given Dresden the reputation of being a city of culture and arts.

Conference Venue

The Maritim Hotel & International Congress Centre Dresden is located in a tranquil spot right on the banks of the Elbe and not far from the attractions of the historic old city. The ”Semperoper“, the ”Frauenkirche“ (”Church of Our Lady“), the Green Vault and much more are just a few minutes away on foot. The attractive and architecturally unique building is the ideal starting point for all travel occasions.

Maritim Hotel & Internationales Congress Center Dresden
Ostra-Ufer 2 / Devrientstr. 10 - 12
01067 Dresden
Phone: + 49 (0) 351 216-0
E-Mail: info.dre@maritim.de

Registration Desk Hours

Sunday,	June 22, 2014	17:00 - 19:00
Monday,	June 23, 2014	7:30 - 18:00
Tuesday,	June 24, 2014	7:30 - 17:00
Wednesday,	June 25, 2014	7:30 - 17:00
Thursday,	June 26, 2014	7:30 - 13:00

Availability e-mail on-site
E-mail: vde-conferences@vde.com
jasmin.kayadelen@vde.com

Official language

The official conference language is English. All sessions will be held in English with simultaneous translation into German.

Social Program

Monday June 23, 2014

Get Together (18:00 - 20:00)
A welcome reception will be offered to delegates, exhibitors and registered accompanying persons at the exhibition area. All participants are invited to attend this reception. (Except only student's registration without extra badge)

Tuesday June 24, 2014

Albert-Keil-Ceremony (16:00 - 17:00)
For all participants. The Ceremony takes place in the plenary room.

Poster Session (17:00 - 19:00)
For all participants and exhibitors.

Meeting and Dinner Advisory Group
For Advisory Group members only. The meetings takes place from 17:00 - 18:00.

Departure for the dinner event will be at 19:30 at the Maritim hotel.

Wednesday June 25, 2014

Conference Dinner (19:00 - 23:00)
The conference dinner will take place at the conference venue. The conference dinner ticket is included in the conference participation (Except only student's registration and for accompanying persons)

Thursday June 26, 2014

Technical Program (13:00 - 19:00)
Executive tram ride tour to "Gläserne Manufaktur Dresden" (Volkswagen Transparent Factory)

Volkswagen plant completed in 2002 for finishing fabrication of the luxury car „Phaeton", fascinating combination of technology and design as well as the world of processing and experience, place of many events. Spare capacity was also used to construct Bentley Continental Flying Spur vehicles destined for the European market until 2006, when all work was transferred to Bentley's plant in Crewe, UK.

The guided tour includes a coffee break.

Afterwards an excursion with test demonstration of the high voltage station at TU Dresden is planned.

Departure: June 26, 2014 at 13:00.
Meeting point: in front of the Maritim Congress Center
Duration: 6 hours
Price: included in conference registration, students on request

Insurance

The organizers may not be held responsible for any injury to participants or damage, theft and loss of personal belongings. Participants should therefore make their own insurance arrangements.

Emergency Calls

Fire/Ambulance 112
Police 110

From some phones an additional "0" (0112 or 0110) might be required to place a call

Tipping

Tipping is at your own discretion. In Germany all taxes are included in hotel and restaurant bills. A good service may be rounded up by 5 to 10%.

Transport

Busses and trams from airport: S1 to stop "Bahnhof Mitte"

ICD address for navigation:
Maritim Hotel & Internationales Congress Center Dresden

Exhibition

The conference will be accompanied with an application-oriented exhibition.

Coffee and lunch breaks will be held in the exhibition area.

Any inquiries relating to ICEC 2014 should be sent to:

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60596 Frankfurt
Germany

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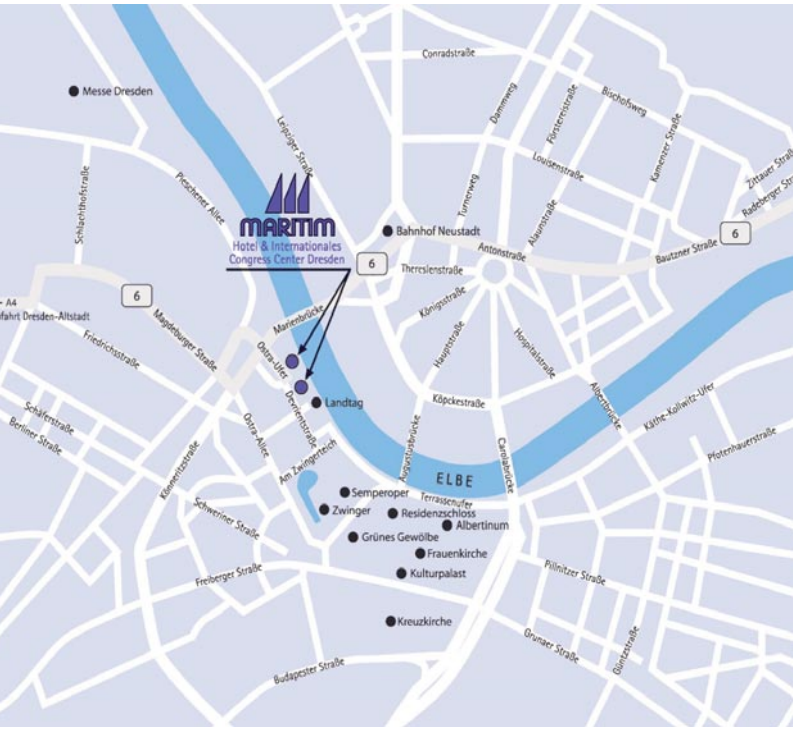
Location Maritim



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