

IEEE INTERNATIONAL SYMPOSIUM ON ELECTRICAL INSULATION

ISEI 2004

19 – 22 September 2004

Indiana Convention Center, Indianapolis, Indiana USA

Co-located with Electrical Manufacturing Expo 04

FINAL PROGRAM

INTRODUCTION

Welcome to ISEI 2004. The following pages describe the technical program and events comprising the 2004 IEEE International Symposium on Electrical Insulation. This is the fifteenth biennial conference in the series that began in 1976. This conference is directed towards those who develop, test or use electrical insulation in electrical equipment. The technical program is the centerpiece of ISEI 2004. This year 139 papers have been received and published from 23 countries. Oral sessions are being held during the day and are focusing on practical issues that are of concern to those who work with transformers, rotating machines, cables, outdoor equipment and switchgear. During these sessions you will find answers to your questions on what new insulation products are available, as well as what new developments are being made in diagnostic testing and life extension. Poster sessions are being held on two evenings and these papers address both practical application issues as well as research into new materials and test methods. The poster sessions allow you to discuss developments on an informal basis with leading researchers.

Short Courses have been scheduled during ISEI 2004 that provide basic information on a wide range of topics that are useful to those who are new to our field or may need a better understanding of new materials and diagnostic techniques that are available.

Attending ISEI 2004 gives you the opportunity to see the latest in electrical insulating materials, products and test equipment. This is because ISEI 2004 has co-located with Electrical Manufacturing Expo 04 (EME 04) sponsored by the Electrical Manufacturing & Coil Winding Association, the same organization that co-locates with the IEEE/NEMA Electrical Insulation Conference (EIC) in odd-numbered years.

Finally, a number of working groups that are developing or revising IEEE standards related to electrical insulation as applied to rotating machines are meeting during ISEI 2004. You are welcome to attend these meetings.

Best wishes for a productive international symposium!

Bill McDermid
ISEI General Conference Chair
2 August 2004

2004 SYMPOSIUM ORGANIZATION

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FINANCE CHAIR

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SHORT COURSES

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John Tanaka, University of Connecticut, CT, USA

DEIS MEETINGS CHAIR

A.T. Bulinski, NRC-Canada, ON, Canada

SYMPOSIUM ADVISORY BOARD

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IEEE DIELECTRICS AND ELECTRICAL INSULATION SOCIETY (DEIS)

The DEIS is responsible for leadership, coordination and communication among engineers, chemists, mathematicians and physicists who are concerned with dielectric phenomena and with development and characterization of all gaseous, liquid and solid electrical insulating materials in electrical and electronic circuits and systems under all conditions of use.

Membership in the DEIS (only an additional \$25 per year with IEEE dues) includes a subscription to the *IEEE Transactions on Dielectrics and Electrical Insulation* and the *IEEE Electrical Insulation Magazine*, both published bi-monthly. Among the other benefits of the Society, all DEIS members also receive information on all DEIS sponsored meetings and events. For membership and other information please see the IEEE homepage <http://www.ieee.org> which also provides a link to the DEIS website under "IEEE Societies".

The current executive members of the DEIS are:

President: Dr. Soli Bamji

National Research Council of Canada

Vice President Administration: Dr. Vijendra Agarwal

The College of Staten Island of CUNY, USA

Vice President Technical: Bill McDermid

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Auburn University, USA

REGISTRATION FORM
2004 IEEE INTERNATIONAL SYMPOSIUM ON ELECTRICAL INSULATION

The Indiana Convention Center
 Indianapolis, Indiana, USA
 19-22 September 2004

Name (Last/First): _____

Affiliation: _____

Address: _____

City/State/Prov: _____

Country: _____

Zip/Postal Code: _____

Business Tele: _____ Fax: _____

Email: _____

Special Requirements: _____

of Guests Attending: ____

FEES in US \$	IEEE Member	Non- Member	Student/ Retiree
Symposium	\$455	\$505	\$255
Short Courses	\$325	\$325	\$150
Selected Short Courses: 1 2 3 4 5 (circle)			
Additional Proceedings	\$50	\$65	\$50
Indicate quantity _____			
ISEI Dinner Guest Tickets	\$52	\$52	\$52
Indicate quantity _____			

Fees are payable by company check/cheque drawn on a US bank, VISA, MasterCard, or American Express. Make checks payable to IEEE ISEI 2004. Acknowledgement of receipt of pre-registration fees will be sent by e-mail for registrations that are received by 13 September 2004.

Type of Credit Card: MC VISA AmEx

Credit Card No: _____

Expiry Date: _____

Signature: _____

IEEE Member No: _____

DEIS Member: Yes / No (circle) If "No" and you would like to receive the IEEE Electrical Insulation Magazine, to satisfy U.S. Postal Service, sign here if registering by mail or fax _____

Provide mother's maiden name if registering on-line _____

MAIL/FAX TO:
 Geo. E. Fern Company
 1100 Gest Street, Cincinnati, OH 45203 USA
 FAX: 513-621-4439

For on-line registration visit <http://www.deis.nrc.ca/isei2004.htm>

CONFERENCE REGISTRATION AND FEES

The registration fee includes: admission to all ISEI conference sessions, EME 04 conference sessions and exhibits, one copy of the ISEI Conference Record in both print and CD-ROM versions. Also included are continental breakfasts on Monday, Tuesday and Wednesday, morning and afternoon refreshment breaks, buffet food service at poster sessions on Sunday and Monday evenings and the ISEI Dinner on Tuesday evening. Short Courses are not included in the registration fee.

Registration services are available on the first (ground) floor of the Indiana Convention Center on Sunday, 19 September 2004 from 08:00 to 17:00 h and weekdays during the conference from 07:00 to 17:00 h.

IEEE WORKING GROUP & COMMITTEE MEETINGS DURING ISEI 2004

Date	Time	Document	Title	Chair
Sunday 19 September	10:00 – 11:00	1434	Guide to the Measurement of Partial Discharges in Rotating Machinery	W. McDermid (Manitoba Hydro)
	11:00 – 12:00	434	Guide for Functional Evaluation of Insulation Systems for Large High-Voltage Machines	L. Rux (US Army Corps of Engineers)
	13:00 – 15:00	1310	Recommended Practice for Thermal Cycle Testing of Form-Wound Stator Bars and Coils for Large Generators	G.C. Stone (Iris Power Engineering)
	15:00 – 17:00		Guide for Rewinds of AC Synchronous Generators	W.H. Bartley (Hartford Steam Boiler)
Wednesday 22 September	08:00 – 10:00	433	Recommended Practice for Insulation Testing of Large AC Electric Machinery with High Voltage at Very Low Frequency	H.G. Sedding (Kinectrics)
	10:00 – 12:00	56	Guide for Insulation Maintenance of Large Alternating-Current Electric Machinery	D. Conley (Siemens- Westinghouse)
	11:30 – 13:00		Symposium Advisory Board	J. Densley (ArborLec)
	13:00 – 15:00		Materials Subcommittee	D. Conley (Siemens- Westinghouse)

Working group meetings on Sunday, 19 September 2004 will be held at the Indianapolis Marriott Downtown Hotel in Indiana Ballroom F (1st floor).

Working group meetings and the Materials Subcommittee meeting on Wednesday, 22 September 2004 will be held at the Indiana Convention Center in Room 210.

The Symposium Advisory Board will meet on Wednesday, 22 September 2004 at the Indiana Convention Center in Room 206.

HOTEL INFORMATION FOR ISEI 2004 ATTENDEES

18 – 22 September 2004

Please request the following EME Expo rates.

Note that some ISEI functions will be held at the Indianapolis Marriott Downtown.

