



The 23rd International Conference on Electrical Contacts **ICEC2006/Sendai**

together with the 6th International Session on
Electromechanical Devices **IS-EMD2006**

6-9 June 2006
Sendai International Center
Sendai, JAPAN

Organizing Committee Secretariat

c/o Professor Hiroshi Inoue

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Final Program



Sponsored by
Institute of Electronics, Information and Communication Engineers, Japan

General Information

Name

The 23rd International Conference on
Electrical Contacts 2006, (ICEC2006/Sendai)

Period

June 6 (Tuesday) - 9 (Friday), 2006

Venue

Sendai International Center
Aobayama, Aoba-ku Sendai-shi 980-0856, Japan
Tel. (ICEC2006 Secretariat) : 022-263-3766
(from June 5 to 9)

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The Institute of Electronics, Information and Communication
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Cosponsored by

The Research and Engineering Society for Electromechanical
Components and Contact Technology in Japan (RES-ECCT)

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Japan Institute of Electronics Packaging (JIEP)
Japan Electronics Packaging and Circuits Association (JPCA)
The Japan Society of Mechanical Engineers (JSME)
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Timetable

	6 / 5 (Mon.)	6 / 6 (Tue.)	6 / 7 (Wed.)	6 / 8 (Thu.)	6 / 9 (Fri.)
9:00		9:00	9:00	9:00	9:00
10:00		Opening	Session 4: Contact Phenomena II (5)	Session 8: Materials I (5)	Session 10: Arc Phenomena II & Relays, Switches I (5)
11:00		Session 1: Arc Phenomena I (8)	10:15	10:15	10:15
12:00		12:00	10:45	10:45	10:45
13:00		Lunch	12:00	12:00	12:00
14:00		14:00	14:00	14:00	14:00
15:00	15:00	Session 2: Contact Phenomena I (6)	Session 6: Automotive & Connectors (6)	Session P Poster (38)	Session 12: Contactors & Breakers (7)
16:00	16:00	15:30	(Social Event)	16:00	15:45
17:00	Registration	16:00	15:45	Advisory Meeting	15:45
18:00	Welcome Reception	16:00	17:00		Closing
19:00	20:00	18:00	18:00		
	20:00		Banquet		

Technical Program

6/5 (Mon.)

15:00 – 20:00 Registration Desk Open

16:00 – 20:00 Welcome Reception

6/6 (Tue.)

9:00 – 10:00

Opening: 2F Tachibana Room

10:00 – 12:00

Session 1: Arc Phenomena I (8)

Chair: Thomas J. Schoepf

Co-chair: Takayoshi Kubono

- 1.1 **High Chop Currents Observed in Vacuum Arcs between Tungsten Contacts**
Erik D. Taylor, Paul G. Slade, Wangpei Li; Eaton Electrical, USA
- 1.2 **The Formation of Arc Roots on a Metallic Splitter Plate in Low-Voltage Arc Chambers**
Thomas Ruther, Alexandra Mutzke, Manfred Lindmayer, Michael Kurrat; TU Braunschweig, Germany
- 1.3 **Experimental Study of the Influence of Arc Ignition Position on Arc Motion in Low Voltage Circuit Breaker**
Xingwen Li, Degui Chen; Xi'an Jiaotong University, China
- 1.4 **A Comparison for the Effects of Opening Speed, Contact Gap and Material Type on Electrical Erosion for Relays Interrupting Inductive Automotive Loads**
Gerald Witter, Zhuan-Ke Chen; Chugai USA, Inc., USA
- 1.5 **Numerical Study of the Electrical Arc Movement Supported by Experiments**
Christian Rumpler; Fraunhofer Institute SCAI, Frank Reichert; Technical University Ilmenau, Hartwig Stammberger, Peter Terhoeven; Moeller GmbH, Frank Berger; Technical University Ilmenau, Germany
- 1.6 **Electrical Arc Study in the Range of 14-112VDC for Automotive Power Contacts**
Erwann Carvou, Nouredine Ben Jemaa; Universite de Rennes 1, France
- 1.7 **Experimental Studies of the Arc Behaviour in Low Voltage Arc Rail Arrangements Supporting Numerical Simulations**
Frank Reichert, Frank Berger; Technical University Ilmenau, Christian Rumpler; Fraunhofer Institut SCAI, Hartwig Stammberger, Peter Terhoeven; Moeller GmbH, Germany

1.8 Particle Density in a Breaking Arc between Silver Electrodes

Mitsuru Takeuchi; Nagoya Municipal Industrial Research Institute, Japan, Takayoshi Kubono; Shizuoka University, Japan

14:00 – 15:30

Session 2: Contact Phenomena I (6)

