

Final Program

53RD IEEE HOLM CONFERENCE ON ELECTRICAL CONTACTS 2007 17-19 SEPTEMBER 2007



Sheraton Station Square Hotel
Pittsburgh, PA



Sponsored By:
The Components, Packaging, and
Manufacturing Technology Society of
the IEEE

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Purpose

To provide a forum for the presentation and discussion of the latest developments in the field of electric contacts, as well as, the application of recent advances in materials and processes in electrical, electronic and telecommunications equipment.

For Whom

Practicing designers, engineers, physicists and research scientists - those new to the field and those experienced. The 2007 Holm Conference will include excellent papers authored by many of the outstanding technical people in this field. We expect to have 47 planned presentations from US and international engineers and scientists. These papers will provide the attendees with up-to-date information on a wide range of subjects that makes this conference so attractive to the practicing engineer.

Additionally, the 2007 Holm Conference will make it possible for any attendee to discuss personally with any author either additional details concerning the work presented by the author at the conference or any subject related to the author's field of expertise.

Background

The Holm Conference began in 1953 as a forum for the discussion of electrical contact phenomena and related fields. In 1968, the conference was named the Holm Conference in honor of Dr. Ragnar Holm. Dr. Holm, whose contributions to the field of electrical contacts spanned 50 years and forms the foundation of the electrical contacts field, was the inspiration and guide of the Conference from its inception until his death in 1970.

In addition to the Annual Conference, the Conference Organization regularly conducts an intensive course on contacts and participates in the biannual International Conference on Electrical Contacts.

Registration

All Participants are encouraged to pre-register to avoid lines at the conference and to obtain the discounted fee.

CONFERENCE	Prior To 8/24/2007	After 8/24/2007
IEEE Member	\$600	\$650
Non-Member	\$650	\$700
Student	\$250	\$300
One Day Only	\$300	\$300
Emeritus	Contact IEEE	
Extra Proceedings	\$70	\$70
Monday Social	\$55	\$55

REGISTRATION HOURS

Sunday, 16 September	4:00 p.m. – 6:00 p.m.
Monday, 17 September	7:30 a.m. – 5:00 p.m.
Tuesday, 18 September	8:00 a.m. – 5:00 p.m.
Wednesday, 19 September	8:00 a.m. – 11:00 a.m.

Registration can be completed online:
www.ewh.ieee.org/soc/cpmt/tc1

Registration payments: Checks are to be made out to the IEEE HOLM in U.S. funds. Visa, MasterCard and American Express. Please mail your payment along with the enclosed registration form to:

IEEE Holm Conference
IEEE Conference Management Services
445 Hoes Lane
Picataway, NJ 08854
Or fax to +1 732 465 6447

For additional information please contact Holm Registrar, at +1 732 562 5337, via fax to +1 732 465 6447, or email: a.sadlowski@ieee.org

WELCOME RECEPTION

All conference attendees are invited to register early and attend a welcome reception on Sunday, 16 September from 4:00 PM – 6:00 PM at the Sheraton Station Square Hotel.

Hotel Accommodations

The conference this year meets in Pittsburgh, PA at the Sheraton Station Square, where meeting facilities are well suited to the Conference Sessions and other activities. The hotel is offering special rates of \$129.00 US dollars single/double occupancy to conference attendees. Rates are subject to 14% tax. To make a reservation please call the Sheraton Station Square at +1 412 261 2000 and identify yourself as part of the IEEE Holm Conference on Electrical Contacts in order to receive the special group rate. The special rate is valid until Friday, August 24, 2007, reservations received after this date are subject to space and availability.

Check in time: 3:00 p.m. Check out time: 12:00 p.m.

Sheraton Station Square Hotel
300 West Station Square Drive
Pittsburgh, PA 15219
+1 412 261 2000

Travel Arrangements

Please contact the IEEE Travel Services Department at 1 800 TRY IEEE (1 800 879 4333) or 1 732 562 5387 if calling from outside the US to obtain negotiated airfares on Continental, United Airlines and American Airlines.

Transportation From Airports

Taxis:

Please refer to www.pitairport.com for additional information regarding the airport and local transportation. Taxis and limos are available at the airport and should cost approximately \$40, depending on time of day and traffic.

