

The 15th Annual

# PowerQuality

EXHIBITION & CONFERENCE

**Complete Conference  
Session Descriptions  
Inside!**

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see page 14.**

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# Here's What's New at the

# PowerQuality

EXHIBITION & CONFERENCE

## Our FREE Keynote Address!

Kurt Yeager, President of the Electric Power Research Institute (EPRI) will speak on Power Quality and Reliability in the 21st Century. See page 6 for details!

## An Unprecedented FREE General Session!

Join us as a panel of past winners of the John Mungenast International Power Quality Award share their views and field your questions on the state of the Power Quality and Reliability Industries. See page 11 for details.

## Enter to Win \$25,000!

As always, many exhibitors will be running at-Show specials and sales promotions only for PowerSystems World attendees - including discounts, giveaways, and raffles. In addition, this year's Show will include a Show-sponsored promotion that will give attendees the opportunity to win \$25,000! Visit our website in September for details.

## New and Advanced Power Quality Courses!

This year's Conference Program will feature several new courses covering a wide variety of power quality, power reliability, and distributed generation issues. See inside for listings and descriptions.



## The Power Quality Exhibit Hall

Walk aisle after aisle of leading suppliers who have come to show you what's new and help you find the right power quality and reliability solutions for your company. There's no better



way to make a product recommendation than meeting with vendors and inspecting, testing, and pricing their products.

**NEW!**

## The Distributed Generation Pavilion

In an era of increasing demands on an antiquated grid system, planned (rolling) and unplanned blackouts, and terrorism threats against our electrical facilities, many companies have come to recognize that the most certain means of power reliability is self-sufficiency. And with energy costs rising and new technologies continuing to improve the cost-effectiveness of power generation systems, many organizations are now installing on-site generation systems to cut their energy costs and insure the reliability of their power.

To showcase some of the top companies and emerging technologies in distributed generation, the Power Quality Exhibition and Conference will feature a Distributed Generation Pavilion – a special section on the Show floor where manufacturers and suppliers will showcase the latest distributed generation products and equipment – such as microturbines, combustion turbines, reciprocating engines, fuel cells, photovoltaic systems, and wind turbines.

## Preview Power Quality Changes to the 2005 NEC®!

Be sure to check out PAC 28, 2005 National Electric Code & Upcoming Code Changes. This presentation will introduce changes that will be made to the upcoming 2005 edition of the NEC®, with a particular look at changes affecting power quality and reliability environments. See page 5 for details.

## FREE! Round Table Discussions with Power Quality Experts!

Discuss your power quality and reliability concerns with several power quality authorities at our round table discussions! Check our website in September for details.

## SUNDAY, NOVEMBER 14

9:00am to 5:00pm	<b>PAC 21</b> <b>Troubleshooting and Solving Power Quality Problems</b> David Mueller Electrotek	<b>PAC 22</b> <b>Lightning &amp; Lightning Protection</b> Michael Stringfellow PowerCET	9:00am to 1:00pm	<b>PAC 23</b> <b>The New IEEE Emerald Book</b> Vladi Basch, BG&E Doug Dorr, EPRI PEAC	<b>PAC 24</b> <b>Grounding &amp; Harmonics: Case Studies and Practices</b> David Brender Copper Development Association
			2:00pm to 6:00pm	<b>PAC 25</b> <b>Distributed Generation</b> Vladi Basch, BG&E; Doug Dorr, EPRI PEAC	

## MONDAY, NOVEMBER 15

9:00am to 5:00pm	<b>PAC 26</b> <b>Power Quality 300 - Advanced Power Quality</b> Doug Dorr, EPRI PEAC	<b>PAC 27</b> <b>Wiring and Grounding Solutions for Power Quality and Data Integrity Issues</b> Thomas Shaughnessy PowerCET	<b>PAC 28</b> <b>2005 National Electric Code &amp; Upcoming Code Changes</b> L. Keith Lofland International Association of Electrical Inspectors	9:00am to 1:00pm	<b>PAC 29</b> <b>Establishing a Successful Power Quality Business</b> Ram Mukherji, Mukherji Consulting
				2:00pm to 6:00pm	<b>PAC 30</b> <b>The Power Quality Standards Landscape</b> Erich Gunther, EnerNex Corp.

## TUESDAY, NOVEMBER 16

8:30am to 9:45pm	<b>FREE</b> <b>KEYNOTE ADDRESS AND AWARDS: Kurt Yeager, President - EPRI Power Quality &amp; Reliability in The 21st Century &amp; Patrizio Vinciarelli, CEO &amp; President - Vicor Corporation Where Should the 'Buck' Stop?</b>				
10:00am to 11:00am	<b>PQS01</b> <b>What Do Upcoming Economic Conditions Mean for the Power Quality Industry</b> David Mueller, Electrotek	<b>PQS02</b> <b>The State of Superconducting Technology</b> Swarn Kalsi, American Superconductor Corp.	<b>PQS03</b> <b>Distributed Generation Communications &amp; Control Requirements</b> John Brogan, Encorp		

### EXHIBIT HALL OPENS 11:00AM

2:00pm to 4:00pm	<b>PQT01</b> <b>Power Quality as a Business</b> Chair: Anthony Hoevenaars, Mirus International, Inc.	<b>PQT02</b> <b>Grounding Practices</b> Chair: Larry Petersen, Varian Medical Systems	<b>PQT03</b> <b>Power Quality Technologies - Distributed Generation, Micro-Turbines &amp; Fuel Cells</b> Chair: Mohan Ray, Northrup Grumman Corp.	<b>PQT04</b> <b>Power Quality Reliability - Equipment Technologies</b> Chair: John Johnson, Strategic Facilities, Inc.
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## WEDNESDAY, NOVEMBER 17

8:00am to 10:00am	<b>PQT05</b> <b>Reliability - The Next Wave</b> Chair: Mark Zuber, Advanced Power Systems	<b>PQT06</b> <b>Power Factor</b> Chair: Mark McGranaghan, EPRI PEAC	<b>PQT07</b> <b>Power Quality Technologies - TVSS &amp; Conditioning</b> Chair: Larry Petersen, Varian Medical Systems		
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### EXHIBIT HALL OPENS 10:00AM

10:15am to 11:15am	<b>FREE</b> <b>Poster Sessions in Exhibit Hall</b>				
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11:30am to 12:30pm	<b>PQS04</b> <b>An Introduction to Nanotechnology</b> Mike Beehler, Burns & McDonnell	<b>PQS05</b> <b>The State of Wind Generation</b> Thomas Key, EPRI PEAC	<b>PQS06</b> <b>Reality Checks on Surge Protective Devices &amp; Applications</b> Francois Martzloff, Surges Happen!	<b>PQS07</b> <b>A Fuel Cell Based UPS System</b> MGE UPS Systems, Inc.	
2:00pm to 4:00pm	<b>PQT08</b> <b>Power Quality &amp; Reliability - International Monitoring</b> Chair: Greg Evans, Welcomm, Inc.	<b>PQT09</b> <b>Harmonics</b> Chair: Mark Zuber, Advanced Power Systems	<b>PQT10</b> <b>Power Quality Technologies - UPS/Batteries</b> Chair: Allen Byrne, American Power Conversion	<b>PQT11</b> <b>Power Quality Technologies - New Backup Power Systems</b> Chair: Bob Schuerger, EYP Mission Critical Facilities, Inc.	

