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POWER QUALITY – The Silent Factor

By: Ir. Mah Soo

All of us know that Hypertension is a silent killer as it contributes towards cardio-vascular diseases and may subsequently lead to sudden heart failure and death. Many of us, both as providers and users of electrical power, also know something about power quality but only those that have been affected by poor power quality would testify to the above analogy.

To most of us, power quality is reliability of the supply electricity and any significant interruption of supply of electricity will definitely cause equipment tripping, plant outage and plant inavailability for the time between interruption and restoration of supply.

In fact, what is the definition of power quality and are there any international standards and technical recommendations on power quality? There many international standards including numerous Malaysian Standards as well.

In order to appreciate the impact of Power Quality, its definition has to be ascertained.

It could be defined according to the numerous standards, some of which are given below:

1. Power quality is the physical characteristics of the electrical supply provided under normal operating conditions that do not disrupt or disturb the customer's processes. (CENELEC EN 50160)
2. Any Event related to electrical parameters (voltage, current or frequency deviations) which result in failures or malfunction of end-user's equipment.
3. Power quality involves voltage variations/transients (such as voltage swells, sags and dips), surges (over-voltage and under-voltage), harmonics, flickers and electromagnetic interference.

The question one would ask is why power quality is not given its due recognition. It is due to the rapid increase in the usage of semiconductor devices and equipment in the present electronic and ICT revolution. This has contributed to numerous power quality problems that have not been experienced previously. The theoretical sinusoidal voltage and current waveform that has been previously taken for granted has now been transformed into some grossly distorted sinusoidal waveform by devices such as energy converters, electronic speed control of electrical drives, electronic switching, uninterrupted power supplies, electronic ballasts and energy-saving fluorescent lighting, computers and other information and communication equipment.

These contribute towards power quality problems which are being encountered both at pre-electricity power meter (utility side) and post meter (consumer side) in the form of voltage flicker, sags and swells, power interruptions, harmonics, electromagnetic interference, transients and surges. These problems can have great impact both to the performance and useful service life of electrical plants and equipment in these sectors.

Their impact on businesses due to power interruptions, downtime in repairs of damaged plants and equipment can be quantified in financial losses in the order of millions of Malaysian Ringgit as well as intangible assets such as public image and goodwill. The understanding of Electromagnetic Compatibility (EMC) will definitely improve the effectiveness in the monitoring and control of the environment to protect life-saving equipment and other critical equipment with adequate immunity with the adequacy in their specifications during their design, procurement and installation stages.

Hence the public in general and the engineering fraternity in particular need to understand these concerns and issues of power quality.

With the globalisation of trade, manufacturers, users and service providers in the electricity industry also need to be familiar with the Malaysian and International Standards on Electromagnetic Compatibility (EMC) in general and on Power Quality (PQ) in particular to be able to meet the expected participation and optimum performance.

It is important for both the utilities, users, consumers and manufacturers to be aware of the impact Power Quality problems and their influence on the planning and design of future plants and equipment. It is with this intention that the Technical Workgroup on Power Quality under the TC 77A group will be organising a seminar, "The Malaysian Standards in making the difference in Power Quality," which would be held on Tuesday, 16 August 2005 at the Concorde Hotel, Shah Alam, Selangor D.E. This seminar will highlight the EMC environment in general and Power Quality in particular. Insights of work towards the harmonisation of the Malaysian Standards towards International Standards such as the IEC in Power Quality will be discussed. The facts and myths about Power Quality, the various problems due to poor Power Quality situation together with insights on the tax incentives will also be discussed. It is hoped that this will bring benefits to both the practicing, consulting and supervising engineers in the field and also academicians. Further information on the above seminar can be obtained from the SIRIM web-site.

As a service to all IEM members who wishes to attend the above seminar, they can register with the Electrical Engineering Technical Division of IEM and if the number is substantial, we will attempt to approach SIRIM to negotiate for some group discount as an added benefit to our IEM members.