Driving:

If you are arriving by your own transportation, you may park at the Sheraton Station Square Hotel parking area at \$16/day. If you are traveling from Pittsburgh International Airport: Take 60 South (Pittsburgh) to Interstate 279 North to Exit 5-C. Bear right and continue for approximately one mile. At the second light, turn right onto Carson Street (837). The hotel is approximately 1.5 miles on the left. For specific driving directions, consult Map Quest at www.mapquest.com or call the hotel directly at +1 412 261 2000.

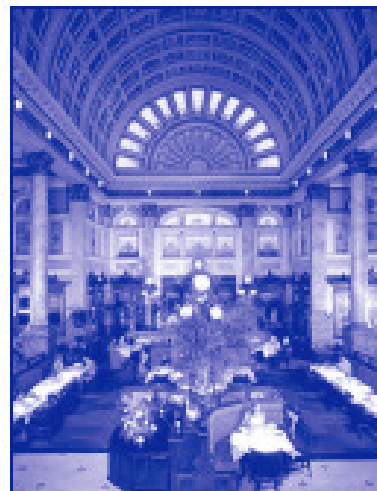
Social Events

Join us for Dinner and Drinks

Grand Concourse
Monday, 17 September 2007
6:00 PM



It's like no other restaurant you've ever seen. This fine seafood emporium, a Chuck Muer restaurant, is set in the Edwardian splendor of the Pittsburgh & Lake Erie Railroad terminal built in 1901. Opened to the public in April of 1978, the Grand Concourse is part of Pittsburgh History and Landmark's Station Square restoration, which is on the National Register of Historical Sites.



On the Monongahela River just across Smithfield Bridge, Station Square sits with a grand view of the Golden Triangle. The decor of the Grand Concourse combines brass, marble, mahogany and a breathtaking stained glass cathedral ceiling.

IEEE Holm Conference Ragnar Holm Scientific Achievement Award Nomination Guidelines

History: The Ragnar Holm Scientific Achievement Award was created by the 1971 Holm Conference Steering Committee in honor of the memory of Dr. Ragnar Holm, the founder of the modern science of electrical contacts. This award is to be granted to the living scientist or engineer who has made significant contributions to the theory or practice of electrical contacts, or for work in related technologies which is directly applicable to contacts. In considering a person's work and selecting a recipient preference will be given for: a.) Nominees that have made contributions to the technology over many years, b.) the originality and scientific importance of contributions, and c.) achievements that have found a high degree of practice. Provided worthy candidates are found, the Award will be granted annually.

Eligibility: Any person may be nominated for this award regardless of IEEE membership. Members of IEEE Holm Awards Committee are not eligible to be considered for the award while serving on this committee. Nominations are not accepted for persons deceased. Candidates must have made contributions to the electrical contact field for a period spanning at least ten years.

Nominator Eligibility: Any person may nominate a candidate for this award, with the following exception: members of the award committee.

Nomination Support Materials:

Endorsers: At least two letters of endorsement are required. One is from the nominator and the others are from the endorsers selected by the nominator. Endorsers should be in a position to substantiate the candidate's contributions by providing explicit detail from personal knowledge. The nominator is responsible for submission of the letters of endorsement.

Candidate Personal Data/Education/Work: "Name", provide complete name of candidate, not initials. "Personal", provide date of birth, and citizenship. "Education", list year and exact degree of institute. "Society Membership", list various professional society affiliations. Under society activities list officers and major committee work. "Professional History", list present occupation followed by previous career experiences. Indicate positions held, years, and briefly explain each responsibility.

Technical Accomplishments: "Technical Publications", such as books, papers, reports, and standards are to be listed in chronological order giving author's names, title, book, journal, or proceedings. "Patents", should be listed by date, number, title, and country of origin. Documentation authentication "Development of Products or processes", may be listed for items not covered by patents. "Technical Presentations", such as keynote addresses or courses developed by the candidate should also be listed.

Significant Contributions: Describe the candidate's outstanding contributions in terms of specific items. Provide a short paragraph to each one including a general description of the item, the degree of originality and creativity, and importance of the work to the electrical contact field and the time period over which the contribution was made. Also state cases of examples of practices which were developed or modified through contributions of the candidate.