Chair: J. Brian P. Williamson

Co-chair: Terutaka Tamai

- 2.1 **Evaluation of the Life-Time of Permanent Electrical Contacts**
Milenko Braunovic; MB Interface, Canada, V.V. Izmailov, M.V. Novoselova; Tver State University of Technology, Russia
 - 2.2 **Thin Tunnel Film in Contact Boundary and the Lifetime for Closed Contacts Deteriorated by Ingress of Reactants**
Eisuke Takano; Consultant, Japan
 - 2.3 **Transient Phenomena in Contacts of Making Switches**
Stanislaw J. Kulas; Warsaw University of Technology, Poland
 - 2.4 **Multiscale Characteristics of Electrical Contact Resistance**
Chang-Wook Lee, Yong Hoon Jang; Yonsei University, Korea
 - 2.5 **Long-Term Behaviour of Contraction Connections**
Mario Jochim, Helmut Lobl, Steffen Grobmann; Technische Universitat Dresden, Germany, Jean-Claude Mauroux, Th. Schoenemann; ABB Switzerland Ltd., Switzerland
 - 2.6 **Factors Influencing the Fretting Corrosion of Tin Plated Contacts**
Tetsuya Ito, Masato Matsushima, Kensaku Takata, Yasuhiro Hattori; Auto Networks Technologies, Ltd, Japan
- 16:00 – 18:00
- #### Session 3: Communication, MEMS & Other Advanced Technologies (8)
- Chair: Nouredine Ben Jemaa
- Co-chair: Makoto Takahashi
- 3.1 **A Study on the Current and Radiation Noises from 30M to 3G Hz Generated by Slowly Breaking Silver Compound Contacts**
Tatsuya Nakamura, Kazuaki Miyana, Yoshiki Kayano, Hiroshi Inoue; Akita University, Japan
 - 3.2 **A Novel Route to Perovskite Lead Titanate from Lead and Titanium Glycolates via Sol-Gel Process**
Nuchnapa Tangboriboon; Chulalongkorn University, Thailand, Alexander M. Jameison; Case Western Reserve University, USA, Anuvat Sirivat; Chulalongkorn University, Thailand, Sujitra Wongkasemjit; Chulalongkorn University, Thailand

- 3.3 RF MEMS Relay with Polarized Electromagnet**
Takeshi Hashimoto, Noriteru Furumoto, Hideki Enomoto;
Matsushita Electric Works, Ltd., Japan
- 3.4 Advanced Characterization of Semiconductor Wafer Probing Methodology**
Oliver Nagler; Infineon Technologies AG, Markus Reinl;
Bundeswehr University, Florian Kaesen; Infineon Technologies AG,
Ignaz Eisele; Bundeswehr University, Germany
- 3.5 Contact Properties of Ag Bumps Fabricated by Conductive Paste Dispensing**
Kenichi Kataoka; Tokyo Electron AT Ltd., Toshihiro Itoh,
Tadatomo Suga; The University of Tokyo, Japan
- 3.6 Fault Current Limitation by Means of Liquid Metal Technology**
Stephan Schoft; ABB Secheron SA, Switzerland, Jens Tepper;
ABB Corporate Research Center, Switzerland
- 3.7 Research on the Influence of Arc Discharge Conditions on the Formation of Carbon Nano-Materials**
Gang Xing, Shenli Jia, Qiduan Xu, Zongqian Shi; Xi'an Jiaotong University, China
- 3.8 An Optical Parallel Transceiver with Polymeric Three Dimensional Waveguide**
Osamu Daikuhara; Fujitsu Component Ltd, Shigenori Aoki,
Hideki Takauchi; Fujitsu Laboratories Ltd., Japan

6/7 (Wed.)

9:00 – 10:15

Session 4: Contact Phenomena II (5)

Chair: Christofer Leygraf

Co-chair: Tatsuro Kobayashi

- 4.1 Contact Welds Weakened by Mechanical Pre-Opening Stress**
Clemens Schrank, Alexander R. Neuhaus, Martin Reichart; AC2T Research,
Werner F. Rieder; Vienna University of Technology, Austria
- 4.2 Pre-Conditioning Automotive Relay Contacts to Increase Their Resistance to Dynamic Welding**
Thomas J. Schoepf, Abdellah Boudina; Delphi Mechatronic Systems,
Germany, Robert Rowlands; Delphi Packard Electric Systems, Brent Repp;
Delphi Electronics & Safety Troy, USA
- 4.3 Influence of the Break-Arc Conditioning Effect on Make-Arc Welding and Material Transfer**
Alexander R. Neuhaus, Clemens Schrank, Martin Reichart; AC2T Research
GmbH, Werner F. Rieder; Vienna University of Technology, Austria

- 4.4 Migration of Composite Contact Materials Components at High Current Arcing**
Eugeniusz Walczuk, Piotr Borkowski; Technical University of Lodz,
Krystyna Frydman, Danuta Wojcik-Grzybek, Witold Buchole;
Institute of Electronic Materials Technology, Warsaw, Poland
- 4.5 The Loaded Surface Profile: A New Technique for the Investigation of Contact Surfaces**
John W. McBride; University of Southampton, UK

