



Power Quality: An Overview

Chris Sermon, P.E.

Power Quality Systems, Inc.



With the growth of residential, commercial and industrial users, the quality of the electric power delivered and utilized has come under greater scrutiny. Suppliers, direct users and indirect users can feel the effects of poor power quality. This presentation provides an introduction to power quality – its origins, its level of importance and how it can be improved.

Chris Sermon is a member of the IEEE, and is a Senior Engineer with Power Quality Systems, Inc. in Pittsburgh. He is a Registered Professional Engineer in the Commonwealth of Pennsylvania.

Place: Westinghouse Energy Center
Monroeville
Date: May 6th
Social: 6:30 PM
Program: 7:00 PM

For more information, or to register, contact Harry Hagerty at (412) 492-0943 ext. 226 or hhagerty@ieee.org by April 29th.

Directions: From downtown Pittsburgh, take the Parkway East Outbound to Exit 14A (Monroeville). Cross the traffic light (Business 22) and proceed on Rt. 48 South for two traffic lights. Turn left onto Northern Pike. Proceed East ~ 0.2 miles and turn right at the first traffic light onto Westinghouse Drive. Travel 0.7 mile to the three flags where the main entrance is located. Parking in the evening will be plentiful in the large area in front of the building. Enter the main entrance. Check with the security inside. You will be directed to the proper auditorium for the presentation.

From PA Turnpike, take Exit 57 (Monroeville). After the toll plaza, get in the left lane (Business-22). At the first light, turn left on to Rt. 48 South and follow the directions shown above.

A New Era for The Bulletin

**E-Mail
Only**

The Pittsburgh Section ExComm is moving forward with the electronic distribution of the Bulletin. Beginning with the March issue (2 issues ago), all members of the section should have received an electronic copy. If you have been getting the paper version of the Bulletin, this is the last issue you will receive. All issues after this will be electronic only. This change in distribution medium will save the section a considerable amount of money in both printing and postage.

Distribution will be based on the email address that is in the IEEE membership database. If you have not received the March and April bulletin via email, please check the email address that is in the membership database. You can update your membership information by visiting services1.ieee.org/membersvc/coa/intro.htm.

Region 2 2005-06 Director Elect Nomination

Parviz Famouri, past chair of the IEEE Pittsburgh Section has been nominated for the Director-Elect post for Region 2. Mr. Famouri was nominated by the Region 2 Nominations and Appointments Committee, and is endorsed by the Pittsburgh Section. He is a professor at the University of West Virginia in the Lane Department of Computer Science and Electrical Engineering, and has a long history of supporting the IEEE in various capacities.

Statement - IEEE has a tremendous potential to enhance serving its members. I have the leadership and necessary skills to lead the Region towards achieving this potential.

Unemployment among electrical, computer engineers and related fields is higher than the overall national average. Some of our members are hurting by either being unemployed, underemployed or are concerned about job security. The effects of H1-B visa policy and continuation of outsourcing engineering jobs are affecting our members.

I have shown these skills as I had the opportunity to contribute significantly to the Region 2 as a volunteer for the past 6 years. As the Region 2 Student Activity Chair (SAC), I developed the student hardware competition for the Region, an annual event that brings excitement to the Student Conference. I am actively involved in the Region as the Professional Activity Committee for Engineers (PACE) Coordinator. I meet with sections, review and approve projects, and organize the Region 2 Workshops, which assist the Region's PACE volunteers to better support, our members.

For a complete listing of his statement, please visit www.ems.wvu.edu/famouri/statement.htm.



Tutorial on Variable Frequency Drives

Richard Osman, P.E.



This tutorial will begin with the basic principles of variable frequency AC motor drives of several types as well as the applicable characteristics of both induction and synchronous motors. Some of the topics to be covered are speed/torque characteristics, flux oriented torque control, dynamic and regenerative braking, synchronization and computer representation of system dynamics.

The modern variable frequency AC drive will also be described along with a number of applications. These will include the use of two four-quadrant drives to exchange power asynchronously between two power systems. The ASIRobicon "Perfect Harmony" line from 480 V, 100 hp drives to 25,000 hp medium voltage drives will be described in detail and demonstrated.

Mr. Osman graduated with a BSEE from Carnegie Mellon University (then Carnegie Institute of Technology) in 1965. He was employed by the Westinghouse R&D Center before joining Robicon Corporation in 1970. He was the Engineering Manager for AC Drives for many years. Currently, he is the Vice President of Technology for High Voltage Engineering Company, the parent of ASIRobicon Corporation. Mr. Osman is the author of a number of papers on AC motor drives and is a senior member of the IEEE. He has presented a number of seminars on AC motor drives internationally and is a Professional Engineer in the Commonwealth of Pennsylvania.