Forward Nominations To: IEEE Holm Nominations Committee, c/o IEEE Holm Conference Planner, 445 Hoos Lane, Piscataway, NJ 08854 USA

2008 Nominations Deadline: November 15, 2007

The 2007 Ragnar Holm Achievement Award

The Ragnar Holm Scientific Achievement Award derives its significance and prestige from the scientist whose name it carries. The contributions of Dr. Ragnar Holm to electrical contact theory and application are renowned the world over. The award, created in 1971 by the Steering Committee of the Holm Conference, honors the memory of the founder of modern electrical contact science by recognizing outstanding scientists and engineers in the field of electrical contacts or related technologies

Effect of Particle Contamination on Electrical Contact Failure

Dust contamination is a major cause of current disruption in electric contacts. It is fast becoming the greatest influence on their reliability. However, due to its complexity, the effect of dust is difficult to simulate in the laboratory; and effective ways to reduce the failure caused by the fine dust particles on contacts still present a difficult and unsolved research problem. Based on the inspection of failed electric contacts, and also on the study of the characteristics of dust particles, this paper describes the composition of the materials in dust, and also the mechanical, electrical, and chemical characteristics of the particles. The conditions required for the dust to cause contact failure are discussed: in particular the effect of micro motion at the contact interface; the selective deposition of dust particles; the adhesion between particles; the chemical and electrostatic attachment of particles to the contact surface; and the creation of high resistance due to particle accumulation.

Ji Gao Zhang graduated from the Radio Engineering Dept. of Nanking Institute of Technology China in 1954. After graduation he has been a lecturer and associate professor in Tianjin University, and Beijing University of Posts & Telecommunications BUPT. He became a visiting scholar in surface science working on the project of electric contacts at Syracuse University from 1980 to 1982. He received his PhD degree in Electric Engineering from Wroclaw Technical University of Poland in 1986.



He has been a professor since 1986 at the BUPT. He has founded and built up a laboratory of electric contacts in the university. The lab was supported by AMP. Inc. (1996-1999) and from 2002 by Nokia Co. His research fields include analysis and mechanism of electric contact failure, environmental effects on contact reliability, characteristics and effects of dust particles on electric contacts, lubricant application and testing, the effect of connector failure on electric power and telecommunication systems. He has published about 60 papers on electrical contact phenomena in the proceedings of IEEE Holm conference, IEEE transactions and proceedings of ICEC, and more than 100 papers in the Chinese scientific journals, conference proceedings and in foreign journals as well.

Holm 2008

The 54th IEEE Holm Conference on Electrical Contacts will be held 27-29 October 2008 at the Florida Hotel & Conference Center in Orlando, Florida.

Prospective authors should submit a brief abstract (200 words maximum) online before 11 January 2008. Authors will be notified concerning acceptance of abstracts on 7 March 2008. Please include complete contact information for all correspondence to be sent.

Abstracts are to be submitted through the IEEE Conference eXpress website:
<http://www.ieee.org/conferencepublishing>
Enter conference ID – holm08
(please use lower case)

Important Dates

11 January 2008	Abstract Deadline
7 March 2008	Notification of Acceptance
16 May 2008	Completed Paper Deadline
27 October 2008	Conference Begins

Correspondence Address

IEEE Conference Management Services
IEEE Holm Conference (2008)
445 Hoes Lane
Piscataway, NJ 08854
Tel: + 1 800 810 4333 or + 732 562 3870
Fax: + 1 732 465 6447
Email: a.zupeck@ieee.org

Holm Web site:
www.ewh.ieee.org/soc/cpmt/tc1/

Morton Antler Lecture

The Morton Antler Lecture is an annual lecture given at the IEEE Holm Conference on a topic of special interest to the electrical contact community. This lecture series was established in honor of Dr. Morton Antler, a long time member of the Holm Steering Committee and participant in the Holm Conference. Dr. Antler was a distinguished scientist and lecturer in the fields of electrical contacts, tribology, corrosion, and electrodeposition.

2007 Morton Antler Lecture

The Characterization of the Dynamic Arc-Anode Interaction and Using Plasma Deposition of Nanocomposites to Tailor Materials Properties

Professor Joachim Heberlein, *University of Minnesota, Mechanical Engineering*



Professor J.V.R. Heberlein received the Diploma in Physics from the Technical University Stuttgart, Germany, and the Ph.D. degree in Mechanical Engineering from the University of Minnesota in 1966 and 1975, respectively.