10:45 – 12:00

Session 5: Contact Phenomena III (5)

Chair: Mingzhe Rong

Co-chair: Isao Minowa

- 5.1 Voltage Distribution and Aging of Wires in Connectors for Stranded Power Cable Conductors**
Ake Bohlin, Bertil Larsson; ABB Kabeldon, Sweden,
Kazuhiisa Hagsisawa; University of Tsukuba, Japan
- 5.2 Prediction Model of the Dynamic Contact Resistance and Its Application in Electrical Contact Reliability Research of Contacts**
Fang Yao, Jianguo Lu; Hebei University of Technology, Jianrong Zheng,
Zhangwu Huang; Zhejiang People Electric Appliances Group Incorporated
Company, China
- 5.3 Electrodes Space Partition to Current Tubes of Individual Spots. Application to Simulation of Processes in Multiple-Point Contacts**
Vadim V. Samoilov; J. St. Co. Contactor, Russia
- 5.4 Structural Analysis of Electrical Contacts Based on Displacement Energy of Atoms and Its Application to Sheet Contact with Low Contact Load**
Tomishige Tai, Mitsuo Koguchi; Japan Aviation Electronics Industry,
Limited, Japan
- 5.5 Numerical Analysis of Electrical Contact Characteristics of High Temperature Superconducting Bulk**
Mingzhe Rong, Jian Li, Yi Wu, Zhiqiang Sun; Xi'an Jiaotong University, China

14:00 – 15:30

Session 6: Automotive & Connectors (6)

Chair: Gerald Witter

Co-chair: Makito Morii

- 6.1 An Experimental Study of Arcing between Electrical Contacts on Automobile Connector by the High Voltage Battery System**
Takaya Kondo, Tomohiro Shimada, Shinya Matsuura, Hiroshi Kawasaki;
Yazaki Parts Co., Ltd., Japan

6.2 Magnetic Pressure Welding of Aluminum Plate and Wire - Plate to Stranded Wire -

Kenichi Hanazaki; Yazaki Corporation, Tomokatsu Aizawa, Mehrdad Kashini; Tokyo Metropolitan College of Technology, Japan

6.3 Adhesion and Attaching of Particles at the Failed Connector Contacts

J.G. Zhang, J. C. Gao, C.F. Feng, Beijing University of Posts & Telecommunications, China

6.4 Accelerated Design Process for Insulation Displacement Connectors Using the Finite-Element-Method

Stefan Jorgens, Henning Taschke; Lumberg Connect GmbH, Germany

6.5 Assessing the Repeatability of RF and Microwave Connectors in High-Frequency Precision Measurements

Masahiro Horibe, Masaaki Shida, Koji Komiyama; NMIJ, AIST, Japan

6.6 Calculation and Optimization of Uniform Flexible and Tapered Cantilever Beams for Electrical Connectors Analyzing the Maximum of Safety against Overstressing the Material Yield Strength Limit

Achim Brenner; HARTING KGaA, Horst F. Nowacki; University of Applied Sciences, Germany

15:45 – 17:00

Session 7: Sliding Contacts (5)

Chair: Ji-Gao Zhang

Co-chair: Ryo Nagase

7.1 Correlation between Wear and Electrical Behaviour of Contact Interfaces during Fretting Vibration

Noureddine Ben Jemaa; University of Rennes 1, France, Jonathan Swingler; University of Southampton, UK

7.2 Enhanced Friction and Wear Behaviour of Electrical Contacts Via Bio Inspired Microstructure Control Produced by Laser Interference Metallurgy

Frank Mucklich, A. Lasagni; Saarland University, Germany, C. Daniel; Ridge National Laboratory, USA

7.3 Simulation of Steady and Unsteady State Surface Temperatures under Sliding Imperfect Electric Contact between Rough Surfaces

Wan-Sik Kim, Q. Jane Wang; Northwestern University, USA, Shuangbiao Liu; Caterpillar Inc., USA, Mark Asta; Univ. of California, USA

7.4 Study on New Type of Pantograph Contact Strips

Fengyi Guo, Ne Dong, Zhonghua Chen, Zhaoyuan Shi; Liaoning Technical University, China

7.5 Characteristics of Arc-Reducing Effect by Capacitor in Commutation Circuit

Ryoichi Honbo, Youichi Murakami, Hiroyuki Wakabayashi, Shinji Ueda, Kenzo Kiyose, Naoki Kato; Denso Corporation, Japan

18:00 – 20:00

Banquet (Sendai Washington Hotel, 2F Grand Court)

6/8 (Thu.)