<p>CROWNE PLAZA at UNION STATION Phone: 317-631-2221 123 West Louisiana Street Indianapolis, IN 46225</p> <p>EME Expo Rates*: \$123 - Single, \$133 – Double *Applicable taxes not included <i>The Crowne Plaza is located in the heart of downtown, just one block from the Convention Center. Features: health club, indoor pool, business center, executive level and valet parking.</i></p>	<p>EMBASSY SUITES HOTEL Phone: 317-236-1800 110 West Washington Street Indianapolis, IN 46204</p> <p>EME Expo Rates*: \$140 – Single, \$150 – Double *Applicable taxes not included <i>All suite property with private bedroom, comfortable living room and galley kitchen located one block from Indiana Convention Center. Complimentary cook-to-order breakfast & nightly reception. Restaurant, indoor pool, health club. Attached to Circle Centre Mall.</i></p>
<p>HYATT REGENCY INDIANAPOLIS Phone: 317-632-1234 / 800-233-1234 One Capitol Avenue Indianapolis, IN 462004</p> <p>EME Expo Rates*: \$138 – Single, \$148 – Double *Applicable taxes not included <i>Conveniently located next to the Indiana Convention Center. Special services include: health club, sauna, whirlpool, indoor pool, valet parking, gift shop, business services, restaurants, lounge and Skywalk connection. Attached to Circle Centre Mall.</i></p>	<p>INDIANAPOLIS MARRIOTT DOWNTOWN Phone: 317-822-3500 Reservations 800-640-7666 350 West Maryland Street Indianapolis, IN 46225</p> <p>EME Expo Rates*: \$149 – Single, \$149 – Double *Applicable taxes not included <i>Opened in Spring 2001, 615 room full service hotel connected to the Indiana Convention Center. Features include health center/indoor pool, lounge, valet parking, restaurants, business center and video-express check-out.</i></p>
<p>OMNI SEVERIN HOTEL Phone: 317-634-6664 40 West Jackson Place Indianapolis, IN 46225</p> <p>EME Expo Rates*: \$133 – Single, \$143 – Double *Applicable taxes not included <i>Located in the heart of downtown one block from the Indiana Convention Center. Two restaurants, lounge, health club with indoor pool, business center, gift shop, valet parking. Attached to Circle Centre Mall.</i></p>	<p>THE WESTIN HOTEL Phone: 317-262-8100 50 South Capitol Avenue Indianapolis, IN 46204</p> <p>EME Expo Rates*: \$147 – Single, \$168 – Double *Applicable taxes not included <i>Combines luxury with practicality and convenience, connected to the Indiana Convention Center. Features our famous Heavenly beds and showers, health club, indoor pool, restaurant, lounge, business center, valet parking, newsstand/gift shop and video/express check-out.</i></p>
<p>COURTYARD by MARRIOTT DOWNTOWN Phone: 317-635-4443 501 West Washington Street Indianapolis, IN 46204</p> <p>EME Expo Rates*: \$139 – Single, \$139 – Double Applicable taxes not included <i>Across from Indiana Convention Center. Features: Restaurant and lounge, exercise room, coin operated washers/dryers free parking.</i></p>	<p>Discount Airline Travel <i>Delta is offering special meeting fares</i></p> <p>Call 1-800-241-6760 Refer to file 201003A Delta Air Lines is offering special rates which allow you a 5% discount off Delta’s published round-trip fares. A 10% discount will be offered on Delta’s domestic system for travel to the meeting based on the published unrestricted roundtrip rates. No advance purchase is required, but if you purchase your ticket 60 days or more prior to departure you receive an additional 5% bonus discount.</p>

For on-line registration at the Marriott Downtown or Marriott Courtyard please visit
<http://www.stayatmarriott.com/EICEMCW/>

SHORT COURSES

Short Course 1: Rotating Equipment Insulation Materials and Processing Techniques

Instructors: Kevin Alewine, Nancy Frost and Hal Miller (Von Roll Isola)

Abstract: The focus of this course is on the use of dielectric materials in an insulation system, primarily for rotating equipment. Insulation systems are composed of one or more dielectric materials functioning in combination with conductors to provide a total insulation package. The performance of the system is not merely a collection of individual material properties, but instead utilizes synergy to meet the dielectric system performance needs.

This course is designed to give the insulation development engineer a basic understanding of the principles and tools used in the process of selection and qualification of an insulation system. The focus is primarily on medium and higher voltage (4 kV to 14 kV) rotating machine applications, as well as transformer applications if the audience interest exists.

Who Should Attend: Technicians, design and electrical engineers as well as those who direct insulation development activities would be interested in this course. The focus is on motor and generator applications; however, the principles will be useful for engineers working on other applications as well.

Instructor Biographies:

Nancy Frost, Ph.D. joined Von Roll Isola in 2002 as an Applications Engineer. Her education with a B.S. in Chemistry and M.S. & Ph.D. in Electrical Engineering, plus her research experience in insulation materials make her an excellent addition to the Applications team at Von Roll Isola. She has published papers annually in several conferences over the past 10 years.

Hal Miller, Sr. Applications Engineer at Von Roll Isola has more than 33 years in product development, and technical support of electrical insulation materials development, applications and testing. He has authored several papers and is a frequent instructor in EIC and similar seminars.

Kevin Alewine, Applications Engineer with Von Roll Isola, has been involved in resin and varnish sales, applications and marketing for more than 20 years. Kevin is heavily involved insulating liquid training and applications support work at VRI. Kevin has organized or participated in several workshops and seminars in the industry.

Schedule: 6 hours - Sunday, 19 September 2004 10:00 – 17:00

Indianapolis Marriott Downtown Hotel - Michigan/Texas Rooms (1st floor)

Fee: \$275 on or before 19 August 2004, \$325 after 19 August

Short Course 2: Polymer Materials and Insulators

Instructors: Edward Cherney and Shesha Jayaram, University of Waterloo

The course deals with silicone rubber materials for the housing of polymer insulators. The importance of filler type, concentration, particle size and bonding on the erosion resistance of silicone rubber is discussed. Silica filler, which is generally not used in silicone compounds, is shown to provide better resistance to erosion than the commonly used alumina tri-hydrate filler. A novel technique using an infrared laser that simulates hot spots from dry band arcing and a method that quickly ranks materials in order of their resistance to erosion is discussed. Nanoparticle fillers for silicone materials is shown to provide improved resistance to erosion under dry band arcing.

Partial discharge is discussed as a means of detecting the early aging on silicone rubber materials and silicone rubber housed insulators. The technique, which detects partial discharges from water droplets, is used as an indicator of the loss of hydrophobicity and the onset of leakage current. The technique is shown to be a more sensitive method of detecting the onset of leakage current than measuring leakage current alone. The critical stress below which water droplet corona does not affect the surface hydrophobicity is discussed.

The course also deals with silicone rubber housed insulators. Specifically, the third harmonic of the leakage current on insulators is shown to be a useful technique of detecting the onset of dry band arcing. In addition, the method is used to examine various aspects of weather-shed design, such as shed diameter, spacing, angle of inclination and creepage distance on the ageing performance of insulators.

The course discusses novel methods of grading the electric stress on composite bushings and polymer insulators as well as a design optimization of stress control rings for transmission insulators using a FEMLAB, a commercial FEM based software. A high permittivity silicone composition is shown to be useful in grading the electric stress on composite bushings and a resistive silicone composition on polymer insulators for transmission. A varistor based silicone composition is shown to be more beneficial in grading the stress on cable terminations.

The course also presents results of an artificial aging test in a salt-fog chamber on polymer housed distribution type surge arresters. Various aspects of internal and external housing design is discussed.

Who Should Take This Course:

The course is intended for material scientists working with polymer material compositions for outdoor insulation and for engineers working with insulator design and testing and laboratory personnel involved in research.

Instructor Biographies



Edward A. Cherney received the B.Sc Degree in Physics and Chemistry from the University of Waterloo, the M.Sc Degree in Physics from McMaster University and the Ph.D. Degree in Electrical Engineering from the University of Waterloo in 1967, 1969 and 1974 respectively. In 1968 he joined the Research Division of Ontario Hydro and in 1988 he went into the insulator industry, first with a manufacturer of insulators and then later with a manufacturer of silicone materials. Since 1998 he has been an international consultant in the outdoor insulation field and an adjunct professor at the University of Waterloo. He has published extensively on outdoor insulation, holds several patents, co-authored one book on outdoor insulators, involved in several IEEE working groups on insulators, a registered engineer in the

province of Ontario, and a Fellow of the IEEE.