## THURSDAY, NOVEMBER 18

8:30am to 10:00am	<b>FREE</b> <b>General Session: Join Past Mungenast Award Winners for a discussion on The Future of Power Quality</b>				
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### EXHIBIT HALL OPENS 10:00AM

10:30am to 12:30pm	<b>PQT12</b> <b>Power Quality &amp; Reliability - Monitoring</b> Chair: Greg Evans, Welcomm, Inc.	<b>PQT13</b> <b>Power Quality Technologies - UPS</b> Chair: John Sears, Active Power	<b>PQT14</b> <b>Power Quality Technologies - VFDs &amp; Motors</b> Chair: Paul Bakke, DOE/NREL	<b>PQT15</b> <b>Current Issues in Power Quality</b> Chair: Mark McGranaghan, EPRI PEAC	
1:30pm to 3:30pm	<b>PQT16</b> <b>Power Quality - Healthcare Issues</b> Chair: Nihal Kularatna, U of Auckland	<b>PQT17</b> <b>Power Quality - Data Centers/Institutional Issues</b> Chair: Dan Carnovale, Eaton Cutler-Hammer	<b>PQT18</b> <b>Power Quality - Heavy Industry Issues</b> Chair: Steve Cotton, Data Power Monitoring		

## PROFESSIONAL ADVANCEMENT COURSES

**Sunday, November 14, 2004**

**9:00am – 5:00pm**

### **PAC21**

#### **Troubleshooting and Solving Power Quality Problems**

*David Mueller, Electrotek Concepts, Inc.*

Power quality has become an increasingly important topic for electric power customers. This is particularly true for industrial and commercial customers; particularly as manufacturing and control processes more heavily rely on equipment sensitive to power system interruptions and disturbances. Increased automation of manufacturing and other industrial processes and expanded use of energy-efficient power electronic technologies and microprocessor-controls are forcing customers to pay more attention to power quality.

This tutorial presents an overview on identifying and solving end-user power quality concerns, focusing on practical measures. It covers site surveys, monitoring power quality, analyzing measurement results, and solving power quality problems. It describes the processes that many utilities and customers employ to prevent, identify, and solve these problems. Included with this tutorial are several case histories.

### **PAC22**

#### **Lightning and Lightning Protection**

*Michael Stringfellow, PowerCET*

This course provides comprehensive training on the nature of electrical interference - where it comes from, how it affects equipment and the means to protect equipment. One principal cause of equipment upset and failure is lightning. The course explains how lightning strikes buildings and structures, and how lightning currents flow in building power, telecommunication, data and signal lines and how to assess the risk for facilities. You will learn how to implement an effective facility protection and grounding system. The course covers practical aspects of transient over-voltage protection and grounding for facilities and electronic equipment.

**Sunday, November 14, 2004**

**9:00am – 1:00pm**

### **PAC23**

#### **The New IEEE Emerald Book**

*Doug Dorr, EPRI PEAC*

*Vladimir Basch, BG&E*

The IEEE Emerald Book is a fundamental standard used for all aspects of power quality investigations, classification of problems, problem evaluation and problem resolutions. It also demonstrates good construction practices for avoiding power quality problems in the first place. The Emerald Book has been in a state of updating for some time and will soon be reintroduced. Many changes have occurred and you can be a part of one of the first groups that will learn not only about the changes, but about the experiences, theories, thought processes, and discussions that lead to specific changes. Don't miss this opportunity to learn about the new Emerald Book from experts in the field.



### **PAC24**

#### **Grounding & Harmonics: Case Studies and Practices**

*David Brender, Copper Development Association*

The Orange County, Florida 911 system presents several technological challenges and solutions to power quality improvement in an emergency communications system. In addition to the sensitive equipment issue is the political nature of the owner. The sites (11 in all) are located near Orlando, along the famous I-4 "Lightning Alley", which presents additional complications.

Lessons to be learned include the typical issues of grounding, transient voltage surge suppression, and proper connections. In a governmental installation, the experiences of Orange County are not dissimilar from other "lowest cost bidder" installations. Lack of accountability contributed to the electrical problems.

Fortunately, the solutions are very cost-effective.

## **EXHIBIT HOURS**

**Tuesday, November 16**      **11:00am – 6:00pm**

**Wednesday, November 17**      **10:00am – 5:00pm**

**Thursday, November 18**      **10:00am – 3:00pm**

**Sunday, November 14, 2004**

**2:00pm – 6:00pm**

## **PAC25**

### **Distributed Generation**

*Doug Dorr, EPRI PEAC*

*Vladimir Basch, BG&E*

Confusion and the turmoil plaguing electric energy companies, including the electric utilities brings new challenges to the distributed generation marketplace. Did the California fiasco or the dramatic reevaluations of the energy companies effect the implementation of the distributed generation technologies? What are the latest technological and business developments taking place in the leading distributed generation companies? And how are the Federal Energy Regulatory Commission, Departments of Energy, EPA, Public Service Commissions, local electric distribution companies attitudes and actions helping or hindering the implementation of the latest distributed generation technologies? What is the role of IEEE standards on distributed generation? When can I really buy a fuel cell for my home?

This course will cover the latest distributed generation technologies, including solar, wind, microturbines, fuel cells and a variety of engine based technologies. In addition we will focus on key underlying technological elements necessary for a successful practical implementation of distributed generation products, including advanced energy storage, flywheels, super capacitors and inverters. Although the energy providers and their customers have enjoyed the first generation of such technologies, the next generation promises to leap frog the current performance by increasing efficiencies, extending operating times, reducing cost and size. As these technologies are pressed into service we have learned a lot about their interaction with the real world loads and equally important their behavior in the presence of power quality events taking place on the electrical supply. This learning experience is producing product improvements on ongoing basis.

**Monday, November 15, 2004**

**9:00am – 5:00pm**

## **PAC26**

### **Power Quality 300 – Advanced Power Quality**

*Doug Dorr, EPRI PEAC*

Power quality problems and solutions range from very simple to extremely complex, as do the types of electric power variations that cause power quality problems. In addition the issues are compounded when a solution for a harmonics related problem may do very little to resolve a voltage sag problem. This course is intended to go into more detail on the "hows and whys" equipment is upset by power variations and provide a much better understanding of the most cost effective ways to resolve system and process upsets due to power quality variations. The primary focus of the course will be in depth analysis of the powering requirements for different types of electronic equipment categories ranging from PCs to

variable speed drives, to elevator controls with substantial support through real world case studies where problems were successfully resolved. The course will draw from a wealth of over 600 successful site audits conducted over the past 15 years into virtually every power quality area of interest. Attendees are encouraged to register early and will be contacted by email to submit any cases they have that are unresolved. Four cases will be selected for discussion and possible resolution during the class using a time proven systematic investigation methodology. Attendees will also work through some pre-developed materials to better emphasize the concepts presented.

## **PAC27**

### **Wiring and Grounding Solutions for Power Quality and Data Integrity Issues**

*Thomas Shaughnessy, PowerCET*

The fundamental physical requirements for reliable equipment operation are clean power, good grounding and protection for data networks. Too frequently, equipment performance problems are blamed solely upon power quality. Certainly, power fluctuations can wreak havoc with equipment, but even equipment protected with uninterruptible power sources (UPS) can experience problems. More likely, equipment problems can be due to grounding, ac wiring and network cabling issues. The likelihood that other factors are involved becomes increasingly apparent after ac power mitigation equipment (UPS, TVSS, Power Conditioner etc.) has been used without success.

This course will focus upon the overlooked aspects of equipment performance.

## **PAC28**

### **2005 National Electric Code & Upcoming Code Changes**

*L. Keith Lofland, International Association of Electrical Inspectors*

This presentation will introduce changes that will be made to the upcoming 2005 Edition of the NEC®, with a particular look at changes affecting power quality and reliability environments. Learn not only about the specific changes, but why they were considered and implemented. Attend this PAC session and get a leg up on the new NEC®!



#### **S&C Electric Company Tour**

S&C Electric Company is a global provider of switching and protection equipment and services for electric power systems. The Company's John R. Conrad Industrial Complex headquarters are located on North Ridge Boulevard in Chicago, about a thirty-minute bus ride from the Navy Pier. On Wednesday evening, November 17, S&C will conduct a tour of its facilities to showcase its PureWave® product line of power protection systems designed for service entrance applications. The tour includes a review and demonstration of two UPS systems in actual use, an Adaptive VAR Compensator, and a demonstration of a Source Transfer System for applications utilizing two utility feeders. Bus transportation and refreshments will be provided. For reservations, contact S&C at (414) 423-8776, ext. 110 or fax your request to (414) 423-8766, or e-mail [dtracy@sandc.com](mailto:dtracy@sandc.com). Space is limited so sign up early.

# Power Quality 2004 Conf

**Monday, November 15, 2004**

**9:00am – 1:00pm**

## **PAC29**

### **Establishing a Successful Power Quality Business**

*Ram Mukherji, Mukherji Consulting*

This session will explore how to establish and run a power quality business from bottom to top and all of the areas and concerns as well as common mistakes that many organizations who have created a power quality business have made. Lessons learned will be emphasized as well as business and marketing plans, technology mix, customer service and cash flow issues.

