Report on One-Day Power Quality Training Programme: Advanced Practical Electric Power Design for Continuous Process Equipment

By : Gary Wong

Alex McEachern is a world-reknowned energy and power quality expert, garnering him the nickname "The Guru of Power Quality". Mr. McEachern has been actively involved in drafting and approving international power standards, including an active role in drafting voltage dip immunity standards, IEC 61000-4-11 and IEC 61000-4-34. Apart from his contributions in power standards, he has been conducting world tours in Power Quality Training Programmes, and his latest destination is Malaysia.

The training programme was conducted at the Eastin Hotel, Petaling Jaya on 18 May 2006 which was organised by Power Quality Engineering Sdn. Bhd. PQE's principal activity is in Power Quality, Strategic Energy Management and Predictive Maintenance. Mr. McEachern's visit was a short one-day stopover, and his seminar was an illuminating look at voltage immunity, packed into a relatively short full-day seminar.

In short, Mr. McEachern presented a facinating look at real world examples of power problems and solutions. His seminar covers a variety of topics, from harmonic and phase analysis of frequencies and voltages to practical grounding and wiring problems along with humourous anecdotes of factory complacencies and archaic problem-solving mentality. Mr. McEachern introduced the concept and application of an industrial power corruptor, which fouls the power line in order to ascertain the level of tolerances or immunity in power equipment to voltage dips or sags. This is in line with the SEMI F47 and IEC 61000-4-11/34 specifications for equipment's voltage sag immunity.

The seminar ended in the evening and Mr. McEachern was whisked off to another destination in his world-wide power training tour. ■

Figure 1: Mr. McEachern addressing the crowd

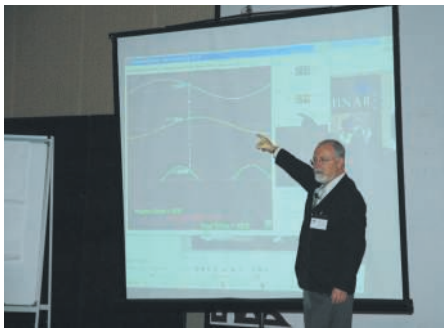

Figure 2: A demonstration of typical voltage sag waveforms

Note: The Advanced Practical Elecric Power Design for Continuous Process Equipment seminar was solely organised by Power Quality Engineering Sdn. Bhd.

INTERVIEW WITH ALEX MCEACHERN

We had an opportunity to pick Mr. McEachern's brains during the seminar, and here are a couple of his takes on Malaysia's role in voltage immunity and the challenges involved in acknowledging its importance or significance.

JURUTERA: What are your recommendations to our local factories to manage power requirements?

ALEX MCEACHERN: You have to make a distinction between price, quantity and quality of power. If price is a primary factor for companies, then we have to ensure that there is good information regarding where the power is being used and how much is being used. In most commercial buildings or factories, electricity is delivered into the building and measured at the point of distribution. There is no information regarding the usage within the compound, whether in excess or otherwise. I understand that in Malaysia, there are plans to require each factory to have a manager of electric power, which would help in this regard, but I would also suggest the usage of sub-metering, that is, metering within the factory, to find out where the electricity is being consumed.

All that said, the price for electricity in Malaysia is extremely low, compared with the rest of the world. Apart from Saudi Arabia and regions of South Africa, Malaysia has one of the lowest utility costs. In Japan for instance, the price is about four times what it is here. Personally, I'm a believer that if the price of something is high, people will consume less and be more aware of overusage. If the price here in Malaysia remains low, people tend to overconsume power without a second thought.

JURUTERA: How important is the cost and management of electric power in Malaysia?

ALEX MCEACHERN: In small to medium companies, where the cost of electric power around 1% of overall operating expenses, it wouldn't be prudent to apply much effort in managing power. However, in many technology-based businesses, the cost of electricity is negligible compared with the its quality and reliability, which is of paramount importance. For example, for a semiconductor manufacturing factory, the cost of electricity is an average of 2% of the total cost of operating the factory, but a single disturbance in the electric power system can damage millions of dollars worth of wafers.

Ultimately, the quality of electric power is an issue of compatibility. The output from the mains socket must be adjudged of a certain quality standard for operating an equipment and also vice versa, wherein the equipment is tolerant enough to sustain the output from the mains socket. Virtually all electric power goes into light bulbs and motors and it doesn't make sense to ensure high quality power to feed these equipment. Instead, equipment needs to be designed to tolerate the normal bumps and disturbances in the power grid.

The electric power system is, by its nature, susceptible to disturbances. Snakes get across insulators, diggers dig up underground cables, birds stretch their wings across power lines, lightning strikes, there will be disturbances along the power grid, so the equipment must be designed to tolerate normal disturbances. What constitutes a normal disturbance? At the moment, Malaysia has adopted an IEC 61000-4-34 standard, which specifies a nominal voltage dip tolerance. If Malaysian factories buy equipment that can meet that standard, my guess is that 90% of quality problems will be resolved. ■