9:00 – 10:15

Session 8: Materials I (5)

Chair: Chi Leung

Co-chair: Shuichi Nitta

8.1 A Novel Method for Accurate Measurement of Elastic and Plastic Properties of Contact Spring Materials

Piet van Dijk; PVDIJK Consultancy BV, NL

8.2 Long Time Behaviour of Static High Current Plug-In Connectors with CuCo2Be Helical Spring

Falk Blumenroth, Helmut Lobl, Stefan Grossman; Technische Universitat Dresden, Germany, Matthias Kudoke; ABB Schweiz, Switzerland

8.3 Precipitation Hardened High Copper Alloys for Connector Pins Made of Wire

Robert Zauter, Dmitry V. Kudashov; Wieland-Werke AG, Germany

8.4 Investigation of Au/Pd-Ni/Ni Plating on Electrical Contacts

Osamu Hiramoto; Sony Corporation, Japan

8.5 Development of AgNi Contact Material

Nobuhito Yanagihara, Osamu Sakaguchi, Toshiya Yamamoto; Tanaka Kikinzoku Kogyo K. K., Japan

10:45 – 12:00

Session 9: Materials II (5)

Chair: Werner Johler

Co-chair: Sigeru Umemura

9.1 Sputter Erosion Model of Arcing Contact Materials

Li Zhenbiao, Wu Xixiu; Huazhong University of Science and Technology, China, Hassan Nouri; University of the West of England, UK

9.2 New Silver-Oxide Composites to Reduce Break Arc Duration and Its Subsequent Damages

Damien Sallais; Metalor Technologies (France) SAS, Noureddine Ben Jemaa; University of Rennes 1, Andre Perrin, Timothee Heraud; University of Rennes 1, Didier Jeannot, Christine Bourda; Metalor Technologies (France) SAS, France

- 9.3 Investigation on Current Chopping Characteristics of Ag-Cu-WC-Co Contact Materials**
Atsushi Yamamoto, Takashi Kusano, Tsutomu Okutomi, Kunio Yokokura;
Toshiba Corporation, Japan
- 9.4 The Influence of Manufacturing Process, Metal Oxide Content, and Additives on Switching Behavior of Ag/SnO₂ in DC and AC Relays (2)**
Andreas Koffler, Peter Braumann, Bernd Kempf; Umicore AG & Co. KG,
Germany
- 9.5 Substitute Contact Material for Silver/Cadmium Oxide in AC Applications in the Low Current Range**
Volker Behrens, Thomas Honig, Oliver Lutz, Dietmar Spath;
AMI DODUCO GmbH, Germany

14:00 – 16:00

Session P: Poster (38), 2F Sakura Room

Chair: Koichiro Sawa

Co-chair: Seiji Asai

Poster, Arc Phenomena

- P1 Observation of Moving Range of Arc Spots on Contact Surfaces in a 42 Volt DC Resistive Circuit**
Junya Sekikawa, Takayoshi Kubono; Shizuoka University, Japan
- P2 A New Method to Calculate Arc Duration at a Break Contact**
Keiichi Suhara; Tokyo National College of Technology, Japan
- P3 Analysis on Breaking Current Waveforms for the Monitoring of Electrical Contact Lifetime**
Zhenbiao Li, Meifang Wei; Huazhong University of Science and Technology,
Jiaxiang Liu; Shanghai Hugong Auto-electric Co. Ltd, China, Horn Guenther,
AMI DODUCO (TIANJIN) Electrical Contacts Manufacture Co. Ltd, USA
- P4 Spectroscopic Temperature Measurement of Breaking Arcs in a D.C.42V Circuit**
Naoki Moriyama, Junya Sekikawa, Takayoshi Kubono; Shizuoka University, Japan
- P5 The Behavior of Breaking Arc Depending on the Separating Speed of Electrical Contacts**
Yoshinobu Nakamura, Takayoshi Endo, Junya Sekikawa,
Takayoshi Kubono; Shizuoka University, Japan
- P6 6GHz Measurement of Voltage Rise Time and Frequency Spectra Distribution due to Micro Gap Discharge in Voltage below 1500V**
Ken Kawamata; Hachinohe Institute of Technology, Shigeki Minegishi,
Akira Haga; Tohoku Gakuin University, Japan

- P7 New Algorithm for Volumetric Analysis of Contact Damages with Laser Microscope Data**
Makoto Hasegawa, Kazutaka Izumim, Yusuke Kamada;
Chitose Institute of Science and Technology, Japan
- P8 The Simulation and Experimental Research on Air Arc Plasma Considering Wall Ablation in Low-Voltage Circuit Breakers**
Qian Yang, Mingzhe Rong, Yi Wu; Xi'an Jiaotong University, Bin Cai;
Daqo Group, Chin
- P9 Three-Dimensional Numerical Analysis with P-1 Radiation Model in Low Voltage Switching Arc**
Zhiqiang Sun, Mingzhe Rong, Yi Wu, Jian Li; Xi'an Jiaotong University, China