**Monday, November 15, 2004**

**2:00pm – 6:00pm**

## **PAC30**

### **The Power Quality Standards Landscape**

*Erich Gunther, EnerNex Corporation*

This session provides an overview of most of the key IEC and IEEE power quality related standards, how to apply them, and when and why. This session is ideal for anyone involved in performing power quality simulations, surveys, and measurements, as well as those involved in the manufacturing and sale of power quality analytical tools, measurement equipment and mitigation/correction equipment. Both released and unreleased standards will be discussed. The session also covers the background and intent behind these standards, facilitating understanding of their purpose and application.

## **THE CONFERENCE**

**Tuesday, November 16, 2004**

**8:30am – 9:45am**

### **KEYNOTE ADDRESS**

#### **Power Quality and Reliability in the 21st Century**

*Kurt Yeager, President – EPRI*



Mr. Yeager will address the status of electric reliability in North America, the role of the Power Quality and Reliability industries in supporting the nation's electric infrastructure, and EPRI's research and practical role in bolstering enhanced electric service to meet the needs of the 21st Century.



#### **Where Should the 'Buck' Stop?**

*Patrizio Vinciarelli, CEO & President – Vicor Corporation*

The Intermediate Bus Architecture, which relies on non-isolated Point-Of-Load (POL) "buck" converters, suffers from fundamental limitations in confronting the challenges of powering a digital world. The need for efficient POL power conversion-down to a fraction of a volt-with requisite density and speed, has led to new power conversion engines and a new power distribution architecture. The keynote address will discuss how these new engines overcome the limitations of niPOLs with a more granular form of distributed power: FPA.

#### **Award Presentations**

Following the Keynote Addresses, The first Power Electronics Technology Lifetime Achievement Award, and the John Mungenast International Power Quality Award, both honoring individuals who have made major contributions to their respective industries, will be awarded.

**Tuesday, November 16, 2004**

**10:00am – 11:00am**

### **SEMINARS**

## **PQS01**

### **What Do Upcoming Economic Conditions Mean for the Power Quality Industry?**

*David Mueller, Electrotek*

An upturn in the economic conditions will have important effects for the power quality industry, resulting in important changes. Improving macroeconomic fundamentals such as product prices will greatly influence the ability of power quality projects to be developed and sold. Other economic factors such as manufacturing utilization are important factors in determining the viability of power conditioning projects.

The speaker will illustrate these points with international case histories showing how economic conditions, both good and bad, have had major effects on power quality projects. He will extend these case histories to develop a thesis on how changing economic conditions might affect future power quality projects and trends.

## **PQS02**

### **The State of Superconducting Technology**

*Swarn Kalsi, American Superconductor Corporation*

This presentation will address a new superconducting technology, the supercondenser, as well as the status of superconducting technologies, including SMES, Cables, Transformers and Motors.

PQS Preceding Course number indicates 1 hour Seminar  
PQT Preceding Course number indicates 2 hour Technical Paper Presentation

## PQS03

### Distributed Generation Communications and Control Requirements

*John Brogan, Encorp*

A one hour tutorial on all of the important aspects of communication and control required by today's distributed generation systems. System monitoring for status, parameter limits, control, alarm and notification, as well as metering, trending, performance, required maintenance and security will be examined.

**Tuesday, November 16, 2004**

**2:00pm – 4:00pm**

### TECHNICAL SESSIONS

## PQT01

### Power Quality as a Business

*Chair: Anthony Hoevenaars, Mirus International, Inc.*

As electrical distribution networks continue to be stretched to their capacities, a power quality focus becomes evermore critical. The power outage of August 14, 2003 in the eastern part of N. America drove this message home as an estimated 50 million people and 61,800 MW of load was disrupted for up to 4 days. Estimates of the cost for this interruption range from \$4 billion to \$10 billion. This session on the business of power quality will discuss how a business model for power quality can be created, some marketing strategies that can be employed by power quality professionals, the economic challenges faced by utilities and users in protecting their critical loads and how to attract, hire and keep qualified employees. Those interested in expanding their power quality business, establishing new power quality related businesses or understanding the business impact of power quality issues will find the information presented in these sessions quite valuable.

#### Paper Presentations

- Creating a Power Quality Business Model: What Works and What Doesn't  
*Ram Mukherji, Mukherji Consulting*
- Putting the Quality into Power Quality Marketing  
*Greg Evans, Welcomm, Inc.*
- Power Quality - The Economic Challenges for Utilities and Users  
*Terry Chandler, Power Quality, Inc.*
- Hiring Quality Employees  
*Lisa Lineal, Lineal Recruiting*

## PQT02

### Grounding Practices

*Chair: Larry Petersen, Varian Medical Systems*

Attendees will learn the proper techniques for grounding, bonding and lightning protection in varied construction scenarios.

Grounding techniques and system measurements and monitoring equipment and new grounding methods and materials will be addressed.

Measurement of Neutral-to-Earth Voltage, "Peak versus True RMS" describes the methods for properly measuring and reporting neutral-to-earth voltages.

#### Paper Presentations

- Basics of Power Quality  
*David Brender, Copper Development Association*
- Why 95% of Grounding System Tests Are Invalid  
*John Howard, Lyncole XIT*
- Measurement of Neutral-to-Earth Voltage, "Peak" versus "True RMS"  
*David Winter, David Winter Consulting*

## PQT03

### Power Quality Technologies: Distributed Generation, Micro-Turbines and Fuel Cells

*Chair: Mohan Ray, Northrup Grumman Corporation*

Energy storage flywheel combined with modern electronics is one technology that is going high speed, operating in a vacuum and eliminating bearings. Thermal and compressed air storage (TACAS) is another technology that is used - energy stored in the form of heat in the thermal storage unit and passed on through compressed air and small flywheel. Both are used for "power ride-through" without the use of any batteries. This session discusses new approach in data center power source solutions and power quality solutions using new research based on new products.

#### Paper Presentations

- TEX: The Next Generation of Energy Storage Technology  
*John Sears, Active Power*
- Superconducting Technologies  
*Paul Bakke, DOE NREL*
- A Universal Vector Controller for Grid Connected Inverters  
*Taotao Jin, University of California, Irvine*
- The Issue is Reliability – Welcome the High Speed Flywheel  
*Eugene Weaver, Pentadyne Power Corporation*

**SAVE \$\$\$**

**Register by October 22nd for Early Bird Discounts on Conference Sessions!**

*See page 14 for details!*

# Power Quality 2004 Conf

**Tuesday, November 16, 2004**

**2:00pm – 4:00pm**

## **PQT04**

### **Power Quality Reliability – Equipment Technologies**

*Chair: John Johnson, Strategic Facilities, Inc.*

Improving – or responding to – power quality issues is an on-going, uphill battle faced by facility managers every day. As fast as we solve one problem, new technologies on the load side create new headaches. Twenty years ago ‘harmonics’ were things we played around a campfire. Power factor and voltage correction was in its infancy, mainly because we either A) didn’t understand it; or, B) really didn’t much care about it. In those days, manufacturing was usually the culprit – large motors driving a vertical turret lathe – not the victim. Today, computer-controlled laser cutting machines are super-sensitive to minor voltage fluctuations. Industries like wafer production didn’t exist. A big dip in voltage when a big motor started was a bigger problem to the cafeteria operator than it was to the plant manager. In those days the typical data center had a primitive UPS, intended more to provide backup power than to filter the incoming power. The computer loads were usually 400 Hertz (cycles per second for you REAL old timers!) and had their own MG sets to filter out any nasty stuff. Today, power quality is THE major concern of every data center facility manager as well as plant manager. New technology is constantly being developed to wage the war against ‘Bad Power’. This session will enlighten the attendee in this area, starting with improved high voltage distribution cables, medium-voltage interfacing, power quality monitoring, and cost factor considerations in the proper selection of on-site mitigation.

