Advanced Quality of Electrical Supply

20-21 November 2008 University of Wollongong

A professional development course in power engineering presented by the Integral Energy Power Quality and Reliability Centre, School of Electrical, Computer and Telecommunications Engineering, University of Wollongong.

Course Objectives

The rapidly increasing installation of electronic equipment such as digital controls, computers and sensitive process control equipment has increased the susceptibility of utility customers to supply disturbances. In addition, the application of power electronic equipment with its higher energy efficiency and more effective control features has in turn often increased the level of disturbances that might affect customer equipment. Electricity supply businesses need to have an ongoing awareness of problems and solutions in the power quality area.

This course is one of two advanced courses which build on the introductory course Quality of Electrical Supply and is designed to expand the coverage of selected power quality topics in order to give participants practical skills in the analysis and mitigation of specific problems. The selected topics for this course are:

- Voltage fluctuations and flicker
- Harmonics
- Voltage unbalance
- Power electronic mitigation techniques

Following the course, participants will be able to:

- understand how short-term and long-term flicker severity indices are calculated, assess limits for rapid voltage changes, apply the standard AS/NZS 61000.3.7 and evaluate the effectiveness of different mitigation techniques.
- calculate distortion levels, evaluate resonance problems, apply the standard AS/NZS 61000.3.6 and determine the effectiveness of mitigation methods.
- apply symmetrical component theory to the calculation of unbalance factors and understand the effects of unbalance on various loads.
- understand how power electronic devices can be used to mitigate power quality problems.

Participants will learn advanced analysis techniques and methods of improving power quality by both network and plant modifications. Course participants will have the opportunity to develop their knowledge and skills through discussion and laboratory sessions.

Who Should Attend?

Utility specialists, consultants, engineers and senior technical staff who wish to advise customers on power quality concerns, or who service large customers or who wish to understand aspects of network design, construction and maintenance techniques for maximising quality of supply.

The course assumes the participants will have an understanding of phasor calculations, simultaneous equations and Fourier analysis.

The Venue

The course will be held in the School of Electrical, Computer and Telecommunications Engineering, Building 35, University of Wollongong, Northfields Avenue, Wollongong.

About the Speakers

Professor Vic Gosbell is Technical Advisor to the Integral Energy Power Quality and Reliability Centre and has been actively engaged in teaching, research and consulting in various aspects of power quality for over twenty years.

Professor Danny Sutanto is Professor of Power Engineering in the School of Electrical, Computer and Telecommunications Engineering. His research interests include power electronic applications in industry and electrical transmission and distribution networks.

Assoc. Professor Sarath Perera is Technical Director of the Integral Energy Power Quality and Reliability Centre and teaches in the School of Electrical, Computer and Telecommunications Engineering. His research interests include power quality, EMC and power system simulation techniques.

Training Investment

The course investment provides for an inclusive industry related training package with course notes, lunches and morning and afternoon tea. Course fee per person is AUD$1,000 including GST.

Course Outline

The course is conducted over two days commencing at 8:25 am on Thursday 20 November, 2008 and comprises lectures and computer laboratories:

Day 1

- *Voltage fluctuations & flicker:* Causes, standards, effects on loads, limits, mitigation, case studies, flicker severity indices, tutorial on standard AS/NZS 61000.3.7.
- *Power electronic mitigation techniques I:* Application of power electronic devices to the mitigation of voltage fluctuations, harmonics and unbalance.
- *Harmonics I:* Overview of harmonics and Fourier analysis, definitions, estimation of harmonic currents due to load types, effect of system impedance, modelling harmonic loads, resonance effects, effect of mitigation techniques, standards including AS/NZS 61000.3.6.

Day 2

- *Harmonics II:* Overview of harmonics and Fourier analysis, definitions, estimation of harmonic currents due to load types, effect of system impedance, modelling harmonic loads, resonance effects, effect of mitigation techniques, standards including AS/NZS 61000.3.6.
- *Power electronic mitigation techniques II:* Application of power electronic devices to the mitigation of voltage fluctuations, harmonics and unbalance.
- *Voltage unbalance:* Sequence components, IEEE & IEC standard definitions of unbalance factor, load behaviour.

Accommodation

Arrangements for accommodation are the responsibility of participants and costs are not included in the course fee. A list of hotels and motels in the Wollongong area will be supplied to participants upon registration.

Enquiries

Registration enquiries: Please call Ms Esperanza Riley at the School of Electrical, Computer and Telecommunications Engineering, Uni. of Wollongong Ph: 02 4221 3580 Fx: 02 4221 3236 E: eriley@uow.edu.au

Course enquiries: Please call Dr Vic Smith at the Integral Energy Power Quality and Reliability Centre, Uni. of Wollongong Ph: 02 4221 4737 Fx: 02 4221 3236 E: v.smith@elec.uow.edu.au

Registration Form

Please enroll me in the two-day course "Advanced Quality of Electrical Supply" to be held in Wollongong, Australia from 20-21 November 2008.

Cost per person: AUD$1,000 inclusive of GST

Please register before 10 November 2008

Surname……Given Name……

Organisation……..Job title/position……..……

Postal Address……..

State……...Postcode……..Country…….……..

Telephone.....……Fax…...…….....

Mobile.....……....Email.....…….....……..

Special dietary requirements…….

Methods of Payment

☐ If you wish to pay by **credit card**, please fill out the details below and **fax to +61 2 4221 3236**.

Please debit (circle): Bankcard Visa Mastercard

Card number:

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expires: ☐☐/☐☐ in the amount of

AUD$.....

Name on card: ……

Signature: ……

Email for receipt: …….

☐ **Cheque** payable to **"The University of Wollongong"**

Mail to: PQ Course Registration
School of Electrical, Computer and Telecommunications Engineering
University of Wollongong NSW 2522
Australia

Note: There is no guarantee that economic participation levels for this course can be achieved. The program may be changed at any time due to unforeseen circumstances. If the course can not proceed for any reason, UOW will not accept liability of whatsoever kind for expenses incurred by any person or corporation with the sole exception of the course investment, which will be refunded in full.