Poster, Contact Phenomena

- P10 A Computer Program for the Calculation of Electrode Mass Loss under Electric Arc Conditions**
Piotr Borkowski; Technical University of Lodz, Poland
- P11 The Acceleration Test Method for Heat and Fire Phenomena of Electrical Terminal by Loose Contact**
Youichi Aoyama, Hisa Numa, Ryo Fujita; Kurume National College of
Technology, Japan
- P12 Change in Contact Resistance for Closed Contacts of Ag, Al, Au, Cu, Fe, Ni and Sn in Aging Tests without Mechanical Separation**
Eisuke Takano; Consultant, Japan
- P13 Numerical Modeling on Heat Conduction of the Electrical Contact at Breaking Operation by FDTD-HCE**
Kazuaki Miyanaga, Tatsuya Nakamura, Yoshiki Kayano, Hiroshi Inoue;
Akita University, Japan
- P14 Effect of Humidity on Growth of Oxide Film on Surface of Copper Contacts**
Terutaka Tamai; Hyogo University of Teacher Education, Graduate Course, Japan
- P15 Behavioral Phenomena of Bridge in Contacts with Respect to Opening Speed**
Hiroyuki Ishida, Shosuke Suzuki; Tohoku Bunka Gakuen University,
Hideaki Sone; Tohoku University, Hiroshi Inoue; Akita University,
Masanari Taniguchi, Tasuku Takagi; Tohoku Bunka Gakuen University,
Japan
- P16 Contact Resistance Characteristics of YBaCuO Superconductors with Deposited Metal Layer**
Hiroyuki Fujita, Katsuya Fukuda, Koichiro Sawa; Keio University,
Masaru Tomita; Railway Technical Research Institute,
Masato Muraami; Shibaura Institute of Technology, Naomichi Sakai,
Izumi Hirabayashi; Superconductivity Research Laboratory, Japan

- P17 Soft Materials Used for Low Contact Force Probing**
Kazuhiro Inoue; The University of Tokyo, Kenichi Kataoka; Tokyo Electron AT Ltd., Toshihiro Itoh, Tadatomo Suga; The University of Tokyo, Japan
- P18 Non-Linear Resistance Modeling Caused by Constriction Current through Two Dimensional Weak Link on a Copper Print Board**
Isao Minowa; Tamagawa University, Japan
- P19 FIB-Tomography and 3D Reconstruction of Crater Formation due to Discharge Phenomena**
Frank Muecklich, N. Jeanvoine, C. Holzapfel, F. Soldera; Saarland University, Germany
- P20 Estimation of Gap Breakdown Field in Contact with Hand-Held Metal Piece from Charged Human Body**
Yoshi Taka, Ikuko Mori, Osamu Fujiwara, Nagoya Institute of Technology, Japan
- Poster, Communication, MEMS & Other Advanced Technologies**
- P21 A Study on Spontaneous Temperature Fluctuations and 1/f Spectrum Generation Model in Electric Contaction and Granular Structures**
Keiji Takagi; KIT Senior Academy, Japan
- P22 Fundamental Measurement of Radiated Electromagnetic Field from a Transmission Line which has Connector Contact Failure**
Yu-ichi Hayashi, Hideaki Sone; Tohoku University, Japan
- P23 Wideband Measurement of Discharge Current Waveform due to Air Discharge of an ESD-Gun with a Low Charge Voltage**
Ikuko Mori, Osamu Fujiwara; Nagoya Institute of Technology, Shinobu Ishigami; National Institute of Information and Communications Technology, Japan
- P24 Electrical and Tribological Characteristics of Metal-Doped Carbon Thin Films**
Shigeru Umemura, Shinsuke Misu-Matsuhashi; Chiba Institute of Technology, Shigeru Hirono; NTT AFTY Corporation, Japan
- P25 A Study about an Effect of Additional Magnetic Flux Shield for Eddy-current Type Proximity Sensor**
Koichi Koibuchi, Koichiro Sawa; Keio University, Takashi Honma, Takumi Hayashi, Kuniyoshi Ueda, Hiroshi Sasaki; Yamatake Corporation, Japan
- P26 Comparison of Thermally Deformed Patterns of Printed Circuit Board by Simulator Soft, Thermography and Holography**
Hiromichi Kubota, Masanari Taniguchi, Tasuku Takagi; Tohoku Bunka Gakuen University, Japan