Shesha Jayaram is a Professor in the Electrical and Computer Engineering Dept, University of Waterloo, Waterloo, and an Adjunct Professor at the University of Western Ontario, London. She received the B. A. Sc. degree in Electrical Engineering from the Bangalore University, M. A. Sc. in High Voltage Engineering from Indian Institute of Science, Bangalore, and the Ph.D. degree in Electrical Engineering from University of Waterloo, in 1980, 1983, and 1990 respectively. Prof. Jayaram's research interests are developing diagnostics to analyze insulating materials, industrial applications of high voltage engineering, and applied electrostatics. Prof. Jayaram has been an active member of the IEEE Dielectric and Electrical Insulation Society and the Electrostatic Processes Committee (EPC) of the IEEE Industry Applications Society. In both, she has contributed as a board member, chair of EPC during 1998-99, session organizer/chair and as a member of the paper review process committee. She is a registered professional engineer in the province of Ontario, Canada.

Schedule: 6 hours - Sunday, 19 September 2004 10:00 – 17:00

Indianapolis Marriott Downtown Hotel – Florida/Illinois Rooms (1st floor)

Fee: \$275 on or before 19 August 2004, **\$325** after 19 August

Short Course 3: Basics of Electrical Insulation for Non-Engineers

Instructors: Kevin Alewine, Nancy Frost, & Hal Miller (Von Roll Isola)

Abstract: The focus of this course is the basics of electrical insulation materials for the non-engineer and marketing personnel. The basic aspects of insulation materials will be covered, including how to select and how to test material performance.

The course covers the properties of the various types of insulation, with an emphasis on materials used in commercial and industrial products, ranging from low to high voltage (over 2300 V) and up to higher temperature ($\geq 155^{\circ}\text{C}$) applications. We will also review the major test methods and standards used in selecting and qualifying insulation systems. Also covered in the course is an introduction to electricity at the basic and introductory level as well as insulation materials and the areas (transformers, motors, generators) where they are utilized.

Who Should Attend: This class would appeal to marketing and sales managers and other non-engineers, including senior managers, product managers, who need a working knowledge of insulation materials and applications. Entry-level engineers with limited experience in insulation materials would also be interested in this course.

Instructor Biographies:

Hal Miller, Sr. Applications Engineer at Von Roll Isola has more than 33 years in product development, and technical support of electrical insulation materials development, applications and testing. He has authored several papers and is a frequent instructor in EIC and similar seminars.

Kevin Alewine, Applications Engineer with Von Roll Isola, has been involved in resin and varnish sales, applications and marketing for more than 20 years. Kevin is heavily involved insulating liquid training and applications support work at Von Roll Isola. Kevin has organized or participated in several workshops and seminars in the industry.

Nancy Frost, Ph.D. joined Von Roll Isola in 2002 as an Applications Engineer. Her education with a B.S. in Chemistry and M.S. & Ph.D. in Electrical Engineering, plus her research experience in insulation materials make her an excellent addition to the Applications team at Von Roll Isola. She has published papers annually in several conferences over the past 10 years.

Schedule: 6 hours - Three 2 hour sessions – Monday, Tuesday & Wednesday 10:00 – 12:00

Indiana Convention Center Room 208

Fee: \$275 on or before 19 August 2004, **\$325** after 19 August

Short Course 4: Modern Electrical Machinery Diagnostics – An Introduction

Instructor: Howard Penrose, BJM Corp.

This course will provide you with an overview of motor diagnostic technologies and their application in evaluating electrical machinery. Of particular importance is how each of the technologies inter-relate with the other technologies, providing the engineer, technician or maintenance professional with a complete electrical and mechanical view of the electrical machinery circuit. You will come away from the class with an understanding of where each technology may be applied. The overview will include: Motor circuit analysis; Motor current signature analysis; Vibration analysis; Infrared analysis; Insulation testing; and, much more. Attendees will have hands-on experience with Motor Circuit Analysis and Motor Current Signature Analysis during the class. A number of case studies and methods for demonstrating cost avoidance will be presented.

Outline:

Basic electric motors and motor theory
Electrical Machinery System Defined
Electrical Machinery Diagnostic Technologies
Multi-Technology Approach to Electrical Machinery Diagnostics
Multi-Technology Approach Cases
Hands-On MCA
Hands-On MCSA
Return on Investment
Using Electrical Machinery Diagnostics as an Energy Tool

Who Should Take This Course:

The course is designed for evaluating the condition of electrical machinery for commissioning, troubleshooting and reliability programs. Maintenance and reliability professionals; Machinery repair; Machinery manufacturers; Field service; and, Consultants should attend. Includes a copy of: Motor Circuit Analysis 2nd Ed.: Motor Diagnostics, By Howard W Penrose, Ph.D.

Biography:

Dr. Penrose joined ALL-TEST Pro in 1999 following fifteen years in the electrical equipment repair, field service and research and development fields. Starting as an electric motor repair journeyman in the US Navy, Dr. Penrose lead and developed motor system maintenance and management programs within industry for service companies, the US Department of Energy, utilities, states, and many others. Dr. Penrose then taught engineering at the University of Illinois at Chicago as an Adjunct Professor as well as serving as a Senior Research Engineer at the UIC Energy Resources Center performing energy, reliability, waste stream and production industrial surveys. Dr Penrose has repaired, troubleshot, designed, installed or researched a great many technologies that have been, or will be, introduced into industry. He has coordinated US DOE and Utility projects including the industry-funded modifications to the US Department of Energy's MotorMaster Plus software in 2000 and the development of the Pacific Gas and Electric Motor System Performance Analysis Tool (PAT) project. Dr. Penrose is the Vice-Chair of the Connecticut Section IEEE (Institute of Electrical and Electronics Engineers), a past-Chair of the Chicago Section IEEE, Past Chair of the Chicago Section Chapters of the Dielectric and Electrical Insulation Society and Power Electronics Society of IEEE, is a member of the Vibration Institute, Electrical Manufacturing and Coil Winding Association, the International Maintenance Institute, NETA and MENSA. He has numerous articles, books and professional papers published in a number of industrial topics and is a US Department of Energy MotorMaster Certified Professional, as well as a trained vibration analyst, infrared analyst and motor circuit analyst.

Schedule: 6 hours - Wednesday, 22 September 2004 08:00 – 15:00

Indiana Convention Center Room 205

Fee: \$275 on or before 19 August 2004, **\$325** after 19 August

Short Course 5: Oil Analysis as a Diagnostic Tool for Oil Filled Electrical Equipment

Instructor: Nick Dominelli, Powertech Labs

Abstract:

Analysis of insulating oils is used by most utilities as a diagnostic technique for detection of incipient faults and to assess the condition of oil filled electrical equipment. This course will provide an overview of the most common oil test, their significance, and interpretation. This includes dissolved gas analysis (DGA), oil quality and properties, paper decomposition products (furans), other specialized or advanced oil tests and their applications to various equipment. Sampling techniques and the use of diagnostic software will also be briefly discussed.

Who Should Attend: Maintenance engineers responsible for oil filled electrical equipment, substation supervisors or managers, staff involved with equipment repair, oil sampling and oil testing.

Biography

M.Sc. (Chemistry), Simon Fraser University, Burnaby, B.C., 1976

Honours B.Sc. (Chemistry), Simon Fraser University, Burnaby, B.C., 1971

Mr Dominelli is the Director of Applied Chemistry at Powertech Labs Inc. (formerly BC Hydro Research and Development Labs). His areas of responsibility include research and testing of insulating fluids, lubricants, coolants and sulphur hexafluoride for equipment diagnostics, condition assessment and life extension; environmentally friendly replacements for insulating and hydraulic fluids; PCB and hazardous waste destruction; assessment of polymeric materials and wood pole preservatives; alternate energy and fuel cells. He was a senior Research Chemist in the Chemistry Department of BC Hydro Research and Development from 1981 to 1995.

Prior to joining BC Hydro Mr. Dominelli worked as an analytical chemist and Analytical Advisor for Health and Welfare Canada from 1975 to 1981. His responsibilities included the analysis and identification of illicit drugs and providing expert testimony at criminal trials.

Schedule: 6 hours - Wednesday, 22 September 2004 08:00 – 15:00

Indiana Convention Center Room 207

Fee: \$275 on or before 19 August 2004, **\$325** after 19 August

Note: Short Courses 1, 2, 4 & 5 will break for lunch between 12:00 & 13:00.