#### **Paper Presentations**

- Understanding the Medium-Voltage Interface for Your Power Quality Needs  
*Jerry Baskin, Federal Pacific*
- A Concise Comparison of New High Temperature Low Sag Power Transmission Cable Technologies with Current Cable Technologies  
*John Nunley, Composite Technology Corporation*
- Utilization of Permanent Power Quality Metering to Locate and Eliminate Distribution System Arcing  
*Robert McDonald, JEA*
- Price and Performance Considerations for Backup Power and Ride-through Solutions  
*Daniel Carnovale, Eaton Cutler-Hammer*

#### **Get Ready for the 2005 NEC®, by attending an EC&M Code Change Conference Near You!**

EC&M, your National Electrical Code Authority, will bring you accurate, in-depth coverage of the many NFPA changes to this vital electrical construction industry standard. In just two informative and interest-filled days, you’ll learn about the major changes that will impact your work, whether you’re an electrician, electrical engineer, or plant/facility electrical maintenance person. For session times, location, and registration information, go to [www.ecmmag.com/nec](http://www.ecmmag.com/nec), or call 1-203-926-0947.

**Wednesday, November 17, 2004**

**8:00am – 10:00am**

## **TECHNICAL SESSIONS**

## **PQT05**

### **Reliability – The Next Wave**

*Chair: Mark Zuber, Advanced Power Systems*

Three topics will be covered during this session that directly impact electrical power reliability. The importance of the proper detection and analysis of voltage disturbances and how the location of monitoring equipment impacts understanding the data gathered will be examined. The application and configuration of communications systems for critical power distribution will be explored, as will their effect on system reliability. New approaches to maximizing electrical power reliability through the implementation of intelligent distribution automation systems will also be investigated.

#### **Paper Presentations**

- Detection and Recording of Voltage Variation Power Quality Events  
*Alexander Apostolov, AREVA T&D EAI*
- New Approaches to Maximizing Reliability  
*Douglas Staszeky, S&C Electric Company*
- Powering the Internet, OK - What About “Interneting” The Power?  
*Kfir Godrich, EYP Mission Critical Facilities, Inc.*

## **PQT06**

### **Power Factor**

*Chair: Mark McGranaghan, EPRI PEAC*

Power quality issues are often closely inter-related with power factor concerns and solutions. Harmonic distortion problems, in particular, are often caused by the application of power factor correction capacitors. This session explores a number of important issues related to both power factor correction and power quality. The session particularly focuses on power factor correction for non-linear loads, taking into account the effect of harmonics. The discussion includes the effect of dynamic loads where the power factor correction must be able to adjust with the load.

#### **Paper Presentations**

- Power Factor in Electrical Power Systems with Nonlinear Loads  
*Gonzalo Sandoval Rodriguez, Inelap S.A. de C.V., A Beckwith Electric Solutions Partner*
- Using UPS Filters for Power Factor Correction  
*Robert Schuerger, EYP Mission Critical Facilities, Inc.*
- Power Quality Solutions for Dynamic Welding Loads  
*Scott Schindlbeck, Elspec North America*
- Power Quality Problems: Causes, Impact, and Solutions Case Study: Power Factor Correction Capacitors and Fifth Harmonic Filter, Design and Testing  
*Abdullatif Bagegni, Merrimack College*

## PQT07

### Power Quality Technologies – TVSS and Conditioning

Chair: Larry Petersen, Varian Medical Systems

Attendees will be informed about power quality case studies of an Active Voltage Conditioner (AVC - a sag mitigation device) and recent improvements seen by one customer. The different types of technologies available in the market for TVSS and how these technologies will affect the future and market size of the TVSS industry will be addressed. Also discussed will be the evolution of status indication for surge-protection devices, and historical background and increased sophistication of status indication and functions of monitoring power quality of low voltage power distribution systems.

#### Paper Presentations

- Measured Performance of a 26 Kilovolt 2 Megawatt Sag Mitigation Device  
*Robert MacDonald & Thomas Ventresca, JEA*
- Surge Suppression Technologies  
*Vishal Sapru, Frost & Sullivan*
- Monitoring of Surge Protective Devices in Low-Voltage Power Distribution Systems  
*François Martzloff, Surges Happen! & James Funk, Eaton/Cutler-Hammer*

Wednesday, November 17, 2004

11:30am – 12:30pm

## SEMINARS

### PQS04

#### An Introduction to Nanotechnology

*Michael Beehler, Burns & McDonnell*

Nanotechnology is the construction of new materials, products and systems at the molecular level. It has the potential to impact and change every industry known to man and lead to new and unimagined uses. This session will define nanotechnology, provide examples of current uses of nanotechnology in our world today, and postulate about the applications of nanotechnology in the generation, transmission and distribution of electricity.

### PQS 05

#### The State of Wind Generation

*Thomas Key, EPRI PEAC*

Noted power quality and reliability expert Tom Key will discuss the state of wind energy and the integration of wind power into the grid, which presents many unique problems. Tom Key is a former winner of the John Mungenast International Power Quality Award.

Wednesday, November 17, 2004

10:15am – 11:15am

EXHIBIT HALL POSTER  
PAPER PRESENTATIONS

FREE  
TO ALL  
ATTENDEES



### PQS06

#### Reality Checks on Surge-Protective Devices and Applications

*François Martzloff, Surges Happen!*

Old-timers and newcomers alike will join for a session to visit unanswered questions and revisit unquestioned answers in an open forum format to discuss current issues on the application of surge protective devices in low-voltage power distribution systems. Some standards and product offerings seem to engage into an upward action towards increased ratings, which need to be reconciled with reality checks. Participants will be invited to share facts and opinions on this subject and hear what their colleagues in industry can contribute. Come prepared (with questions or facts, or both) to engage in a lively technical discussion.

### PQS07

#### A Fuel Cell Based UPS System

*MGE UPS Systems, Inc.*

A new UPS technology based on a fuel cell will be demonstrated and discussed. This exciting new technological approach to sags will be discussed in depth and the session will be highlighted with a live demonstration of such a unit.

## EXHIBIT HOURS

Tuesday, November 16 11:00am – 6:00pm

Wednesday, November 17 10:00am – 5:00pm

Thursday, November 18 10:00am – 3:00pm

PQS Preceding Course number indicates 1 hour Seminar  
PQT Preceding Course number indicates 2 hour Technical Paper Presentation

Wednesday, November 17, 2004

2:00pm – 4:00pm

## TECHNICAL SESSIONS

### PQT08

#### Power Quality & Reliability – International Monitoring

Chair: Greg Evans, Welcomm, Inc.

The international nature of PowerSystems World is highlighted by this session that includes scholarly papers presenting innovative approaches to power quality metering and analysis. These papers offer a look at new techniques aimed at utility power quality monitoring as well as a review of commercially available techniques for conducting a range of utility power quality measurements.

#### Paper Presentations

- Enhancing Analysis Techniques for Dedicated Virtual Instrumentation by Using High Efficiency Power Quality Monitoring Solutions  
*Costin Stefanescu, University Politehnica of Bucharest*
- Integrated Approach to On-Line System Wide Power Quality Monitoring  
*Tan Kong Peng, Singapore Power Grid*
- Very Low Cost Device for Power Quality and Reliability Measuring & Recording  
*Joaquim Delgado, DEE/ESTV*
- Independent Benchmark Study of Commercially Available Products in Five Critical Power Quality Applications  
*Bruce Roeder, Arbitor Systems*

### PQT09

#### Harmonics

Chair: Mark Zuber, Advanced Power Systems

This session will include four presentations. Topics addressed will include how line to line connected induction motors influence harmonics generated by VFD's, phase shifting techniques and concepts for harmonic mitigation, the effects of capacitor loss on phase to ground and phase to phase voltage distortion created by harmonics, and new passive filter treatments that are designed to reduce harmonics at the panelboard level.