Poster, Automotive, Connector & Sliding

- P27 Transferred Pip Formed on Electrical Contacts Mounted on Relays in a DC42V Resistive Circuit**
Jyunpei Watanabe, Junya Sekikawa, Takayoshi Kubono; Shizuoka University, Japan
- P28 Research on Ultrasonic Welding between Aluminum and Tin Plated Brass**
Kazuhiro Murakami, Yoshihiko Watanabe; Yazaki Corporation, Japan
- P29 Electro-Mechanics Goes Lead-Free Re-qualification, Reliability and Field Report of a Connector Manufacturer**
Stefan Jorgens; Lumberg Connect GmbH & Co.KG, Germany
- P30 Press-fit Connector for Automobile ECUs**
Yoshiyuki Nomura, Yasushi Saitoh, Kingo Furukawa, Yoshinori Minami, Kanji Horiuchi, Yasuhiro Hattori; AutoNetworks Technologies, Ltd., Japan
- P31 Crosstalk Control of High Speed LAN Connectors**
Seiichi Onoda, Keiichi Inoue; Watanabe Co., Ltd., Japan
- P32 Basic Studies for Accurate Commutation Analysis which Enables Commutation Spark Energy Estimation**
Noboru Morita, Takahiro Ueno, Qingliang Zhang; Nippon Institute of Technology, Takeshi Noguchi; Kawamata Seiki Co., Ltd., Yuji Nakanishi; Toshiba Mitsubishi-Electric Industrial System Corporation (TMEIC), Japan
- Poster, Materials**
- P33 Study on AuAg8/AgNi15/CuNi20 Micro Contact Profiles**
Fan Jinduo; Jinduo Precious Metal Materials Co., Ltd., Shi Yunmei; Beijing Information Science and Technology University, Li Zhou; Central South University, Wen Liangqi; Wenzhou University, Wang Guisheng, Zhang Hongbing; Jinduo Precious Metal Materials Co, Ltd., China
- P34 Physical and Chemical Changes under Thermal Cycling of an Extrinsic Conducting Polymer Electrical Contact**
Liza Lam; Osaka University, Singapore, John W. McBride, Jonathan Swingler; University of Southampton, UK
- Poster Relay & Switches**
- P35 Surface Analysis of Relays Used for Earthquake Disasters**
Yoshitada Watanabe, Hanako Miyamaru; Kogakuin University, Koichiro Sawa; Keio University, Japan
- P36 Study on Measurement of the Contact Resistance of Relay**
Guojin Liu, Jianguo Lu, Zhigang Li, Haitao Wang; Hebei University of Technology, China
- P37 Coulomb's Electrostatic Force during Making and Breaking Operation of a Reed Switch**
Noboru Wakatsuki, Atsushi Yamamoto; Ishinomaki Senshu University, Japan

P38 Study on Accelerated Testing Method & Instrument for Storage Life of Electromagnetic Relay

Li Wenhua, Lu Jianguo, Luo Yanyan, Yang Fengbiao, Li Wenxiong;
Hebei University of Technology, China

6/9 (Fri.)

9:00 – 10:15

Session 10: Arc Phenomena II & Relays, Switches I (5)

Chair: Eugeniusz Walczuk

Co-chair: Hideaki Sone

10.1 Experimental Study of the Consequences of Molten Bridge Phenomena on Power Contacts

Thomas Klonowski, R. Andlauer, T. Leblanc; Laboratoire de Genie Electrique de Paris, F. Faure; Schneider Electric, R. Meyer, Philippe Teste; Laboratoire de Genie Electrique de Paris, France

10.2 Mathematical Approach to Model Rapidly Elongated Free-Burning Arcs in Air in Electric Power Circuits

Stefan Berger; Swiss Federal Institute of Technology Zurich, Switzerland

10.3 Study of Arc Interruption Utilizing Arc Column Rotation Phenomena

Shigeru Kasai, Tatsumi Ide; NEC Tokin Iwate Corporation, Japan

10.4 Modeling and Simulation of Hermetically Sealed Electromagnetic Relay under Mechanical Environment

Ren Wanbin, Chen Yinghua, Zhai Guofu; Harbin Institute of Technology, China

10.5 Applications of Heavy-Duty Reed Switches

Kenjiro Hamada, Yoshinori Shimizu; Yasukawa Controls Co., Ltd., Shingo Umezaki; National Institute of Industrial Safety, Japan

10:45 – 12:00

Session 11: Relays & Switches II (5)

Chair: John W. McBride

Co-chair: Makoto Hasegawa

11.1 Limits of Electromechanical Relays

Werner Johler; Tyco Electronics, Switzerland

11.2 Development of Cadmium-Free Contact Material for AC Wall Switch Applications

Zhuan-Ke Chen, Gerald Witter; Chugai USA, Inc., USA

11.3 System Level Simulation for Electromechanical Relays

Dieter Volm, Martin Bichler, Klaus Fichtner; Panasonic Electric Works Europe AG, Germany

11.4 Dimensioning of Switches Made up of a Series and Parallel Connection of Numerous Low-Current Contacts

Manfred Grader; Swiss Federal Institute of Technology Zurich, Switzerland

11.5 Methods of Electronic Short-Circuit Detection for Improving Current Limitation in Low-Voltage Systems

Timo Mutzel, Frank Berger; TU Ilmenau, Michael Anheuser; Siemens AG, Germany

14:00 – 15:45

Session 12: Contactors & Breakers (7)

Chair: Paul Slade

Co-chair: Youichi Aoyama

12.1 Analysis and Research on Factors Affecting Electro-Dynamic Repulsion Force in Air Circuit Breaker with the Method of 3-D Finite Element