Place: ASIRobicon, New Kensington, PA
Date: May 12th and 19th
Social: 6:30 PM
Program: 7:00 – 9:00 PM

The tutorial is two evenings and will include the presentation and a plant tour. Attendees who complete both sessions will be granted 0.5 Continuing Education Units (CEU). A bound volume of the material presented will be included.

The deadline for registration is April 22nd, and the fee for the tutorial is \$50 for IEEE members, \$75 for non-members, and \$25 for student members. If you need a CEU certificate, an additional \$10 will be charged. This \$10 fee is required by the IEEE to issue the certificate. For more information, or to register, please contact Keith Sueker at (412) 793-8909 or ksueker@att.net. Please make registration checks payable to IEEE Pittsburgh Section, and mail them to Keith Sueker, 110 Garlow Drive, Pittsburgh PA 15235.

Directions from Monroeville: Take Rt. 22 East to Rt. 286 East – Golden Mile Highway. Take Rt. 286 East (past the merger with Rt. 380) to Rt. 780 (9.9 miles). Turn left onto Rt. 780. Turn left into Westmoreland Business and Industrial Park (1 mile). Turn right in ASIRobicon (0.6 miles). Visitor parking is available in the front lot near the main lobby

IEEE Pittsburgh Section – Life Member Chapter

Bob Grimes, an IEEE Life Member (LM), is exploring the requirements and interest in forming a Life Member Chapter for the section. He believes there are enough members that qualify for LM status. An IEEE Life Member is an individual who has attained the age of 65 and who has been a member of IEEE or one of its predecessor societies for such a period that the sum of their age and their number of years of membership equals or exceeds 100. LM Chapters can help to enable LMs to retain active IEEE associations, contribute to the social good in their communities, advance IEEE professional interests, and enjoy each others company.

Technical Opportunities: Arrange technical programs that may not be provided by other IEEE units; Talks on current and emerging technology; Talks on technical history; Provide assistance to IEEE entities holding technical conferences in the area; Training assistance for use of PCs and the WEB.

Public Service: Publicize the role & contributions of IEEE by talks to service clubs, PTAs, etc.; Join the RE-SEED program to provide assistance to middle and secondary schools in making science and math attractive to students (www.reseed.org); provide Science Fair judges; Mentor students and young engineers; Find and volunteer for areas of public service that needs competent technical support.

Helpful Talks: Investing; Health; Travel.

Other: Social occasions - Picnics, dinners, outings; Visit other IEEE Life Members who can't attend functions; Publicize those aspects of the IEEE Financial Advantage Program that meet the needs of seniors; Make presentations to nearby technical firms to show the virtues of IEEE membership and participation as a means of attracting new members, in cooperation with the Section's Membership Development Committee.

Contact Bob Grimes at bob.grimes@verizon.net if you are a LM and interested in this.

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Transmission Regulatory Issues in the United States

John A. Casazza, IEEE Life Fellow
IEEE Distinguished Lecturer



The key regulatory issues involved in meeting our future transmission needs will be reviewed with emphasis on coordination of institutional and technical solutions. The presentation will cover the decisions that have to be made on how to meet our future transmission requirements as future power requirements increase, power sources of various types are added and older generator units are retired. Who will make the key decisions on future transmission additions? Who will build and own them? How they will be paid for? Who will pay for them? The role of government? The role of industry? The problems of public acceptance (NIMBY)?

Through out the talk the emphasis will be on the role of the engineers in setting transmission policy in government and in industry. Why has it been declining? Possible corrective actions will be discussed and an opportunity for questions and a vigorous discussion will be provided.

John A. (Jack) Casazza is currently President of the American Education Institute, a not-for-profit organization that he founded in 1994 dedicated to providing the education needed in setting electric power policy. He is a past Director for the Georgia Systems Operation Company. He has been a member of the Executive Committee of the New York State Electric Reliability Council and the Energy Engineering Board of the National Research Council. He is a past President of CSA Energy Consultants and Vice President for Planning and Research for the Public Service E & G Co. Recently he helped form Power Engineers Supporting Truth dedicated to improving the technical competence of government officials and the leadership role of engineers (www.PEST-03.org).

Jack has received many awards for his contributions to the development of electric power systems. He is the author of more than 80 publications. Wiley/IEEE Press has just published his most recent book "Understanding Electric Power Systems – An Overview of the Technology and the Market place".