FINAL TECHNICAL PROGRAM

SUNDAY EVENING, 19 SEPTEMBER 2004

18:00 – 20:00

RECEPTION AND POSTER SESSION

Indianapolis Marriott Downtown Hotel

Marriott Ballrooms 5 & 6 (2nd floor)

Session 1: Insulation Materials for Rotating Machines & Their Assessment - Part 1 (Poster)

Marriott Ballrooms 5 & 6 (2nd floor)

Session Chair: Ken Kimura, *Kyushu Institute of Technology*

- 1-1 Experiments for the Life Assessment of Generator Bars
M.R. Naghashan, Power and Water Institute of Technology, Tehran, Iran
- 1-2 Investigations on Characteristic Parameters to Evaluate the Condition of the Insulation System for High Voltage Rotating Machines, M. Farahani, H. Borsi, E. Gockenbach, University of Hannover, M. Kaufhold, Siemens, Nürnberg, Germany
- 1-3 A Novel Coil Winding Technique Applicable to Multiple Strand Concentrated Wound Electric Motors for Low Voltage-High Torque Applications,
Z. Rahman, M. Peygaleh, K. Matin, WaveCrest Labs., Dulles, VA USA

Session 2: Rotating Machine Insulation Evaluation - Part 1 (Poster)

Marriott Ballrooms 5 & 6 (2nd floor)

Session Chair: Saber Azizi, *GE Power Systems*

- 2-1 Design and Building of Data Warehouse for Steam Turbine-Generator Set
J. Ou, C-X Sun, B. Zhang, ChongQing University, ChongQing, China
- 2-2 Estimating Motor Life Using Motor Circuit Analysis Predictive Measurements: Part 2
H.W. Penrose, ALL-TEST Pro, BJM Corp, Old Saybrook, CT, USA
- 2-3 Stator insulation weak spot localization on a 6kV synchronous motor
H.J. Van Breen, E. Gulski, J.J. Smit, Delft University of Technology,
G. Mijnen, Corus Steel, Ijmuiden, The Netherlands
- 2-4 Generator PD Measurement by Using UHF and HF Sensors
X. Li, C.R. Li, L. Ding, W. Wang, North China Power University, Beijing,
W. Wan, Quzhou Electric Power Bureau, Zhejiang Province, China
- 2-5 Effects of Voltage Unbalance on Induction Motors
A. Siddique, G.S. Yadava, B. Singh, Indian Institute of Technology Delhi, India
- 2-6 Identification of Three Phase Induction Motor Incipient Faults Using Neural Network
A. Siddique, G.S. Yadava, B. Singh, Indian Institute of Technology Delhi, India

Session 3: Design & Performance of Transformers (Poster)

Marriott Ballrooms 5 & 6 (2nd floor)

Session Chair: Rogers Wicks, *DuPont*

- 3-1 A Method for Modeling Transformer Tap Winding for Transient Studies
M.S. Naderi, M. Vakilian, Sharif University of Technology, Tehran, Iran

- 3-2** Study on the Effect of Impulse Voltage Withstandability on the Thermally-aged Transformer Paper
T.S.R. Murthy, U. Yugandhar, S.C. Gupta, A. Bhoomaiah, BHEL Corporate R&D, Hyderabad,
J.S. Kuntia, BHEL, Bhopal, India
- 3-3** Development of MV class transformer with hybrid insulation
B.S. Lee, I.K. Song, D.M. Kim, KEPRI, KEPCO,
S.O. Han, Chungnam National University, Yuseong, Korea

Session 4: Transformer Life Assessment Using PD Techniques - Part 1 (Poster)

Marriott Ballrooms 5 & 6 (2nd floor)

Session Chair: Jitka Fuhr, *ABB*

- 4-1** PD Pattern Recognition in Transformer by Using UHF Technology
C.R. Li, W. Wang, Z.G. Tang, Y.S. Ding, North China Electric Power University, Beijing, China
- 4-2** An On-line UHF PD Monitoring System for Power Transformers
W. Wang, C.R. Li, Z. Tang, Z. Li, Y. Ding, North China Electric Power University, Beijing, China
- 4-3** Wavelet-based De-noising for PD Online Measurement of Transformers
J. Li, Y. Wang, L. Du, Z. Jin, Y. Yang, Chongqing University, Chongqing, China
- 4-4** Sensitivity check for UHF PD detection on power transformers
S. Meijer, E. Gulski, J.J. Smit, Delft University of Technology,
H.F. Reijnders, Smit Transformatoren, Nijmegen, The Netherlands
- 4-5** Threshold Selection for Wavelet De-noising of Partial Discharge Data
P.D. Agoris, S. Meijer, E. Gulski, J.J. Smit, Delft University of Technology, The Netherlands

Session 5: Transformer Condition Assessment - Part 1 (Poster)

Marriott Ballrooms 5 & 6 (2nd floor)

Session Chair: Art Lemm, *Cooper Power Systems*

- 5-1** Diagnostic Testing of Oil-impregnated Paper Insulation in Pro-rated Power Transformers under Accelerated Stress, M.K. Pradhan, T.S. Ramu, Indian Institute of Science, Bangalore, India
- 5-2** On-line Monitoring of Temperatures in Power Transformer using Optimal Linear Combination of Artificial Neural Networks, M.K. Pradhan, T.S. Ramu, Indian Institute of Science, Bangalore, India
- 5-3** A GA-based grey prediction model for predicting the gas-in-oil concentrations in oil-filled transformer, Y. Wang, R. Liao, C. Sun, L. Du, J. Hu, Chongqing University, Chongqing, China
- 5-4** Belief Network Classifier for Evaluation of DGA Data of Transformers
J. Yang, Y. Xing, J. Li, Y. Wang, L. Yang, Chongqing University, Chongqing, China
- 5-5** Using Multivariate Statistical Method to Recognize Different Aging Stages of Oil-Paper
R. Liao, L. Yang, J. Li, B. Xie, Chongqing University, Chongqing, China
- 5-6** Fault Diagnosis Model for Power Transformer Based on Statistical Learning Theory and Dissolved Gas Analysis, M. Dong, M.H. Li, Z. Yan, Xi'an Jiaotong University, X'ian,
D.K. Xu, Guodian Nanjing Automation Co. Ltd., Nanjing, China
- 5-7** On-line Multi-sensor Monitoring System for Insulation Condition of Oil-immersed Power Transformer, W-B Zhao, G-J Zhang, Y. Sun, Z. Yan, Xi'an Jiaotong University, X'ian,
D-K Xu, Guodian Nanjing Automation, Nanjing, China
- 5-8** Study on Gas and Oil Separating Plant Used for On-Line Monitoring System of Transformer
J. Sheng, G. Wu, L. Tong, L. Zhou, J. Zhang, Southwest Jiaotong University, Chengdu, China

- 5-9 Oil-Gas Separation Mechanism of Polymer Membranes Applied to On-line Transformer Dissolved Gases Monitoring, L. Tong, G. Wu, J. Sheng, J. Zhang, L. Zhou, Southwest Jiaotong University, Chengdu, Sichuan, China
- 5-10 On-line Condition Assessment and Diagnosis System of Traction Transformers Based on Dissolved Hydrogen Analysis, J. Zhang, G. Wu, J. Sheng, L. Zhou, L. Tong, Southwest Jiaotong University, Chengdu, Sichuan, China
- 5-11 Verification of On-Site Oil Reclamation Process by means of Polarisation / Depolarisation Current Analysis, S.A. Bhumiwat, KEA Consultant, Auckland, New Zealand
P. Phillips, TransGrid, Sydney, Australia
- 5-12 Profile of Water Content and Degree of Polymerisation in the Solid Insulation of Power Transformers, T. Leibfried, University of Karlsruhe, U. Thieß, I. Höhle, Siemens AG, Nürnberg, B. Breitenbach, T. Lainck, J. Leißner, E.ON Netz GmbH, Bayreuth, S. Truant, artec Energie-und Umwelttechnik, Berlin, Germany.
- 5-13 On-line Detection of Winding Deformation, M. Alpatov, Manufacturing Complex of Electrozavod Holding Co., Moscow, Russia

Session 6: PD Measurements in an Industrial Environment (Poster)

Marriott Ballrooms 5 & 6 (2nd floor)