Yingyi Liu, Degui Chen, Xingwen Li; Xi'an Jiaotong University, China

12.2 Simulation of Electrical Field and Breakdown Phenomena in Low Voltage Circuit Breakers

Peter U. Frei, Hans O. Weichert; Rockwell Automation AG, Switzerland

12.3 Switching in Aircraft Electrical Networks at Frequencies up to 800 Hz and Low Air Pressure

Peter Meckler; E-T-A GmbH, Germany

12.4 Thermal Analysis of a Molded Case Circuit Breaker - Effect of Electric Contact Resistance and Bimetal Design

Chi H. Leung; AMI Docuco, USA

12.5 Prognostic and Diagnostic Technology for DC Actuated Contactors and Motor Starters

Xin Zhou, Lian Zou, Roger Briggs; Eaton Corporation, USA

12.6 Development of a New Type of Switchgear for High Voltage Gas Circuit Breaker: Electromagnetic Force Driving Actuator

Jong-Ho Kang, Sang-Min Choi; Seoul National Univ., Woo-Young Lee, Hong-Kyu Kim; Korea Electrotechnology Research Institute, Wang-Byuck Suh, Won-Seok Kim; Iljin Electric Co., Ltd., Hyun-Kyo Jung; Seoul National Univ., Korea

12.7 Electromagnetic Drive and Control Arrangement for Circuit Breaker with Stabilized Contact Force

Bogdan Miedzinski; Wroclaw University of Technology, Zbigniew Kowalski; Mining Electrification and Automation, R & D Centre EMAG, Grzegorz Wisniewski; Wroclaw University of Technology, Poland

15:45 **Closing**

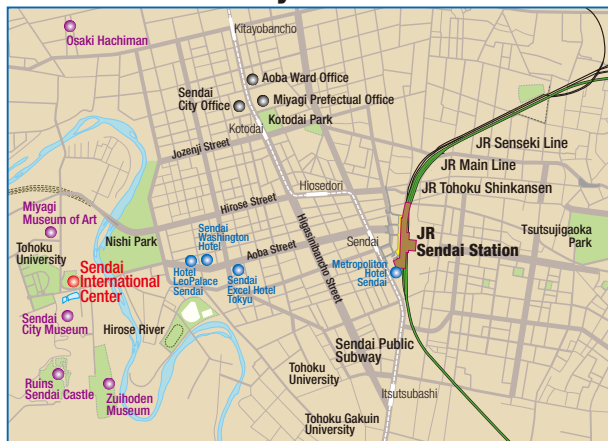
Location

Sendai is located approximately 300 kilometers (180 miles) north of Tokyo on the Pacific coast of Honshu (the largest of Japan's four major islands). Sendai lies in the center of the Tohoku (northeast) Region, one of the seven major regions in Japan. The seasonal weather in Sendai in June is the best for outdoor fun. The maximum temperature is around 20°C with clear skies and green surroundings.



Center of Sendai City

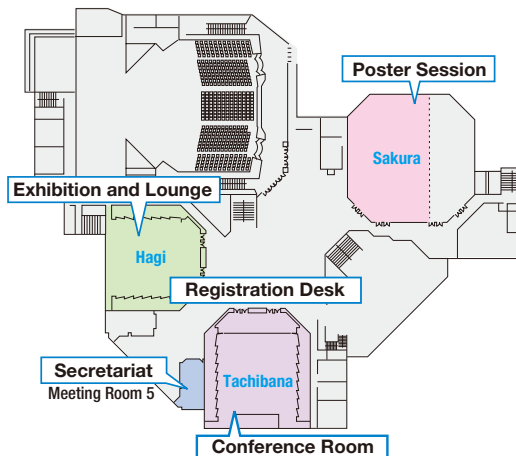
Sendai International Center



How to reach to Sendai International Center

- BUS** 10 minutes from Sendai Station Bus Terminal (West) (No.9 bus stop).
Take bus marked: "710, 713, 715, or 719".
Get off at "HAKUBUTUKAN KOKUSAICENTER MAE". It is the 5th stop.
- TAXI** 7 minutes from Sendai Station
- WALK** 30 minutes from Sendai Station straight down AOBA DORI, across the OHASHI-BRIDGE.

Sendai International Center 2nd Floor



* Social Program for Accompanying Persons on 1st floor.

Registration

	SPEAKER REGISTRATION (On or Before 17:00 on March 15, 2006)
General Speaker	JPY 50,000
Student Speaker	JPY 10,000

General and student attendees

	ADVANCE REGISTRATION (On or Before 17:00 on April 10, 2006)	STANDARD/ON-SITE REGISTRATION (On or After 17:01 on April 10, 2006)
General	JPY 50,000	JPY 55,000
Student	JPY 10,000	
Accompanying person	free	

* Registration fee includes: access to all ICEC sessions 6-9 June, proceedings, social events for accompanying persons and welcome reception.