From 1975 to 1989 he was at the Westinghouse R&D Center involved in a variety of plasma related applications, first as senior engineer in Power Interruption

Research, then as manager of Lamp Research, Applied Plasma Research, and Nuclear and Radiation Technology. Since 1989 he has been at the Mechanical Engineering Department at the University of Minnesota working in the areas of plasma heat transfer, electrode effects, plasma instabilities and various plasma process developments, in particular for plasma deposition of special coatings and for nanoparticle synthesis. He has authored or co-authored more than 250 publications and 6 book chapters, and holds 12 patents. He was awarded the grade of Fellow by ASM International and by the IUPAC, and was elected to the Thermal Spray Hall of Fame of the Thermal Spray Society. He received the Alexander von Humboldt Senior Scientist Award from the German Government. He holds the Ernst Eckert Professorship in Mechanical Engineering at the University of Minnesota.

Erle Shobert Prize Paper

The Holm Conference Prize Paper Award was established in 1970. At that time, the Conference Steering Committee recognized that at each Conference there was at least one paper that stood out from the others in its technical content and quality of presentation. Therefore, the Prize Paper Award Committee was established. The Committee's purpose is to review each paper, listen to each presentation and then judge which paper should receive the Prize Paper Award. The award is presented to the authors of the Prize Paper at the following year's Holm Conference.

2006 IEEE Erle Shobert Prize Paper

Glowing Contact Physics

John J. Shea, Eaton Corporation, Pittsburgh, PA, USA

The 53rd IEEE Holm Conference on Electrical Contacts Contributors

Gold Level

AMI DODUCO

Checon Corporation

Chugai USA, Inc.

Silver Level

Eaton Corporation

Research and Engineering Society for
Electromechanical Components and
Contact Technology in Japan,
Mie University

Bronze Level

Deringer Ney, Inc.

Molex, Inc.

MOOG Components Group

Rockwell Automation

WITH COOPERATION FROM

AC²T research GmbH	Mie University
AMI DÖDUCO	Mdex, Inc.
Auburn University	MOOG Components Group
AutoNetworks Technologies, Ltd.	Nippon Institute of Technology
Beijing University of Posts & Telecommunications	Panasonic Electronic Devices
Checon Corporation	PEM
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Chugai USA, Inc.	Railway Technical Research Institute
Delphi Packard Electric Systems	Rockwell Automation
Deringer Ney, Inc.	Schneider Electric North America
Eaton Corporation	Schneider Electric SA
Eaton Cutler-Hammer	Shibaura Institute of Technology
FormFactor, Inc.	Shizuoka University
Harbin Institute of Technology	Siemens AG
Hydro Quebec IREQ	Services Engineering R & D
IBM Corporation	Sumitomo Electric Industries, Ltd.
Ishinomaki Senshu University	Superconductivity Research Laboratory/ISTEC
ITT / C & K Switch Products	TOSHIBA Corporation
Japan Servo Co., Ltd.	TU Ilmenau
Keio University	Tyco Electronics AXICOM
Laboratoire de Chimie des Surfaces et Interfaces	Universität Braunschweig
Laboratoire de Genie Electrique de Paris	University of Minnesota
Laboratoire d'Electronique Moléculaire	University of Rennes
Leviton Manufacturing	University of Southampton
Massachusetts Institute of Technology	University of Teacher Education
MB Interface	University of Tokyo
Metalor Technologies	Upper Austria University of Applied Sciences
	Xian Jiaotong University

Technical Program

MONDAY, 17 SEPTEMBER 2007

8:00AM

INTRODUCTION AND OPENING REMARKS

John Shea, 2007 Holm Conference Chair

8:10AM – 9:10AM

HOLM AWARD

Effect of Dust Contamination on Electrical Contact Failure

Ji Gao Zhang, Lab of Electric Contacts, Beijing University of Posts & Telecommunications, China

9:10AM – 9:30AM

BREAK

9:30AM – 10:50AM

CONNECTORS

Chair: Roland Timsit

Co-Chair: George Drew

- 1.1 **Electro-Mechanical Modeling of Multilayer Contacts in Electrical Connectors**
F. Ossart, S. Noël, D. Alamarguy, Laboratoire de Génie Électrique de Paris, France
S. Correia, P. Gendre, PEM, France
- 1.2 **Contact Physics of Capacitive Interconnects**
R. D. Malucci, A. P. Panella, Molex Inc., USA
- 1.3 **The Effect of Initial Connector Insertions on Electrical Contact Resistance**
Robert L. Jackson, W. Robert Ashurst, G. T. Flowers, S. Angadi, S. Choe, M. J. Bozack, Auburn University, USA
- 1.4 **Materials Considerations in Using Voltage Drop for Power Rating**
R. D. Malucci, F. R. Ruffino, Molex Inc., USA