Session Chairs: Stefano Bomben, *Ontario Power Generation*, Meredith Stranges, *GE Canada Inc.*

- 6-1 The Importance of Correlating Dynamics when Performing Partial Discharge Measurements and Analysis, C. Kane, A. Golubev, I. Blokhintsev, Eaton Electrical Predictive Diagnostics, Minnetonka, MN, USA, C. Patterson, Magna Electric Corp., Saskatoon, SK, R. Astasiewicz, Alberta Pacific Forests, AB, Canada
- 6-2 Partial Discharge Measurements in the Three-layer Dielectrics with a Barrier
S.M. Lebedev, O.S. Gefle, Y.P. Pokholkov, Tomsk Polytechnic University, Russia,
E. Gockenbach, H. Borsi, V. Wasserberg, N. Abedi, J. Szczechowski, University of Hannover, Germany
- 6-3 An Algorithm, Based on Auto-Correlation Function Evaluation, for the Separation of Partial Discharge Signals, A. Contin, S. Pastore, University of Trieste, Trieste, Italy
- 6-4 Wavelet Transform De-noise of PD Signal on Coaxial Cylinder Electrodes
D. Zheng, C. Zhang, X. Sun, H. Liu, J. Yang, Harbin University of Science and Technology, Harbin, China
- 6-5 Characterisation of Partial Discharge Behaviour in Liquid Nitrogen
D.J. Swaffield, P.L. Lewin, Y. Tian, G. Chen, University of Southampton,
S.G. Swingler, National Grid, Warwick, UK
- 6-6 PD Pattern Recognition Using Combined Features
J. Li, C. Sun, Y. Wang, J. Yang, L. Du, Chongqing University, Chongqing, China
- 6-7 Analysis of PD Phase-Resolved Images at Low Frequency of Testing Voltage
B. Florkowska, P. Zydron, AGH University of Science and Technology,
M. Florkowski, ABB Corporate Research, Kraków, Poland
- 6-8 Optimal Sampling Rate for Wavelet-based Denoising in PD Measurement
X. Zhou, C. Zhou, B.G. Stewart, A. Nesbitt
Glasgow Caledonian University, Glasgow, UK

- 6-9** On-Line PD Diagnostic on Medium Voltage Motors and Cable Lines: Useful Tool for the Maintenance Manager
Y.P. Aksenov, (DIACS), Russia, I. Arces, (Eni), G. Noe, (Comelmar), Italy

MONDAY, 20 SEPTEMBER 2004

06:46 – 07:45 CONTINENTAL BREAKFAST
Indianapolis Marriott Downtown Hotel
Marriott Ballrooms 3 & 4 (2nd floor)

Session 7: Plenary (Oral)
Indiana Convention Center Room 105

08:00 – 09:45

Session Chair: Bill McDermid, *Manitoba Hydro*

- 7-1** Root-Cause Diagnostics of Generator Service Failures
C.V. Maughan, Maughan Engineering Consultants, Schenectady, NY USA
- 7-2** Equipment Health Rating of Power Transformers
N. Dominelli, Powertech, M. Lau, D. Olan, J. Newell, BC Hydro, Vancouver, Canada
- 7-3** The Effect of Winding Stresses on the Pulse Endurance of Corona Resistant Magnet Wire
M.G. Minnick, GE Consumer and Industrial Products, Fort Wayne, IN, USA

09:45 – 10:00 BREAK

Session 8: Transformer Life Assessment Using PD Techniques - Part 2 (Oral)
Indiana Convention Center Room 107

10:00 – 12:00

Session Chair: Howard Sedding, *Kinectrics*

- 8-1** Experience on partial discharge monitoring of power transformers
E. Vellucci, Rete Elettrica Nazionale, Roma, A. Cavallini, G. C. Montanari, D. Fabiani, DIE, Università di Bologna and TechImp Srl, Bologna, Italy
- 8-2** Power Transformer PD Sources Determination Using Current Signals Waveshape and Pattern Distributions
M. Elborki, N. Jenkins, Z. Wang, UMIST, Manchester, P. Crossley, Queen's University Belfast, UK
- 8-3** On-line Condition Assessment of High Voltage Current Transformers
V.R. Garcia-Colon, R. Liñán-García, M.A. Jacobo
Instituto de Investigaciones Eléctricas, Morelos, México
- 8-4** Partial Discharge Diagnosis on Large Power Transformers
D.W. Gross, M. Söller, Power Diagnostix Systems GmbH, Aachen, Germany

Session 9: Repetitive Impulse Effects on Drive Systems (Oral)
Indiana Convention Center Room 108

10:00 – 12:00

Session Chair: Greg Stone, *Iris Power Engineering*

- 9-1** Partial Discharge Inception Voltage of Twisted Pair Samples under Long-Time Repetitive Bipolar Impulses
K. Kimura, S. Ushirone, T. Fukushima, S. Ohtsuka, M. Hikita
Kyushu Institute of Technology, Tobataku, Kitakyushushi, Japan

- 9-2** A Technique for Defect Investigation in Pulse-Controlled Motors through Partial Discharge Measurements
D. Fabiani, A. Cavallini, G. C. Montanari, University of Bologna,
A. Caprara, Techimp Srl, Bologna, Italy
- 9-3** Effect of Multistress on the Lifetime Characteristics of Magnet Wires Used in Flyback Transformer
S. Grzybowski, S. Bandaru, Mississippi State University, MS, USA
- 9-4** A New Algorithm for the Identification of Defects Generating Partial Discharges in Rotating Machines
A. Cavallini, M. Conti, G.C. Montanari, Università di Bologna, A. Contin, Università di Trieste,
F. Puletti, TechImp, Bologna, Italia

12:00 – 13:30 LUNCH

Session 10: Insulation Materials for Rotating Machines and Their Assessment - Part 2 (Oral)
Indiana Convention Center Room 107

13:30 – 16:30

Session Chair: Tim Emery, *Siemens Westinghouse*

- 10-1** Application of Corona Resistant Polyimide Film to Pump Generator Stator Coils
J.E. Timperley, American Electric Power, B. Nindra, National Electric Coil, Columbus, Ohio,
S.A. Filliben, DuPont, Richmond, Virginia USA
- 10-2** Development of Potential Grading Layer for High Voltage Rotating Machine
T. Okamoto, Y. Inoue, M. Kawahara, T. Yamada, Toshiba, Yokohama,
S. Nakamura, 2 Mie University, Tsu, Japan

14:30 – 15:00 BREAK

- 10-3** Comparative Evaluation of Glass Conducting Armour Materials for Form-Wound Stator Coils
M.K.W. Stranges, J.E. Hayward, R. Omranipour, J.H. Dymond, GE Canada Inc. Peterborough,
Canada
- 10-4** Corona Free Winding in Electrical Machines
T. Asokan, GE India Technology Center, Bangalore, India
- 10-5** A Rational Approach to Voltage Endurance
S. Cherukupalli, BC Hydro, G.C. Stone, Iris Power Engineering, W. McDermid, Manitoba Hydro,
Canada

Session 11: Aging of Transformer Insulation Materials (Oral)

Indiana Convention Center Room 108

13:30 – 16:00

Session Chair: Roger Wicks, *DuPont*

- 11-1** Assessment of Thermal Aging of HVDC Converter Transformer Insulation
D.H. Grant, W. McDermid, Manitoba Hydro, Winnipeg, MB Canada
- 11-2** A Novel System for the Prolongation of the Lifetime of Power Transformers by Reduced Oxidation and Aging
V. Wasserberg, H. Borsi, E. Gockenbach, University of Hannover, Germany

14:30 – 15:00 BREAK

11-3 Experimental Investigations on different Insulating Liquids and Mixtures for Power Transformers
C. Perrier, A. Beroual, Ecole Centrale de Lyon, Ecully,
J-L Bessede, Areva T&D, Villeurbanne, France

11-4 Effect of metal and paper inclusions on mineral oil degradation
D.M. Hepburn, I.J. Kemp, Glasgow Caledonian University, Glasgow,
F. Waite, National Grid, Warwick, UK

MONDAY EVENING, 20 SEPTEMBER 2004

17:00 – 20:00

RECEPTION AND POSTER SESSION

Indiana Convention Center

EME Exhibits

Session 12: Insulation Performance in Gas & Liquid Environments - Part 1 (Poster)