* Proceedings (with CDROM) will be sold at the Registration Desk at a price of 10,000 JPY. Proceedings will be sold following the Conference at a price of 15,000 JPY (including shipping).

Transportation to Sendai

There are many international flights arriving at New Tokyo International Airport (Narita). However, there are only a few domestic flights (ANA) available between Narita and Sendai. Alternatively, you can take a 1 hour trip from Narita to Tokyo on the Narita Express (JR EAST train), and a further 1 hour and 40 minutes to reach Sendai from Tokyo on the Tohoku Shinkansen (JR EAST train).

1) Access to Sendai from Narita International Airport

At Narita International Airport, take the train from Narita International Airport station to Tokyo railway station. It takes about 1 hour from Narita to Tokyo.

Narita Express timetable

<http://www.jreast.co.jp/e/nex/>

Station Maps:

Narita Airport, Narita Terminal 2 Station and Tokyo Station

<http://www.jreast.co.jp/e/estation/index.html>

The Narita Express arrives at underground platform No.1 or No.2 at Tokyo Station. After arriving at Tokyo, follow the signs to Shinkansen platform No.20 - No.23.

At Tokyo Railway Station, change trains to the Tohoku Shinkansen. Get off the Shinkansen at Sendai Station. It takes about 2 hours from Tokyo to Sendai. The trains depart from Tokyo three or four times every hour from 6:56 AM to 21:32 PM.

2) How to buy railway tickets

You can buy railway tickets to Sendai at the ticket office or travel service center in Narita Airport Station, or at Narita Terminal 2 Station.



みどりの窓口

Ticket Office



Travel Service Center

3) At Sendai Station

You will arrive at the 3rd floor of the Sendai Station building. The city bus terminal is on the ground floor.

City map

http://www.ieice.org/icec2006/hotel_map.jpg



Sendai Station

4) Flights from Narita to Sendai

A flight schedule from Narita International Airport to Sendai Airport can be found at the URL below.

<http://www.sdj-airport.com/english/flight/page3.html>

Social Events

1. Welcome Reception

June 5, 2006 (Mon.), 16:00 – 20:00

Sendai International Center, 2F Hagi Room

Free

2. Banquet

June 7, 2006 (Wed.), 18:00 – 20:00

Sendai Washington Hotel, 2F Grand Court

(20 minute walk from Sendai International Center)

Fee: 10,000 JPY

3. Social Event for Accompanying Persons

Experience Japanese Culture (Tea ceremony and kimono)

June 7 (Wed.) 13:30 – 16:30

Free (registration required before June 6 (Tue.) A.M.; up to 10 participants)

4. Sightseeing

A city tour bus ticket will be available at the Registration Desk

Technical Exhibition

Date: June 6 (Tue.) to 9 (Fri.), 2006.

Place: Sendai International Center, 2nd Floor Hagi

Purpose: To openly exchange information and technical progress on the issue of electrical contacts

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Contributions

ABB High Voltage Technologies Ltd.	National Institute of Advanced Industrial Science and Technology
ABB Kabeldon	National Institute of Technology Karnataka
ABB Secheron SA	NEC Tokin Iwate, Ltd.
AC2T Research GmbH	Nippon Institute of Technology
Akita University	Northwestern University
AMI DODUCO GmbH	Omron Corp.
Auto Networks Technologies, Ltd	Panasonic Electric Works Europe AG
Beijing University of Posts & Telecommunications	PVDIJK B.V. Consultancy
Chiba Institute of Technology	Rockwell Automation AG
Chitose Institute of Science and Technology	Saarland University
Chugai USA, Inc.	Seoul National University
Chulalongkorn University	Shizuoka University
COM DEV International	Siemens AG Corporate Technology
Delphi Deutschland GmbH Mechatronic Systems	SINTEF Energy Research
Denso Corporation	Sony Corporation
Eaton Corporation	Swiss Federal Institute of Technology Zurich
Eaton Electrical	Tamagawa University
Emulex Corporation	Tanaka Kikinokoku Kogyo K.K.
E-T-A Elektrotechnische Apparate GmbH	Techn. Univ. Ilmenau
Fraunhofer Institut SCAI	Technical University of Lodz
Fujitsu Component Limited	Technische Universitat Braunschweig
Hachinohe Institute of Technology	Technische Universitat Dresden
Harbin Institute of Technology	The University of Tokyo
Hebei University of Technology	Tohoku Bunka Gakuen University
Huazhong University of Science and Technology	Tohoku University
Hyogo University of Teacher Education	Tokyo Electron AT Ltd.
Infineon Technologies AG	Tokyo National College of Technology
Ishinomaki Senshu University	Toshiba Corporation
Japan Aviation Electronics Industry, Limited	TU Ilmenau
Jinduo Precious Metal Materials Co., Ltd.	Tyco Electronics AXICOM