10:50AM – 11:10AM

BREAK

11:10AM – 12:30PM

ARC INTERRUPTION I

Chair: John Shea

Co-Chair: Philip Wingert

- 2.1 **The Effect of Contact Closure in Vacuum with Fault Current on Prestrike Arcing Time, Contact Welding and the Field Enhancement Factor**
P. G. Stade, R. K. Smith, E. D. Taylor, Eaton Electrical, USA
- 2.2 **Numerical Analysis of Low-Voltage Circuit-Breakers under Short-Circuit Conditions**
T. Mützel, F. Berger, TU Ilmenau, Germany, M. Anheuser, Siemens AG, Germany
- 2.3 **Simulation of Pressure Rise in Arc Chamber of MCCB During its Interruption Process**
D. Chen, Z. Li, X. Li, L. Ji, Z. Song, Xi'an Jiaotong University, Xi'an, China
- 2.4 **Benchmark Tests of Single-Break and Double-Break Design Principles**
W. Hauer, Forschungs & Entwicklungs GmbH, Austria, P. Zeller, Upper Austria University of Applied Sciences, Austria, X. Zhou, Eaton Corporation, USA

12:30PM – 1:30PM

LUNCH ON YOUR OWN

1:30PM – 3:10PM

CONTACT MATERIAL

Chair: Gerald Witter

Co-Chair: Daniel Gagnon

- 3.1 **Weibull Analysis of Switching Contact Resistance in Laboratory and Commercial Circuit Breakers**
C.H. Leung, E. Streicher, D. Fitzgerald, AMI DODUCO, USA
- 3.2 **Contact Resistance Characteristics of Elastomeric Complex Structure Contacts for Gold and Tin Printed Circuit Board**
T. Tamai, Mie University, Japan, Y. Hattori, AutoNetworks Technologies, Ltd., Japan
- 3.3 **Dependency of Contact Resistance on Load**
Y. Saitoh, K. Iida, Mie University, Japan, S. Sawada, K. Shimizu, Y. Hattori, AutoNetworks Technologies, Ltd., Japan

3.4 **A Study on Quenching Characteristics of YBaCuO Bulk Superconductor with Deposited Ag Layer**
K. Fukuda, H. Fujita, K. Sawa, Keio University, Japan, M. Tomita, Railway Technical Research Institute, Japan, M. Murakami, Shibaura Institute of Technology, Japan, N. Sakai, I. Hirabayashi, Superconductivity Research Laboratory / ISTECC, Japan

3.5 **Thermal Aging Study of Tin plating on Aluminum**
B. Chudnovsky, A. Zolfaghari, P. Bardollet, Schneider Electric North America/Square D, USA, V. Pavageau, M. Rapaex, Schneider Electric SA, France

3:10PM – 3:30PM

BREAK

3:30PM – 5:10PM

ELECTRICAL FAULTS – DETECTION / MITIGATION

Chair: Henry Czajkowski

Co-Chair: Erik Taylor

4.1 **Material Effect on Glowing Contact Properties**
J. J. Shea, X. Zhou, Eaton Corporation, USA

4.2 **Characterization of Glowing Contacts using Optical Emission Spectroscopy**
X. Zhou, J. J. Shea, Eaton Corporation, USA

4.3 **A Study of Time/Current Characteristics of the Ignition Processes in Cellulosic Material Caused by Electrical Arcing for Application in 240V Arc-Fault Circuit Interrupters**
D. Kolker, S. Campolo, N. DiSalvo, Leviton Manufacturing, USA

4.4 **Arc Fault Detection and Discrimination Methods**
C. E. Restrepo, Siemens Energy and Automation, USA

4.5 **Evaluation of a Setscrew Connector for Aluminum Wire**
J. Aronstein, Consulting Engineer, USA

6:00PM

SOCIAL – GRAND CONCOURSE RESTAURANT

On the Monongahela River at the Smithfield Bridge, Station Square sits with a grand view of the Golden Triangle.