EME Exhibits

Session Chair: Reuben Hackam, *University of Windsor*

12-1 Numerical Analysis of Effect of Avalanche Space Charges on Corona Onset Voltage
D. Zheng, C. Chen, X. Sun, H. Liu, J. Yang, Harbin University of Science and Technology, Harbin,
China

12-2 Study of EHD Effect on Enhanced Condensation Heat Transfer of Dielectric Fluid
C. Chen, J. Yang, Q. Zhang, J. Li, Harbin University of Science and Technology, Harbin, China

12-3 Effect of water on flue gas cleaning and the discharge characteristics
L-M Dong, J-X Yang, X-C Chi, Harbin University of Science and Technology, Harbin, China

12-4 Research of Plasma Explosion of Metal Wire in Water
C. Zhang, J. Yang, X. Chi, Harbin University of Science and Technology, Harbin, China

12-5 Experimental Investigation of Influence of Surface Roughness on Flashover Performance of
Ceramics in Vacuum, L. Ding, Y. Tu, C.R. Li, W. Wang, North China Electric Power University,
Beijing, China

12-6 Commissioning and On-line Testing of GIS and GIL
D.W. Gross, M. Söller, Power Diagnostix Systems GmbH, Aachen, Germany

12-7 Simulation of the Formation and Propagation of Streamers in SF₆ and its Gas Mixtures in Uniform
and Non-uniform Fields
W. Pfeiffer, F. Wang, N. Kouzichine, TU Darmstadt, Germany

Session 13: Insulating Materials and Coatings (Poster)

EME Exhibits

Session Chair: Patricia Irwin, *GE Global Research Center*

13-1 Study on the Positive and Negative Temperature Coefficient Effects of Composite
X-Y Zhang, L-M Dong, Z. Wu, Harbin University of Science and Technology, Harbin, China

13-2 Annealing Effects on the Tree Initiation Voltage of Polyethylene at High Temperature
N. Wang, Y. Zhou, C. Liang, Z. Zhao, J. Cai, X. Luo, Y. Wang, X. Liang, Z. Guan
Tsinghua University, Beijing, China

13-3 Rapid Decomposition Phenomena of Polymer Dielectrics in Circuit Breakers
T. Asokan, GE India Technology Center, Bangalore, India,
L. Jacobs, GE Consumer & Industrial, Plainville, CT USA

Session 14: Performance of Outdoor Polymer Insulators - Part 1 (Poster)

EME Exhibits

Session Chair: John Kuffel, *Kinectrics Inc.*

- 14-1 A Review of Artificial Contamination Withstand Test Methods of High Voltage Outdoor Insulators
A. Naderian, M. Sanaye-Pasand, H. Mohseni, University of Tehran, Iran
- 14-2 Fundamental Investigation Results of Diagnostic Technique for Deteriorated Polymer Insulators
T. Sampe, T. Hirayama, M. Ito, T. Kubota, T. Matsumoto, M. Yaeguchi, B. Marungsri, H. Shinokubo,
R. Matsuoka, Chubu University, Japan, Z. J. Guo, Z. Yu, East China Power Co., China
- 14-3 Computation of Electrostatic field around a partially wet insulator surface through numerical techniques and simulation, P. Basappa, M.L. Williams, K. Agarwal, Norfolk State University, Norfolk, Virginia, USA
- 14-4 Electrical Property of Polymer Insulator with End-fitting Design
H-G Cho, U-Y Lee, Korea Electrotechnology Research Institute, Chang Won, S-H Kang, Chungcheong College, Chungbuk, K-J Lim, Chungbuk National University, Cheongju, I-H Choi, Korea Electric Power Research Institute, Taejon, Korea
- 14-5 Thermal Mechanical Performance Test on Suspended Insulators for Transmission Line
S-W Han, H-G Cho, KERI, Changwon, I.H. Choi, KEPRI, Korea
- 14-6 Evaluation of 23 kV Insulator Profiles with Different Pollution Levels
R. Hernández-Corona, I. Ramírez-Vázquez, G. Montoya-Tena, Instituto de Investigaciones Eléctricas, Cuernavaca, Morelos, México
- 14-7 CFO Voltage and V-T Characteristic of 15 kV Polymer Suspension Insulator under Lightning and Steep Front Short Duration Impulses, S. Grzybowski, Y. Song, Mississippi State University, MS, J. Kappenman, Metatech Corp., Goleta, CA USA
- 14-8 Pollution Flashover Performance of Short Sample for 750kV Composite Insulators
X. Jiang, J. Hu, Y. Liang, L. Shu, Chongqing University,
S. Xie, Shaoyang Electric Power Bureau, Hunan Province, China
- 14-9 Outdoor Insulation Coordination with Artificial Neural Network
W. Sima, Q. Yang, X. Jiang, J. Hu, K. Bai, Chongqing University, Chongqing, China
- 14-10 Electric Stress Grading of Composite Bushings Using High Dielectric Constant Silicone Compositions
Y. Shen, E.A. Cherney, S. H. Jayaram, University of Waterloo, Waterloo, Ontario
- 14-11 Improvements to the Performance of Silicone Rubber Housed Composite Bushings by means of a Resistive Coating, H.J. Wei, E.A. Cherney, S. H. Jayaram, University of Waterloo, Ontario, Canada

Session 15: Live Line Work & Icing of Outdoor Insulation (Poster)

EME Exhibits

Session Chair: Stanislaw Grzybowski, *Mississippi State University*

- 15-1 Partial Vacuum Flashover of Aerial Lift Documentation and Failure Analysis
J.R. Booker, JR Booker Consulting, Baltimore, Ohio, USA
- 15-2 The Simulation Model for Calculating the Surge Impedance of a Tower
Z. Zhang, W. Sima, Y. Zhang, L. Shu, Chongqing University, Chongqing, China

- 15-3** Study on Icing of Energized Insulators with AC Service Voltage and Electrical Performance
X. Jiang, Z. Zhang, L. Shu, Y. Wang, S. Xie, Chongqing University, Chongqing, China
- 15-4** Study on DC Flashover Performance of a Cylindrical Ice Model
C. Sun, J. Yuan, X. Jiang, Z. Zhang, J. Hu, Chongqing University, Chongqing, China
- 15-5** AC Withstand Voltage Performance of 110kV Iced Composite Insulators
J. Hu, L. Shu, C. Sun, X. Jiang, W. Sima, Chongqing University, Chongqing, China

Session 16: Materials & Aging of Power Cables - Part 1 (Poster)

EME Exhibits

Session Chair: John Tanaka, *University of Connecticut*

- 16-1** Improvement of Breakdown Strength by Additives and Curing Conditions on XLPE Insulation for Power Cable
B-H. Youn, D-H Cho, S-I Shim, LG Cable Ltd., Gyeongbuk, Korea
- 16-2** Evaluation of Additives for Pre-breakdown Characteristics Using Diverging Fields
S. Ganga, K. Dwarakanath, S. Sridhar, Central Power Research Institute, Bangalore, India
- 16-3** New Semiconductive Compound Technology for Solid Dielectric Insulated Power Cables
S. Joon Han, L.H. Gross, J. Lastovica III, The Dow Chemical Company, Somerset, NJ USA
- 16-4** Effect of Ultra Violet irradiation on low voltage cable insulation
R. Arora, V. Tripathi, Indian Institute of Technology, Kanpur, India
- 16-5** EAM Insulation for Medium-Volt Power Cable Applications
D.B. Camillo, General Cable Corp., Indianapolis, IN USA

Session 17: Diagnostics & Condition Assessment of Power Cables - Part 1 (Poster)

EME Exhibits

Session Chair: John Densley, *Arborlec Solutions*

- 17-1** VHF PD Detection of 110kV XLPE Cable Accessories
W. Wang, B. Wei, C. Li, L. Ding, C. Li, D. Liu, North China Electric Power University, Beijing, China
- 17-2** Inspection of High Voltage Cables using X-ray Techniques
A.P. Robinson, P.L. Lewin, S.G. Swingler, University of Southampton, S.J. Sutton, National Grid, Warwickshire, UK
- 17-3** Principals and Field Experience with the 0.1Hz VLF Method regarding the Test of Medium Voltage Distribution Cables, H. Oetjen, HDW Electronics, Inc., Bethlehem, PA USA
- 17-4** Sheath Insulation Fault Test Technique for High Voltage Power Cables
M. Li, Z. Yan, Xi'an Jiaotong University, Xi'an, B. Xu, Kehui Electric Co. Ltd., Zibo, China