#### Paper Presentations

- Data Center Panelboards with Built-in Passive Harmonic Treatment  
*Anthony Hoevenaars, Mirus International, Inc.*
- Harmonic Mitigation, Power Factor Correction and Energy Saving With Proper Transformer and Phase Shifting Techniques  
*Jean-Guy Boudrias, Hammond Power Solutions*
- Harmonic Voltage By Induction Motors in Industrial Power Systems  
*Alexander Kusko, Exponent Failure Analysis Associates, Inc.*
- Cleaning Up Harmonic Distortion by Removing or Repairing Utility Capacitors  
*Robert Leatherbee, PSNH*

Wednesday, November 17, 2004

2:00pm – 4:00pm

### PQT10

#### Power Quality Technologies – UPS/Batteries

Chair: Allen Byrne, American Power Conversion

Because of misuse, lack of maintenance, misapplication, and many other reasons, batteries have become the Achilles heel of the battery backed power system. This session will examine why batteries fail, what can be done to detect imminent failure and how failed batteries might be recovered for useful service. The session will also address battery installation and some innovative battery applications.

#### Paper Presentations

- Battery Lifecycle and Reliability Management  
*Steve Cotton, Data Power Monitoring*
- Restoring Reliability, Plus Performance, and Extending the Useful Life With Your VRLA Battery System Through an Unusual, Yet Simple Means  
*Peter DeMar, Battery Research and Testing, Inc.*
- Investing in the Last Line of Defense – Addressing User Expectations for High Power Batteries  
*Roy Gates, Alcad Standby Batteries*
- Battery Management for Ultimate UPS Reliability  
*James Sember, S&C Electric, Power Quality Products Division*

### PQT11

#### Power Quality Technologies – New Backup Power Systems

Chair: Robert Schuenger, EYP Mission Critical Facilities, Inc.

As the technology of power quality matures, the focus shifts to better methods for solving known problems. This session will present papers on: a new method of modeling magnetic properties; on utilizing flywheels and fuel cells in conjunction with UPS system batteries, and about integrating the generator with the UPS system.

#### Paper Presentations

- Review of Hysterectic and Eddy Current Losses in Magnetic Materials  
*Edward Price, Environmental Potentials*
- High Reliability DC Distribution System for Critical Power Environments  
*Moderator: Richard Baugh, PE, ABS, Inc.*  
*Panelists: Mark Baldwin, President, Baldwin Technologies, Inc.; David Geary, PE, Baldwin Technologies, Inc.; Johnny Gonzales, Pentadyne Power, - Doug Burr, Schaefer Power*
- Fuel Cell Evolution: In Production – Fuel Cell/UPS Integration for Unlimited Backup Power  
*MGE UPS Systems, Inc.*
- Fundamentals of the Power Quality/Power Reliability System Application Process  
*Donald Vanderbrook, Generac Power Systems, Inc.*

**Thursday, November 18, 2004**

**8:30am – 10:00am**

## GENERAL SESSION

### The Future of Power Quality

*Chair: Sam Wheeler, Consultant*

The General Session will be a panel consisting of the past winners of the John Mungenast International Power Quality Award (JMIPQA). Each panel member will present his views on the state of the power quality & reliability industries, including the role of renewables, distributed generation and new control and communications technologies, and where he feels the industry is headed considering these technologies. The audience will be allowed to ask questions of this distinguished group of experts, in a Q&A session at the end of the panelist's comments.



**Thursday, November 18, 2004**

**10:30am – 12:30pm**

## TECHNICAL SESSIONS

### PQT12

#### Power Quality & Reliability - Monitoring

*Chair: Greg Evans, Welcomm, Inc.*

This session will address several interesting and unique areas of power monitoring. Disturbance analysis from the perspective of fault tolerance and the CBEMA curve can be expanded to look more closely at the magnitude and the duration of a given power problem. Also how using a business methodology called "Key Performance Indicators" (KPIs) to examine power problems and monitoring faults and a new system using a low cost Ethernet connected system that looks at three phase power disturbances are all considered.

#### Paper Presentations

- Real-Time Disturbance Analysis and Notification  
*Mark Andresen, Applied Power Technologies, Inc.*
- Using Key Performance Indicators to Manage Power System Reliability  
*John Van Gorp, Power Measurement*
- Cost Effective Imbedded Power Monitor  
*Kevin Harris, TEAL Electronics*

#### The John Mungenast International Power Quality Award

Immediately following the Keynote Address, the John Mungenast International Power Quality Award winner will be announced. This prestigious annual award is presented to an individual who has made extraordinary contributions to the power quality field.

### PQT13

#### Power Quality Technologies – UPS

*Chair: John Sears, Active Power*

The electrical power grid in the USA is very good, but customers cannot reasonably expect perfectly clean, reliable power from their electrical utility company. One very real problem (discussed in this session) is the expectations gap between typical electrical utility companies and operators of critical facilities. Since power quality disruptions are inevitable, smart facility managers must take steps to isolate their critical business processes from potentially harmful power events. This session will include both practical techniques and high-level topology for deploying UPS equipment in critical facilities.

#### Paper Presentations

- Advanced UPS Inverter Control: Faster Transient Response Times and Lower Output  
*Henk Mulder & Ronald Glaser, General Electric Company*
- A Novel Super-Capacitor Based Power Transfer Technique with Dynamic Isolation  
*Nihal Kularatna, University of Auckland*
- UPS System Grounding  
*Kevin Collins, Piller, Inc.*
- The Expectations Gap Between Utilities And Critical Facilities  
*Kfir Godrich, EYP Mission Critical Facilities, Inc.*

### PQT14

#### Power Quality Technologies – Vfd's & Motors

*Chair: Paul Bakke, DOE*

This panel will discuss power quality issues and solutions associated primarily with the effects of harmonics on motor loads. Polyphase motors will be reviewed along with new harmonic spectral data and the use of a magnetic phase balancing device will be discussed as a tool for distribution circuit design. Other options for mitigation of harmonics such as 18 pulse drives, phase shifting transformers, active front ends, and passive universal harmonic filters will be discussed with their advantages and disadvantages. Finally, a new One-Cycle controller will be presented and discussed for a regenerative rectifier which enables energy bidirectional flow between the power grid and the motor loads and increased system efficiency.

#### Paper Presentations

- Solving Generator Loading Problems for Offshore Oil/Gas Platforms  
*James Johnson, Schneider Electric*
- A Three-Phase Unity-Power Factor Regenerative Rectifier for Motor Loads  
*Lihua Li, University of California, Irvine*
- Harmonic Mitigation Techniques To Achieve IEEE 519 Compliance in Water & Wastewater Pumping Stations  
*Stephen Wrzesinski, IDCS, LLC*
- Controlling Harmonics in the Polyphase Induction Motor  
*Robert Emmet, Pure Power Systems, Inc.*

# Conference Program

Thursday, November 18, 2004

10:30am – 12:30pm

## PQT15

### Current Issues in Power Quality

Chair: Mark McGranaghan, EPRI PEAC

This session addresses important power quality issues facing electric utilities and industrial and commercial customers. Increasing levels of automation and computer control in all types of facilities continues to increase the importance of power quality. Important issues that will be addressed include advances in monitoring technology to make characterizing power quality issues easier, taking advantage of the Internet and World Wide Web to provide power quality services, and coordinating power quality issues with energy efficiency initiatives.

#### Paper Presentations

- How Wireless Helps with Power Quality Monitoring  
*Richard Evans, Power Monitors, Inc.*
- Building Operator Certification  
*Roger Rossen, Power Quality Solutions & Peggy Reins, Midwest Energy Efficiency Alliance (MEEA)*
- A Different Approach to Power Quality and Reliability Software  
*Brad Gibson, Current Thinking, Inc.*

Thursday, November 18, 2004

1:30pm – 3:30pm

## TECHNICAL SESSIONS

## PQT16

### Power Quality - Healthcare Issues

Chair: Nihal Kularatna, University of Auckland

With the use of sophisticated equipment within healthcare environments, power quality issues have become a serious concern for the accuracy of imaging systems, etc. Based on the experience of four experts in the medical imaging environments, this session will provide an insight into power quality monitoring, issues faced, and analytical guidelines, including the effects of power factor correction capacitors.

#### Paper Presentations

- Power Quality Audits of Diagnostic Imaging Systems  
*Maynard Perszyk, General Electric Healthcare*
- Low Cost Power Monitoring of Diagnostic Imaging Systems  
*David Rush, General Electric Medical Systems*
- The Affects of Power Factor Capacitors on Diagnostic Imaging Equipment  
*Harry Rauworth, General Electric Medical Systems*
- Cost-Effective Power Quality Analysis  
*Judith Russell, PowerLines*

## PQT17

### Power Quality – Data Centers/Institutional Issues

Chair: Dan Carnovale, Eaton Cutler-Hammer

“Mission Critical” facilities, such as data centers, government institutions and educational facilities, require a high level of power quality and reliability. Using case studies, this session will discuss methods for monitoring and evaluating mission critical facilities and the power system infrastructure supplying them.