TUESDAY, 19 SEPTEMBER 2007

8:00AM – 9:20AM

ARC INTERRUPTION II

Chair: Xin Zhou

Co-Chair: Z.K. Chen

5.1 **The Influence of Different Atmospheres on Arc Width, Arc Mobility, and Contact Welding Investigated for Low Power Switches**
C. Schrank, A. R. Neuhaus, M. Reichart, AC'T research GmbH, Austria

5.2 **An Experimental Study of Arc Duration and Transition from Metallic to Gaseous Phase in Ag Alloy Break Arc**
K. Yoshida, S. Tanimoto, Nippon Institute of Technology, Japan

5.3 **Study of the Influence of Cu Vapour on Air Arc Characteristics**
X. Li, D. Chen, M. Rong, R. Dai, Xi'an Jiaotong University, China

5.4 **Properties of Short Arc Phenomena on AgCu Electrical Contact Pairs for Automotive Electronics Devices**
M. Murakami, H. Ryonai, Panasonic Electronic Devices Co., Ltd., Japan, T. Kubono, J. Sekikawa, Shizuoka University, Japan

9:20AM – 9:40AM

BREAK

9:40AM – 10:40AM

MORT ANTLER LECTURE

The Characterization of the Dynamic Arc-Anode Interaction and Using Plasma Deposition of Nanocomposites to Tailor Materials Properties
Joachim Heberlein, Mechanical Engineering, University of Minnesota, USA

10:40AM – 11:00AM

BREAK

11:00AM – 12:20PM

NANO MATERIAL

Chair: Edward Smith

Co-Chair: Robert Malucci

- 6.1 **Fritting Contact Using SnAu Probe**
K. Kataoka, Tokyo Electron AT Ltd., Japan, K. Inoue, T. Itoh, T. Suga, University of Tokyo, Japan
- 6.2 **{111} Si Etched Planar Electrical Contacts for Power MEMS-Relays**
A.C. Weber, A.H. Stocum, J.H. Lang, Massachusetts Institute of Technology, USA
- 6.3 **Nanocomposite Thin Films for Surface Protection in Electrical Contact Applications**
S. Noël, D. Alamarguy, F. Houzé, Laboratoire de Génie Electrique de Paris, France, A. Benedetto, P. Viel, S. Palacin, Laboratoire de Chimie des Surfaces et Interfaces, France, N. Izard, P. Chenevier, Laboratoire d'Electronique Moléculaire, France
- 6.4 **The Relationship between Contact Resistance and Contact Force on Au Coated Carbon Nanotube Surfaces**
E. M. Yunus, J.W. McBride, S.M. Spearing, University of Southampton, UK

12:20PM – 2:00PM

AWARDS LUNCHEON

RAGNAR HOLM SCIENTIFIC ACHIEVEMENT AWARD

Ji Gao Zhang, Beijing University of Posts & Telecommunications, China

DR. MORT ANTLE LECTURE

Joachim Heberlein, Mechanical Engineering, University of Minnesota, USA

2006 IEEE ERLE SHOBERT PRIZE PAPER

Glowing Contact Physics
John J. Shea, Eaton Corporation, Pittsburgh, PA, USA

2:00PM – 3:00PM

MODELING I

Chair: John McBride

Co-Chair: George Flowers

- 7.1 **Modeling the Arc Splitting Process in Low-Voltage Arc Chutes**
A. Mutzke, T. Rother, M. Kurat, M. Lindmayer, E. D. Wilkening, Technische Universität Braunschweig, Germany
- 7.2 **Analyzing Method of Random Vibration Characteristic for Armature System of Hermetically Sealed Electromagnetic Relay**
Z. Guofu, C. Yinghua, R. Warbin, Harbin Institute of Technology, China
- 7.3 **Dynamic Simulation of Operation Mechanism for Molded Case Circuit Breaker**
D. Chen, R. Dai, J. Zhang, W. Tong, Xi'an Jiaotong University, China