Session 18: Diagnostics and Measurement Techniques (Poster)

EME Exhibits

Session Co-Chairs: Doug Conley, *Siemens Westinghouse*, Stefano Bomben, *Ontario Power Generation*

- 18-1** Influence of Variable Plate Separation on Fringing Electric Fields in Parallel-Plate Capacitors
M.C. Hegg, A.V. Mamishev, University of Washington, Seattle, WA USA

- 18-2** Neutral Ground Resistor Monitoring Schemes
M.T. Al-Hajri, Saudi Aramco Oil Company, Dhahran, Saudi Arabia
- 18-3** Design and Realization of On-line Monitoring System for Over-voltage in Distribution Grids
C. Yao, C. Sun, S. Wang, Y. Mi, P. Chen, Chongqing University, Chongqing, China
- 18-4** GIS Based Multi-Level Intelligent Fault Diagnosis System on Electric Power Equipment
W. An, C. Sun, Q. Zhou, J. Yang, ChongQing University, ChongQing, China
- 18-5** Reliability and Interval Estimation of Type-II Censored Electrical Insulation Data
P.K. Shetty, T.S. Ramu, Indian Institute of Science, Bangalore, India
- 18-6** Design of Multi-channel Fringing Electric Field Sensors for Imaging – Part I: General Design Principles
X.B. Li, S.D. Larson, A. S. Zyuzin, A. V. Mamishev, University of Washington, Seattle, WA USA
- 18-7** Design of Multi-channel Fringing Electric Field Sensors for Imaging - Part II: Numerical Examples
X.B. Li, C. Kato, A. S. Zyuzin, A. V. Mamishev, University of Washington, Seattle, WA USA
- 18-8** On-site Data Analysis of Electronic Current Transformer
Z. Qian, X. Zhang, BeiHang University, Z. Mei, C. Luo, Tsinghua University, Beijing, China

TUESDAY, 21 SEPTEMBER 2004

06:45 – 07:45 CONTINENTAL BREAKFAST

**Indianapolis Marriott Downtown Hotel
Marriott Ballrooms 3 & 4 (2nd floor)**

Session 19: Rotating Machine Insulation Evaluation - Part 2 (Oral)

Indiana Convention Center Room 107

08:00 – 12:00

Session Chairs: Clyde Maughan, *Consultant*, James Timperley, *American Electric Power*

- 19-1** Application of Statistical Summary Numbers to Rotating Machine PD Data for Non-Expert Identification of Multiple Aging Mechanisms
G.C. Stone, M. Fenger, Iris Power Engineering, Toronto, Ontario, Canada
- 19-2** Comparison of PD and DF Test Results Before and After Voltage Endurance Tests
H. Zhu, G.L. Halldorson, Powertech Labs, BC, Canada
- 19-3** Principles of Power Factor Testing of Complete Generator Stator Windings
F.T. Emery, Siemens Westinghouse Power Corporation, Charlotte, NC USA
- 19-4** High Voltage DC Ramp Testing as a Diagnostic Of Stator Insulation Condition
H.G. Sedding, Kinectrics Inc., B.K. Gupta, AOK Technologies, Toronto,
W.M. McDermid, J.C. Bromley, Manitoba Hydro, Winnipeg, Canada,
R. Schwabe, D. Levin, New York Power Authority, White Plains, NY,
J. Stein, EPRI, Palo Alto, CA USA

10:00 – 10:30 BREAK

- 19-5** Further Experience in the Use of Existing RTDs in Windings of Motors and Generators for the Measurement of Partial Discharges
C. Kane, A. Golubev, I. Blokhintsev, Eaton Electrical Predictive Diagnostics, Minnetonka, MN USA

- 19-6** An Economic Strategy for Turbine Generator Condition Based Maintenance
T. Laird, Mechanical Dynamics and Analysis, LLC, Sunset Hills, MO USA,
M. Hoof, University of Applied Sciences, Kaiserslautern, Germany
- 19-7** Several Aspects of Stator Insulation Condition Based Maintenance
H.J. Van Breen, E. Gulski, J.J. Smit, Delft University of Technology, Netherlands

Session 20: Diagnostics and Condition Assessment of Power Cables - Part 2 (Oral)
Indiana Convention Center Room 108

09:00 – 12:00

Session Chair: Harry Orton, *OCEI*

- 20-1** Condition Assessment of Butyl Insulated Power Cable Used in Generating Stations
A.K. Hiranandani, DTE Energy Co., Detroit, Michigan USA
- 20-2** Continuous On-line Monitoring of Partial Discharges in High Voltage Cables
Y. Tian, P.L. Lewin, J.S. Wilkinson, S.G. Swingler, University of Southampton,
S. J. Sutton, National Grid, Coventry, UK

10:00 – 10:30 BREAK

- 20-3** Accurate Determination of Ambient Temperature at Burial Depth for High Voltage Cable Ratings
G.M. Williams, P.L. Lewin, University of Southampton, M. LeBlanc, National Grid, Coventry, UK
- 20-4** Transmission Power Cables PD Detection at Damped AC Voltages
E. Gulski, S. Meijer, J.J. Smit, Delft University of Technology, F.J. Wester, Nuon Tecno, Alkmaar,
The Netherlands, P.N. Seitz, Seitz Instruments AG, Niederrohrdorf, Switzerland
- 20-5** Partial Discharge Signals from TR-XLPE Insulated Cable
O. Morel, N. Srinivas, DTE Energy Technologies, Farmington Hills, MI,
B.S. Bernstein, Bruce S. Bernstein Consulting, Rockville, MD USA

12:00 – 13:30 LUNCH

Session 21: Performance of Outdoor Polymer Insulators - Part 2 (Oral)
Indiana Convention Center Room 107

13:30 – 15:30

Session Chair: Edward Cherney, *University of Waterloo*

- 21-1** Diagnosis of Non-Ceramic Insulators Aged in a Salt Fog Chamber By Using Electric Field Sensor,
I. Ramírez-Vázquez, R. Hernández-Corona, G. Montoya-Tena, Instituto Investigaciones Eléctricas,
Morelos, México
- 21-2** Development and Evaluation of an Improved RTV Coating for Outdoor Insulation
J.L. Goudie, T. P. Collins, Dow Corning Corporation, Midland, MI USA
- 21-3** Optimization of Corona Ring Design for Long-Rod Insulators Using FEM Based Computational
Analysis
W. Sima, F.P. Espino-Cortes, E.A. Cherney, S.H. Jayaram, University of Waterloo, Ontario, Canada
- 21-4** Breakdown Tests of Glass Fibre Reinforced Polymers (GFRP) as a part of Improved Lightning
Protection of Wind Turbine Blades
S.F. Madsen, J. Holboell, M. Henriksen, Ørsted-DTU, Lyngby,
F.M. Larsen, SSP Technologies, Broby, L. B. Hansen, LM Glasfiber, Lunderskov,
K. Bertelsen, Vestas Wind Systems, Ringkøbing, Denmark

Session 22: Transformer Condition Assessment - Part 2 (Oral)

Indiana Convention Center Room 108

13:30 – 16:45

Session Chair: Art Lemm, *Cooper Power Systems*

- 22-1** Case Study of Condition Based Health Maintenance of Large Power Transformer at Rihand Substation Using On-Line FDD-EDT, H.M. Shertukde, University of Hartford, R.H. Shertukde, Diagnostic Devices Inc., CT USA
- 22-2** Investigations into Sensitivity of FRA Technique in Diagnosis of Transformer Winding Deformations
J.A.S.B. Jayasinghe, Z.D. Wang, UMIST, Manchester,
P.N. Jarman, National Grid, Warwick, A.W. Darwin, Areva T&D, Stafford, UK
- 22-3** Insulation Condition Assessment of Transformer Bushings by means of Polarisation / Depolarisation Current Analysis, S.A. Bhumiwat, KEA Consultant, Auckland, New Zealand
- 22-4** A Procedure for Diagnosis and Condition based Maintenance for Power Transformers
A. Setayeshmehr, A. Akbari, H. Borsi, E. Gockenbach, University of Hannover, Germany