#### Paper Presentations

- Site Audits and Analysis – What PRA Can Do For Me?  
*John Johnson, Strategic Facilities, Inc.*
- Considerations and Requirements for an Integrated Power Quality Monitoring System  
*C.W. Li, CLP Power HK, Ltd*
- Power Quality and the ABCs  
*Richard Bingham, Dranetz-BMI*
- Data Center Systems Upgrade  
*Mohan Ray, Northrup Grumman Corporation*

## PQT 18

### Power Quality - Heavy Industry Issues

Chair: Steve Cotton, Data Power Monitoring

This session offers a wide range of discussions on power quality issues in heavy industry. It covers the increasingly important area of Electric Arc Furnaces (EAFs) used by the steel industry, and their unique power quality problems; Flicker, another power quality problem area found in steel and metals manufacturing; and Utility level short circuits and faults and their effects on the power quality of the grid. The session concludes with an excellent discussion of enterprise level Energy Management Systems “EEMs”, the state of the technology, topologies and applications.

#### Paper Presentations

- An Investigation Into Harmonic Current Mitigation for Induction Furnace Melting Process  
*R.A. Kolt, Business Engineering Services, Manitoba Hydro*
- Flicker Case Study: Impact of a Short Duration 30 Hz Flicker  
*Gaétan Ethier, Hydro-Quebec*
- Reducing the Effects of Short Circuit Faults on Sensitive Loads  
*Alexander Apostolov, AREVA T&D EAI*
- Data Quality Issues and Solutions for Enterprise Energy Management Applications  
*Greg Thompson, Power Measurement*

PQS Preceding Course number indicates 1 hour Seminar  
PQT Preceding Course number indicates 2 hour Technical Paper Presentation

# Exhibit Hall Information

## EXHIBIT HOURS

Tuesday, November 16 11:00am – 6:00pm  
 Wednesday, November 17 10:00am – 5:00pm  
 Thursday, November 18 10:00am – 3:00pm

## The Power Quality Exhibition & Conference is for Power Quality Professionals... Looking to Inspect, Demo, and Price Power Reliability Equipment!

### Professionals Include:

Energy Producers  
 Manufacturers  
 Commercial Property Owners and Managers  
 Institutional Personnel  
 Plant and Facility Management  
 Utility Managers  
 Governmental Supervisors  
 Consultants  
 Engineers  
 Contractors

### Equipment Includes:

Adjustable Speed Drives  
 Batteries & Accessories  
 Biomass Energy Systems  
 Capacitors  
 Circuit Breakers  
 Consulting Services  
 Data Loggers  
 Distribution Automation Equipment  
 Distributed Generation  
 Energy Management Systems & Storage Devices  
 Fault Locators  
 Flywheel Energy Storage  
 Fuel Cell Systems  
 Fuses  
 Generators  
 Ground Fault Monitoring  
 Grounding Devices & Equipment  
 Harmonic Filters  
 Instrumentation & Test Equip.  
 Lightning Protection Equipment  
 Load Banks  
 Meters  
 Mini-Turbines/Micro-Turbines  
 Motors & Drives  
 Outage Management  
 Photovoltaic Systems  
 Power Conditioners  
 Power Line Filters  
 Power Quality Monitoring Equipment  
 Power Sources  
 SCADA Equipment Software



Solar Powered Systems  
 Standby Generators  
 Submeters  
 Surge Protection Devices (SPD & TVSS)  
 Switch Gear  
 Transfer Switches  
 Transformers  
 Uninterruptible Power Supplies (UPS)  
 Voltage Regulators  
 Wind Powered Energy Systems  
 Wire & Cable

## 2 Powerful Events Under 1 Roof!

**PowerQuality** For Solution Seeking Power Reliability Professionals + **POWER ELECTRONICS TECHNOLOGY** For Power Electronic Professionals = **POWERSYSTEMS WORLD** The Premier Event for Power Professionals

Your Power Quality badge allows you to attend both Shows!

## Walk the Exhibit Hall and Meet With These Leading Suppliers!

ABB Semiconductors, Inc.  
 ACR Systems Inc.  
 Actown Electrocoil, Inc.  
 Advanced Test Equipment Rentals  
 AEMC Instruments  
 Alfatec Kerafol GmbH  
 Alpha Electronics Corp. of America  
 American Superconductor  
 AMETEK Power Instruments  
 Ametherm Inc.  
 Ansoft Corporation  
 AOS Thermal Compounds  
 APC-American Power Conversion  
 Arbitr Systems  
 Arcotronics America, Inc.  
 ASC Capacitors  
 AVX Corporation  
 BiPower Corp.  
 Caddock Electronics, Inc.  
 CATELEC-KENDEIL  
 Caterpillar Inc.  
 Central Semiconductor Corp.  
 Ceramic Magnetics / Feriti  
 CET Technology  
 Coilcraft Inc.  
 Collmer.com  
 ComRent International  
 Copper Development  
 Cornell Dubilier Electronics  
 Cramer Coil & Transformer  
 CREE, Inc.  
 Custom Power Technology  
 Datatron  
 Dau USA

Dearborn Electronics, Inc.  
 Dehn Inc.  
 Denka Corporation  
 Dexter Magnetic Technologies, Inc.  
 Dow Corning  
 Dranetz-BMI/Electrotek Concepts  
 Dymax Services, Inc.



Dynex Semiconductor  
 Eastern Components, Inc.  
 Eaton  
 EBG Resistors  
 Eldre Corporation  
 Electrocube, Inc.  
 Electronic Concepts Inc.  
 Elna Magnetics  
 Elspec North America  
 Energy User News  
 Enerpro, Inc.  
 Environmental Potentials  
 ERM Thermal Technologies, Inc.  
 eupec, Inc.  
 EVOX RIFA  
 EYP Mission Critical Facilities  
 Fair-Rite Products  
 Fastron Electronics Inc.

Ferroxcube USA  
 Floeth Electronic GmbH  
 Fluke Power Quality  
 Fuji Semiconductor, Inc.  
 Fujipoly America Corporation  
 GMW Associates  
 Gowanda Electronics  
 Henkel Loctite Corp.  
 Hioki USA  
 Hitachi AIC  
 Hitec Power Protection  
 HV Components & CKE  
 HVR Advanced Power Components, Inc.  
 Ideal Industries  
 Illinois Capacitor, Inc.  
 IMA (International Magnetics Association)  
 Inelap Power Quality Solutions  
 Infineon Technologies  
 International Rectifier  
 Intersil Corp.  
 Intusoft  
 Isotek Corporation  
 ITW Paktron  
 IXYS Corp.  
 Johanson Dielectrics, Inc.  
 Kanthal Global  
 Kaschke USA, Inc.  
 Kemet Corp.  
 LeCroy Corp.  
 LEM USA, Inc.  
 Littelfuse  
 Lodestone Pacific

Lytron, Inc.  
 Magnetics  
 Megger  
 Merry Electronics (USA) Co. LTD.  
 Metglas, Inc.  
 Methode Electronics  
 Micrometals  
 Midtronics, Inc.  
 MMG  
 MOONS Industries America Inc.  
 MTE Corporation  
 National Semiconductor  
 NORWE Inc.  
 NWL  
 Ohmite Manufacturing Co., Inc.  
 Okaya Electric America, Inc.  
 Payton America  
 Pearson Electronics, Inc.  
 Pentadyne Power Corporation  
 Peter Parts Electronics  
 Philips Semiconductors  
 Phoenix Contact  
 Power Integrations  
 Power Measurement  
 Power Monitors  
 Powerex, Inc.  
 Precise Power Corporation  
 Primedia  
 R-Theta Thermal Solutions Inc.  
 RAF Technologies, Inc.  
 Renco Electronics Inc.  
 Rotech Engineering  
 S&C Electric Company  
 SAFT Power Systems

