

POWER QUALITY FROM AN ENERGY MANAGEMENT PERSPECTIVE



University of Wollongong

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

Course Objectives

Energy managers encourage customers to achieve savings by the use of advanced technologies and power factor correction. Unfortunately there can be conflicts between energy savings and quality of supply. The techniques that achieve energy savings also cause distortion of the supply and can make plant more susceptible to voltage disturbances. For example, variable speed drives create harmonics and can be tripped out by capacitor switching transients. Power factor correction capacitors can amplify harmonics and transients to levels where maloperation of equipment can occur. The POWER QUALITY FROM AN ENERGY MANAGEMENT PERSPECTIVE course will give a practical understanding of the pitfalls associated with energy management solutions that are proposed to customers.

Course Benefits

Following the course you will gain knowledge and skills to assist you in the following:

- an understanding of the various power quality problems, including the causes of power disturbances and the types of loads most affected.
- recognition and mitigation of the power quality problems that are associated with the use of capacitors for voltage regulation and power factor correction, specifically switching transients and harmonic resonance.
- the estimation of the orders of magnitude of problem situations and the use of inexpensive computer software to enable more accurate calculations. The software developed for the course will be distributed to all course registrants.
- knowledge of how utilities and customers can improve their power quality.

Who should attend?

Engineers and technical staff who advise customers about tariff policy and power factor improvement, who develop contracts with large customers or who wish to know network design and construction techniques for maximising quality of supply with regard to capacitor installations. Plant engineers responsible for the installation of power factor correction capacitors will also gain benefit from attending.

About the Speakers

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

Dr. Sarath Perera is a senior lecturer in the School of Electrical, Computer and Telecommunications Engineering. His research interests include electrical machines and harmonics and their effects on power system loads.

Dr Don Platt has worked in both light and heavy processing industries prior to coming to the University of Wollongong. He has published the results of research in magnetics, electrical machines, power electronics and power systems. Two areas of current interest are active power filters and controlled rectifiers.

Dr Venthanar Ilango has been attached to the School of Electrical, Computer and Telecommunications Engineering since 1991. His specialisation is transient overvoltages and reliability studies.

Dr. Vic Smith is a research engineer with the Integral Energy Power Quality Centre at the University of Wollongong. His research interests include investigation and modelling of power quality phenomena.

Expected background

Participants should have an understanding of AC circuit calculations, typical customer load types and power factor correction principles or have equivalent practical experience.

Training Investment

The course investment of \$495 provides for an industry-related training package that includes a copy of all lecture slides and the application software, lunch and morning and afternoon teas.

Course Outline

The course will be conducted in June/July 2000 and comprises lectures and computer-aided tutorials:

- **Introduction:** Overview of power quality issues and their increasing significance, definitions, standards, power quality problems, their causes and management.
- **Long duration voltage problems and power factor correction:** Definitions, effects of voltage variations, methods of voltage regulation improvement, power factor correction, voltage unbalance problems.
- **Transient and capacitor switching:** Classification of transients, capacitor switching transients and their magnification, transient reduction methods, lightning overvoltages and their mitigation.
- **Load behaviour:** Typical loads (eg. motors, rectifiers, AC phase control, computers, etc.), how they effect power quality and how they are effected by power quality problems.
- **Harmonic resonance and magnification:** Resonance principals, capacitors and resonance effects, detuning of capacitors, application of harmonic filters.
- **Power quality in the deregulated electricity industry:** Legal issues & regulations, standards, overseas trends.

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 sent to participants upon registration.

Enquiries

Please call or tax: Dr Vic Smith, Integral Energy Power Quality Centre, University of Wollongong
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Please note that if the course cannot proceed for any reason, the University of Wollongong will not accept any liability for expenses incurred by any person or corporation with the sole exception of the course investment that will be refunded in full.

About the Integral Energy Power Quality Centre

In July 1996, Integral Energy set up Austratia's first Power Quality Centre at the University of Wollongong. The Centre's objective is to work with Industry to improve the quality and reliability of the electricity supply to industrial, commercial and domestic users. The Centre specialises in research into the control of distortion of the supply voltage, training in power quality issues at all levels, and specialised consultancy services for solution of power quality problems. You are invited to contact the Centre if you would like further advice on quality of supply.