3:00pm – 3:20pm

BREAK

3:20pm – 4:20pm

SLIDING

Chair: Stephen Cole

Co-Chair: Edward Smith

- 8.1 **A Study of Sliding Characteristics of Small-Size Slip-Ring System for Electric Power Supply**
K. Sawa, Keio University, Japan, K. Endo, G. Ou, H. Hagino, Japan Servo Co., Ltd, Japan
- 8.2 **Influence of Surface Roughness on Contact Voltage Drop of Electrical Sliding Contacts**
T. Ueno, K. Kadono, N. Morita, Nippon Institute of Technology, Japan
- 8.3 **Comparison of Brush Dynamic Operation Characteristics for Turbine Generator Steel Collector Ring**
N. Morita, T. Ueno, Nippon Institute of Technology, Japan, T. Otaka, M. Arata, Toshiba Corporation, Japan

4:20PM – 4:40PM

BREAK

4:40PM – 5:40PM

FRETTING

Chair: Milenko Braunovic

Co-Chair: Rod Martens

- 9.1 Time and Level Analysis of Contact Voltage Intermittencies Induced By Fretting In Power Connector
E. Carvou, N. B. Jemaa, University of Remes, France
- 9.2 Microscopy Study of Fretting Corrosion of Tin Plated Contacts
T. Ito, K. Takata, Y. Hattori, AutoNetworks Technologies, Ltd., Japan, K. Iida, Y. Saitoh, Mie University, Japan
- 9.3 Analysis and Prediction of Vibration-Induced Fretting Motion in a Blade/Receptacle Connector Pair
F. Xie, G. T. Flowers, C. Chen, M. Bozack, J. Suhling, Auburn University, USA, B. I. Rickett, R. D. Malucci, C. Mariapaz, Molex, Inc., USA

5:40PM

TC1 MEETING

WEDNESDAY, 19 SEPTEMBER 2007

8:00AM – 9:00AM

RELAYS

Chair: Koichiro Sawa

Co-Chair: Richard Moore

- 10.1 Basic Investigations for Switching RF Signals
W. Jöhler, Tyco Electronics Logistics AG, Switzerland
- 10.2 Minimization of Arc Extinction Gap in the Opening Speed Range 1 cm/s - 1 m/s
D. Sallais, Metalor Technologies, France, N. B. Jemaa, E. Carvou, University of Remes, France
- 10.3 Influence of Design Parameters on Contact Interlocking Caused by Material Transfer
M. Reichart, A. Neuhaus, C. Schrank, S. Ilincic, G. Vorlauffer, AC²T research GmbH, Austria

9:00AM – 9:20AM

BREAK

9:20AM – 10:40AM

MODELING II

Chair: Erik Taylor

Co-Chair: Robert Malucci

- 11.1 Calculation of the Short-time Withstand Current for Air Circuit Breaker
H. Xiang, D. Chen, X. Li, L. Ji, W. Tong, Xi'an Jiaotong University, China
- 11.2 The RAS Implications of DIMM Connector Failure Rates in Large, Highly Available Server Systems
T. Dell, IBM Corporation, USA
- 11.3 Thermal Analysis of Sealed Electromagnetic Relays Using 3-D Finite Element Method
H. Liang, W. Wang, G. Zhai, Harbin Institute of Technology, China
- 11.4 Numerical Study on Current and Thermal Distributions of Electrical Contacts by FEM
K. Koibuchi, K. Sawa, Keio University, Japan

10:40AM – 11:00AM

BREAK

11:00AM – 12:40PM

ARC INTERRUPTION III

Chair: Paul Slade

Co-Chair: Chi Leung

- 12.1 **Spectroscopic Imaging Observation of Break Arcs using a High-Speed Camera**
J. Sekikawa, T. Kubono, Shizuoka University, Japan
- 12.2 **Arc Discharge and Surge Suppression During a Breaking Operation of a Magnetic Relay**
H. Honma, S. Kimura, K. Shoji, Ishinomaki Senshu University, Japan
- 12.3 **Breaking Arc Characteristics in Various Power Supply Frequencies**
N. Miki, K. Sawa, Keio University, Japan
- 12.4 **Dynamic Characteristic and Contact Bounce Analysis for an AC Contactor with PWM Controlled Coil**
Y. Liu, D. Chen, L. Ji, Y. Geng, Xi'an Jiaotong University, China
- 12.5 **An Experimental Study of the Minimum Arc Current of Silver Contacts with Different Opening Speeds**
M. Hasegawa, Chitose Institute of Science & Technology, Japan

12:40PM

CLOSING REMARKS

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