15:30 – 15:45 BREAK

- 22-5** Experience with Diagnostic Tools for Condition Assessment of Large Power Transformers
J. Fuhr, ABB BA Power Transformers, Spiez,
T. Aschwanden, BKW FMB Energy, Berne, Switzerland
- 22-6** On-Line Insulation Diagnostics for Current Transformers
R. Evert, Eskom Enterprises, D. Hoch, University of Kwazulu Natal, South Africa

Session 23: Materials & Aging of Power Cables - Part 2 (Oral)

Indiana Convention Center Room 107

15:45 – 17:45

Session Chair: Gian Carlo Montanari, *University of Bologna*

- 23-1** Laboratory Aging of TR-XLPE Cables at 500Hz
T.J. Person, A. Mendelsohn, The Dow Chemical Company, Somerset, NJ USA
- 23-2** Electroluminescence Test to Evaluate Dielectric Property at the Interface Between Semiconductive Shield and Insulation, S. Joon Han, L.H. Gross, The Dow Chemical Company, Somerset, NJ USA
- 23-3** New Developments in Solid Dielectric Life Extension Technology
G.J. Bertini, Novinium, Inc., Tacoma, WA USA
- 23-4** Service Aged Medium Voltage Cables – A Critical Review Of Polyethylene Insulated Cables
A.V. Pack, The Okonite Company, Ramsey, NJ USA

TUESDAY EVENING, 21 SEPTEMBER 2004

18:30 – 19:00

CASH BAR

Indianapolis Marriott Downtown Hotel

Marriott Ballroom 6 (2nd floor)

19:00 – 21:00
ISEI DINNER
Indianapolis Marriott Downtown Hotel
Marriott Ballroom 6 (2nd floor)

WEDNESDAY, 22 SEPTEMBER 2004

06:45 – 07:45 CONTINENTAL BREAKFAST
Indianapolis Marriott Downtown Hotel
Marriott Ballrooms 3 & 4 (2nd floor)

Session 24: Insulation Performance in Gas and Liquid Environments - Part 2 (Oral)
Indiana Convention Center Room 107

08:00 – 09:00

Session Chair: Steven Boggs, *University of Connecticut*

- 24-1** Requirements for Gaseous Insulation for Application in GITL Considering N₂, N₂O and CO₂ with Low Content SF₆
W. Pfeiffer, University of Technology, Darmstadt,
D. Schoen, R+D, Pepperl + Fuchs GmbH, Mannheim, Germany
- 24-2** Partial Discharge Characteristics at Low Pressure in Dry Air and Argon
D.G. Kasten, X. Liu, S.A. Sebo, Ohio State University, Columbus,
D.F. Grosjean, Innovative Scientific Solutions, Dayton,
D.L. Schweickart, Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio USA

Session 25: Live Line Work and Outdoor Insulation (Oral)
Indiana Convention Center Room 108

08:00 – 11:00

Session Chair: George Gela, *EPRI Solutions*

- 25-1** Electrical Degradation of Fiberglass Distribution Line Poles
X. Li, S. Grzybowski, Mississippi State University, MS USA
- 25-2** Progress in Resolving Flashovers of FRP Hot Sticks during EHV Live Line Work
W. McDermid, D.R. Swatek, J.C. Bromley, Manitoba Hydro, Winnipeg, MB Canada
- 25-3** Failure Analysis of Extra-High Voltage (EHV) Hot Sticks
J.R. Booker, JR Booker Consulting, Baltimore, Ohio USA
- 25-4** Study of timber crossarms coated with castor oil-based polyurethane resins: electrical and mechanical tests
R.A.C. Altafim, H.C. Basso, C. Calil Júnior, J.C. Sartori, C.R. Murakami, R.A.P. Altafim, G.O. Chierice, Universidade de São Paulo, J.F.R. Silva, A. Silveira, Elektro Electricidade e Serviços S.A., Campinas, Brazil

10:00 – 10:30 BREAK

- 25-5** Ice Progressive Stress Method: Repeatability During Full Scale Testing of 400 kV Line and Apparatus Insulators and Application of the Test Results
I. Gutman, STRI, Ludvika, D. Hübinette, SVK, Vällinby, Sweden, K. Halsan, T. Ohnstad, Statnett, Oslo, Norway

Session 26: Insulating Materials and Coatings (Oral)

Indiana Convention Center Room 107

09:15 – 11:30

Session Chair: Mike Minnick, *GE Consumer and Industrial Products*

- 26-1** Effect of Thermally Stimulated Discharges on Partial Discharges and Tree Growth in PMMA
P. Basappa, M.L. Williams, K. Agarwal, Norfolk State University, Norfolk, Virginia USA
- 26-2** Novel Measurement Methods for In-Depth Analysis of AC Metallized Film Capacitors
H. Fuhrmann, M. Carlen, D. Chartouni, T. Christen, C. Ohler, T. Votteler, ABB Corp. R&D, Baden, Switzerland

10:15 – 10:30 BREAK

- 26-3** Multi-Layer Composite Insulation Material with High Resources of Electrical Strength
V.M. Pak, Elinar Holding Company,
A.I. Drachev, A.B. Gilman, A.A. Kuznetsov, Institute of Synthetic Polymeric Materials, Russia
- 26-4** Comparison of Polyamide Insulation Coatings on Metallic Substrates using Different Coating Methods
H. Wang, T.L. Baldwin, J.P. Zheng, Florida A&M University and Florida State University, USA

END OF SYMPOSIUM

ISEI 2004 – IEEE INTERNATIONAL SYMPOSIUM ON ELECTRICAL INSULATION

Time	Sunday, 19 Sept	Monday, 20 Sept	Tuesday, 21 Sept	Wednesday, 22 Sept			
06:45		Continental Breakfast (06:45 - 07:45)	Continental Breakfast (06:45 - 07:45)	Continental Breakfast (06:45 - 07:45)			
07:00		Registration (07:00 – 17:00)	Registration (07:00 – 17:00)	Registration (07:00 – 12:00)			
08:00	Registration (08:00–17:00)	Symposium Opening (08:00 – 08:15) S7: Plenary (08:15 - 09:45)	S19: (08:00– 10:00)	S20: (09:00 – 10:00)	S24: (08:00 – 09:00) S26: (09:15 – 10:15)	S25: (08:00 – 10:00)	
10:00	Short Courses No. 1 & 2 (10:00–17:00)	Break (09:45 – 10:00)	Break (10:00 – 10:30)	Break (10:00 – 10:30)			
		Short Course No. 3 (10:00 – 12:00)	Short Course No. 3 (10:00 – 12:00)	Short Course No. 3 (10:00 – 12:00)			
10:30		S8: (10:00– 12:00)	S9: (10:00– 12:00)	S19: (cont) (10:30– 12:00)	S20: (cont) (10:30 – 12:00)	S26: (cont) (10:30 – 11:30)	S25: (cont) (10:30 – 11:00)
12:00		Lunch (12:00 – 13:30) on your own	Lunch (12:00 – 13:30) on your own	End of Symposium (11:30)			
13:30		S10: (13:30– 14:30)	S11: (13:30– 14:30)	S21: (13:30– 15:30)	S22: (13:30– 15:30)	Short Courses No. 4 & 5 (08:00 – 15:00)	
15:00		Break (14:30 – 15:00)		Break (15:30 – 15:45)			
15:30		S10: (cont) (15:00– 16:30)	S11: (cont) (15:00– 16:00)	S23: (15:45– 17:45)	S22: (cont) (15:45– 16:45)		
16:00							
	Buffet & Poster Sessions S1: S2: S3: S4: S5: S6: (18:00 – 20:00)	Buffet & Poster Sessions S12: S13: S14: S15: S16: S17: S18 (17:00 – 20:00)	Cash Bar (18:30 – 19:00) ISEI Dinner (19:00 – 21:00)				
		EME Exhibits (16:00 – 20:00)	EME Exhibits (10:00 – 17:00)	EME Exhibits (10:00 – 17:00)			