Saint-Gobain Ceramics-Baron Nitride  
 SanRex Corp.  
 Semikron, Inc.  
 SEPS, Inc.  
 Siba Fuses  
 SMP Sintermetalle Prometheus  
 Standex Electronics/ ATC-Frost  
 STMicroelectronics  
 Summit Technology  
 Sunrise E.&E., Inc.  
 Synopsys  
 Sypris Test & Measurement (F.W. Bell)  
 Tabtronics, Inc.  
 Tamura Corporation of America  
 Tektronix, Inc.  
 Thermagon, Inc.  
 Thermshield, LLC.  
 Tier Electronics  
 TOCOS America  
 Transtek Magnetics  
 Tripp Lite  
 TSC Ferrite International  
 Tyco Electronics, Power Systems  
 UltraVolt, Inc.  
 United Chemi-Con  
 VAC Magnetics Corporation  
 Vishay Intertechnology  
 Voltage Multipliers  
 Wurth Electronics Inc.  
 Yokogawa Corp of America

Exhibitor List as of 7/26/04

**Teams of  
3 or more take  
10% off!**

**REGISTRATION FORM**

**STEP 1: Four Ways to Register** 1. Online @ [www.powersystems.com](http://www.powersystems.com) 3. Phone: 800-927-5007 or 203-358-3751  
2. Fax: 508-759-4552 4. Mail: c/o CDS, 107 Waterhouse Road, Bourne, MA 02532

Please Print Clearly. Register by October 22, 2004 to receive your Show Credentials in the mail. After October 22nd, your Show Credentials may be picked up on-site. Clearly print information exactly as you want it shown on your badge. All information must be completed to process your registration. **NO ONE UNDER 18 ADMITTED!**

First Name \_\_\_\_\_ Last Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Street Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP Code \_\_\_\_\_ Country (outside U.S.) \_\_\_\_\_  
Telephone \_\_\_\_\_ Fax \_\_\_\_\_

E-Mail—By providing your e-mail address, you grant PRIMEDIA Business Exhibitions permission to contact you via e-mail regarding your registration as well as PowerSystems World updates and/or updates and promotional materials from exhibitors.

**STEP 2: Registration Profile (Please complete the following):**

**1. Your organization's primary business classification: (Check ONE Only)**

- A.  Energy Producer (utility, IPP Cogen, alternate energy, municipal, ESCO)
- B.  Industrial (manufacturing or production)
- C.  Commercial (office buildings, data centers, communications and telecommunications facilities, financial institutions, retail chains/stores)
- D.  Institutional (hospitals, schools, universities)
- E.  Governmental (military, federal, state, local)
- F.  Consulting, Engineering and Contracting
- G.  Other (please specify) \_\_\_\_\_

**2. Your primary job title: (Check ONE Only)**

- A.  Executive/General Management (Chairman, Owner, Partner, CEO, COO, CFO, President, VP)
- B.  Building/Operations Management (Energy Manager, Building/Property/ Facility Manager, Plant Engineering, Property Management, Electrical Maintenance, Operations Manager, Maintenance Manager, Marketing/Sales, Purchasing)
- C.  Engineering (Design Engineer, Application/Project Engineer, Energy Engineer, Architectural Engineer, Systems Integration, Utility Engineer, T&D Engineer)
- D.  Consulting & Contracting
- E.  Service (field, customer)
- F.  Other Please specify: \_\_\_\_\_

**3. Products you buy, use, or specify: (Check ALL that apply)**

- |   |   |  |
|---|---|--|
| A. <input type="checkbox"/> Adjustable Speed Drives                       | O. <input type="checkbox"/> Generators                          | AC. <input type="checkbox"/> Power Sources                         |
| B. <input type="checkbox"/> Batteries & Accessories                       | P. <input type="checkbox"/> Grounding Devices & Equipment       | AD. <input type="checkbox"/> SCADA Equipment                       |
| C. <input type="checkbox"/> Biomass Energy Systems                        | Q. <input type="checkbox"/> Harmonic Filters                    | AE. <input type="checkbox"/> Software                              |
| D. <input type="checkbox"/> Capacitors                                    | R. <input type="checkbox"/> Instrumentation & Test Equipment    | AF. <input type="checkbox"/> Solar Powered Systems                 |
| E. <input type="checkbox"/> Circuit Breakers                              | S. <input type="checkbox"/> Lightning Protection Equipment      | AG. <input type="checkbox"/> Standby Generators                    |
| F. <input type="checkbox"/> Consulting Services                           | T. <input type="checkbox"/> Load Banks                          | AH. <input type="checkbox"/> Submeters                             |
| G. <input type="checkbox"/> Data Loggers                                  | U. <input type="checkbox"/> Meters                              | AI. <input type="checkbox"/> Surge Protection Devices (SPD & TVSS) |
| H. <input type="checkbox"/> Distribution Automation Equipment             | V. <input type="checkbox"/> Mini-Turbines/Micro-Turbines        | AJ. <input type="checkbox"/> Switch Gear                           |
| I. <input type="checkbox"/> Distributed Generation                        | W. <input type="checkbox"/> Motors & Drives                     | AK. <input type="checkbox"/> Transfer Switches                     |
| J. <input type="checkbox"/> Energy Management Systems and Storage Devices | X. <input type="checkbox"/> Outage Management                   | AL. <input type="checkbox"/> Transformers                          |
| K. <input type="checkbox"/> Fault Locators                                | Y. <input type="checkbox"/> PhotoVoltaic Systems                | AM. <input type="checkbox"/> Uninterruptible Power Supplies (UPS)  |
| L. <input type="checkbox"/> Flywheel Energy Storage                       | Z. <input type="checkbox"/> Power Conditioners                  | AN. <input type="checkbox"/> Voltage Regulators                    |
| M. <input type="checkbox"/> Fuel Cell Systems                             | AA. <input type="checkbox"/> Power Line Filters                 | AO. <input type="checkbox"/> Wind Powered Energy Systems           |
| N. <input type="checkbox"/> Fuses   | AB. <input type="checkbox"/> Power Quality Monitoring Equipment | AP. <input type="checkbox"/> Wire & Cable                          |
|   |   | AQ. <input type="checkbox"/> Other, please specify: _____          |

**4. The amount of power quality equipment and services you buy or specify annually:**

- |   |   |   |
|---|---|---|
| A. <input type="checkbox"/> Over \$10,000,000         | C. <input type="checkbox"/> \$500,000 - \$999,999 | E. <input type="checkbox"/> \$25,000 - \$49,999 |
| B. <input type="checkbox"/> \$1,000,000 - \$9,999,999 | D. <input type="checkbox"/> \$100,000 - \$499,999 | G. <input type="checkbox"/> Under \$25,000      |
|   | E. <input type="checkbox"/> \$50,000 - \$99,999   |   |

**5. Would you like to receive information about exhibiting in Power Quality?**

- A.  Yes B.  No

**STEP 4: Session Selections: PROFESSIONAL ADVANCEMENT COURSES**

<b>Sunday, November 14—Full Day</b>	<b>Sunday, November 14—Half Day</b>	<b>Monday, November 15—Full Day</b>	<b>Monday, November 15—Half Day</b>
<input type="checkbox"/> PAC21 (9am-5pm)	<input type="checkbox"/> PAC23 (9am-1pm)	<input type="checkbox"/> PAC26 (9am-5pm)	<input type="checkbox"/> PAC29 (9am-1pm)
<input type="checkbox"/> PAC22 (9am-5pm)	<input type="checkbox"/> PAC24 (9am-1pm)	<input type="checkbox"/> PAC27 (9am-5pm)	<input type="checkbox"/> PAC30 (2pm-6pm)
	<input type="checkbox"/> PAC25 (2pm-6pm)	<input type="checkbox"/> PAC28 (9am-5pm)	

PDF

**STEP 3: Registration Options: CONFERENCE SESSIONS**

(Indicate Sessions in Steps 4 and 5.) Registration fee includes FREE Keynote, General Session and admittance to PowerSystems World Exhibit Hall.