Place: Westinghouse Energy Center, Monroeville
Date: May 26th
Social: 6:30 PM
Program: 7:00 PM

This meeting will be of particular interest to the members who belong to the PES and IAS societies. For more information or to register, contact Dr. Kal Sen at (724) 696-1611 or senkk@ieee.org by May 19, 2004.

Directions: For directions to the Westinghouse Energy Center, please refer to the article on the 1st page of The Bulletin.

Model Predictive Control of an EVD Reactor for the Manufacture of Fuel Cells

Karl F. Muller, Ph.D., P.E.
Design Assurance Group, LLC

Predictive Control or Model-based Predictive Control (MPC) is the only advanced control technique to have had a significant and widespread impact on industrial process control over the last 20 years or so. MPC is not just a specific control strategy but rather a wide range of control methods which make explicit use of a model of the process to obtain control signals by minimizing an objective function that clearly stipulates the control objectives. The main reasons for the penetration of MPC into industrial practice is that

1. The basic formulation extends to multivariable plants with almost no modification.
2. It is the only generic control technology, which can deal routinely with safety, actuator and equipment constraints, and limitations.
3. It is more powerful than conventional control of 'difficult' loops, such as those, which are highly nonlinear and have long response times.

MPC has, so far, been applied mainly in the petrochemical industry with commercial predictive control software products being available such as Aspentech's *DMCPlus*, Honeywell's *RMPCT* and ABB's *3DMPC*. However, the commercial products remain mostly high-level, usually implemented on top of a conventional control layer, aimed at increasing profitability of the operation. They can be an over-kill for smaller processes, such as the one of this talk but, nevertheless, the advantages of MPC may still be desired or needed as they were in this instance.

Described in this talk is the application of predictive temperature control to an Electro-Vapor Deposition (EVD) reactor furnace built for Westinghouse and used in the manufacture of fuel cells. The nonlinear, 4-input, 4-output EVD thermal process had long variable response times and MPC was applied because of difficulties experienced when PID control was considered.

Place: Westinghouse Energy Center, Monroeville
Date: June 3rd
Social: 6:30 PM
Program: 7:00 PM

This meeting will be of particular interest to the members who belong to the PES and IAS societies. For more information or to register, contact Charles Urso at (412) 338-4871 or curso@llitechnologies.com by May 27th, 2004.

Directions: For directions to the Westinghouse Energy Center, please refer to the article on the 1st page of The Bulletin.

2003-2004 Pittsburgh Section IEEE Program Calendar

Group/Society	September	October	November	December	January	February	March	April	May
ExecCom Harry Hagerty (412) 487-8235	20 South Park	16 WVU	20 Point Park	18 Point Park	15 Point Park	19 Point Park	18 Point Park	15 Point Park	20 Point Park
Section Mtngs Harry Hagerty (412) 487-8235	20 Fall Picnic	10 Student Tour at Respironics				22-28 Eng Wk 21 IndEEE Robot Car Race	23 Power Protection & Cond.	17 Leadership Skills for Engineers	
Upper Mon Matt Valenti mvalenti@wvu.edu			3 Biometrics 12/17 Image Processing			16 Computer Forensics 23 Propulsion			
Industry Application Kal Sen (724) 696-1611	11 Model. & Simul. of Fuel Cell	9 & 16 Transformer Tutorial	6 Starter Tutorial	17 Electrical Safety	8 Intellec. Prop. 22 Trans. K-Factor	5 Power Fact/ Harmonics 18 Career Dev.	4 Load Flow 23 Power Protection	1 EMC 22 Tour – Alleg. Energy	6 Power Qual. 12 & 19 Var. Freq. Drives
Magnetics Miklos Gyimesi (412) 268-2308			14 Wall Watching						
Computer John Twigg (724) 387-2772							10 Outsourcing Summit		
Communication Prashant Krishnamurthy (412) 624-5144		3 Negative Effect of Technology on Speech							
Power Eng. Kal Sen (724) 696-1611	11 Model. & Simul. of Fuel Cell	9 & 16 Transformer Tutorial	6 Starter Tutorial	17 Electrical Safety	8 Intellec. Prop. 22 Trans. K-Factor	5 Power Fact/ Harmonics 18 Career Dev.	4 Load Flow 23 Power Protection	1 EMC 22 Tour – Alleg. Energy	6 Power Qual. 12 & 19 Var. Freq. Drives
Robotics Guy Nicolletti (724) 836-9922								8 Artificial Heart/ Internet Security	
PACE Joe Kalasky (724) 838-6492		27 Grassroots Lobbying							
Signal Processing Mike McCloud		22 Geometry in Signal Processing	25 Postural Control						
EMBS Bob Brooks			25 Postural Control						

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