	Advance By Oct. 22	After Oct. 22 Onsite
<b>A. EXTREME VALUE PACKAGES (indicate Sessions in Steps 4 and 5.)</b>		
<input type="checkbox"/> <b>Premium Pass A:</b> 2-FULL Days or 4 HALF Days Professional Advancement Courses (PAC) 3-Day Conference Pass Power Quality Proceedings CD-ROM	\$1,500.	\$1,700.
<input type="checkbox"/> <b>Premium Pass B:</b> 1-FULL Day and 1 HALF Day Professional Advancement Courses (PAC) 3-Day Conference Pass Power Quality Proceedings CD-ROM	\$1,300.	\$1,425.
<input type="checkbox"/> <b>Premium Pass C:</b> 1-FULL Day or 2 HALF Days Professional Advancement Courses (PAC) 3-Day Conference Pass Power Quality Proceedings CD-ROM	\$1,175.	\$1,300.
<input type="checkbox"/> <b>Premium Pass D:</b> 1-HALF Day Half day Professional Advancement Course (PAC) 3-Day Conference Pass Power Quality Proceedings CD-ROM	\$975.	\$1,075.

**B. PROFESSIONAL ADVANCEMENT COURSES: (indicate Sessions in Step 4.)** PAC fees include FREE admission to Exhibit Hall, Keynote, General Session, and course notes.

<input type="checkbox"/> FULL Day or 2 HALF Days:	\$450.	\$500.
<input type="checkbox"/> HALF Day:	\$250.	\$300.

**C. CONFERENCE PASSES (Indicate sessions in Step 5.)**

<input type="checkbox"/> 3-Day Conference Pass:	\$775.	\$875.
<input type="checkbox"/> 2-Day Conference Pass:	\$575.	\$650.
<input type="checkbox"/> 1-Day Conference Pass:	\$350.	\$400.

Select day(s):  Tuesday, 11/16  Wednesday, 11/17  Thursday, 11/18

**D. CONFERENCE PROCEEDINGS: Proceedings are CD-ROMs and are included only in Premium Pass A,B,C & D. At and after the Conference, the price will be \$150 plus shipping & handling. Please Note: 2003 Proceedings are hard cover bound and are not available in CD-ROM**

<input type="checkbox"/> Power Quality 2004 Proceedings CD Rom	\$125.	\$150.
<input type="checkbox"/> Power Electronics Technology 2004 Proceedings CD Rom	\$125.	\$150.
<input type="checkbox"/> Power Quality 2003 Proceedings book	\$75.	\$100.
<input type="checkbox"/> Power Electronics Technology 2003 Proceedings book	\$75.	\$100.

**E. EXHIBIT HALL ONLY REGISTRATION:** FREE (included in Conference & PAC fees.)  
If attending FREE Keynote Session or General Session select in Step 5.

FREE	FREE (\$30 On-site)
Total: \$ _____ \$ _____	

**STEP 5: Session Selections: SEMINARS AND TECHNICAL SESSIONS**

Tuesday, November 16	Wednesday, November 17	Thursday, November 18
8:30-9:45am <input type="checkbox"/> Keynote & Award	8am - <input type="checkbox"/> PQT05	8:30am-10am <input type="checkbox"/> General Session
10am - <input type="checkbox"/> PQS01	10am <input type="checkbox"/> PQT06	10:30am - <input type="checkbox"/> PQT12
11am <input type="checkbox"/> PQS02	<input type="checkbox"/> PQT07	12:30am <input type="checkbox"/> PQT13
<input type="checkbox"/> PQS03	11:30am - <input type="checkbox"/> PQS04	<input type="checkbox"/> PQT14
	12:30pm <input type="checkbox"/> PQS05	<input type="checkbox"/> PQT15
2pm - <input type="checkbox"/> PQT01	<input type="checkbox"/> PQS06	
4pm <input type="checkbox"/> PQT02	<input type="checkbox"/> PQS07	
<input type="checkbox"/> PQT03	2pm - <input type="checkbox"/> PQT08	1:30pm - <input type="checkbox"/> PQT16
<input type="checkbox"/> PQT04	4pm <input type="checkbox"/> PQT09	3:30pm <input type="checkbox"/> PQT17
	<input type="checkbox"/> PQT10	<input type="checkbox"/> PQT18
	<input type="checkbox"/> PQT11	

**STEP 6: Method of Payment**

Registration cannot be processed without payment. Payment must be submitted in U.S. funds drawn on a U.S. bank. Registrations received with declined or invalid credit cards will not be processed.

Credit Card:  VISA  MasterCard  American Express

Check # \_\_\_\_\_ enclosed, payable—in U.S. dollars, drawn on U.S.bank—to: Primedia Business Exhibitions PSW 2004. (Fed. Tax ID#48-1071277)

Credit Card # \_\_\_\_\_

Exp. Date: \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Cardholder's Name \_\_\_\_\_

Sign: \_\_\_\_\_

Cancellation Policy: All cancellations must be made in writing and received by October 15, 2004. You will receive a refund less a \$50 cancellation processing fee. No refund request will be accepted after this date.

# POWER SYSTEMS WORLD

TRAVEL, HOTEL & EVENT INFORMATION

## Getting To and Around Chicago is Easy!

With 2 airports and Amtrak service, getting to Chicago is no problem, and getting around town is just as easy. For complete information on getting to and around Chicago, visit [www.choosechicago.com](http://www.choosechicago.com) and click on maps and transportation. The site includes information on:

- O'Hare and Midway airports
- Airport transfer services
- Public transportation from both airports
- Train information to and around Chicago
- Car rentals
- Maps
- Driving directions to Chicago
- Driving directions to Navy Pier
- Driving directions from the airports to downtown
- Parking information
- Trolley information
- Taking taxicabs (request Lobby 1 or Lobby 2 Navy Pier entrance)

## Getting to Navy Pier from the Train Stations or Anywhere in Chicago!

Its easy to find public transportation times and locations at the Chicago Transit Authorities website. Just go to [www.yourcta.com](http://www.yourcta.com), and click on Trip Planner. You can enter a starting address or simply select landmarks, such as Union Station and Navy Pier.

## Parking at Navy Pier

Parking is available at Navy Pier – and the parking garage leads right into the Convention Center. For more information, go to [www.navypier.com](http://www.navypier.com)

## Holiday Shopping in Chicago!

When it comes to Holiday shopping, Chicago rules! The Magnificent Mile™ offers hundreds of top retailers, including four separate shopping centers. Oak Street is known for its upscale boutiques. And State Street is famous for landmark department stores and the Midwest's largest jewelry district. Visit [www.choosechicago.com](http://www.choosechicago.com) for details.

## What's Happening in Chicago During the Show?

Go to [www.choosechicago.com](http://www.choosechicago.com) and click on Things to See and Do. There's a link for a Calendar of Events, just plug in the dates you'll be in town to see what's going on!

## What About the Weather?

Chicago in November is brisk but not too cold, with an average temperature around 40.



### Navy Pier

600 East Grand Avenue • Chicago, IL 60611

### General Information

(800) 595-PIER • [www.navypier.com](http://www.navypier.com)

### HOTEL ACCOMMODATIONS / SHUTTLE BUS

Be sure to mention PowerSystems World 2004 to receive blocked rates. Reservations must be made by October 25 in order to obtain the discounted rate. Shuttle buses to Navy Pier will be available from the Hyatt Regency.



### The Hyatt Regency Chicago

151 East Wacker Drive • Chicago, IL 60601 USA

Tel: +1 312 565 1234 or 800-233-1234

Fax: +1 312 565 2966

\$149 single/double

### FLY IN

#### American Airlines®

Discount Rate: Up to 10%

Authorization Number:

A88N4AB

Phone #: 1-800-433-1790

[www.aa.com](http://www.aa.com)

### CAR RENTALS

#### AVIS

Discount Rate: 5%

Discount #: D086567

Phone #: 1-800-331-1600

[www.avis.com](http://www.avis.com)

## Bring Film!

From legendary blues clubs to major league sports franchises, world-class museums and performing arts, Chicago is an awesome town to explore. And you can start right at Navy Pier, the Show location! Navy Pier has been a Chicago landmark since it first opened in 1916, and now showcases a unique collection of restaurants, shops and plenty of entertainment, including an IMAX theater, Crystal Gardens (an indoor botanical park), the Chicago Shakespeare Theater and Smith Museum of Stained Glass Windows, and the Chicago Children's Museum.