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Good EMC practice helps reduce financial risks

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Good EMC practice helps reduce financial risks

Keith Armstrong on the financial risks faced by panel builders who may not follow the EMC regulations as closely as they should

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Electromagnetic compatibility (EMC) is concerned with ensuring that equipment does not interfere with other equipment so much that it doesn't work properly, and also with ensuring that equipment will operate well enough in its intended installation(s) despite the electromagnetic (EM) disturbances it will be exposed to when installed.

No one wants to manufacture equipment that suffers from inadequate EMC, because of the very high costs of solving them after installation, or under warranty – but few panel and system builders manage this issue correctly, so are exposed to uncontrolled financial risks.

The new EMC Directive (2004/108/EC) and its implementing UK law (Statutory Instrument 2006 No. 3418) are both fully in force from 20th July 2007 (see PSB June 2007), replacing the old EMC Directive 89/336/EEC (UK SI: 1992 No. 2372) which have been in force since 1996.

Most panel and system builders do not bother with complying with these laws because in the past they have not been enforced very much (this may not be true in the future). This can be a costly mistake, because compliance helps reduce financial risks due to EM interference (EMI), a common problem in modern installations, and getting worse as electronic technologies develop and proliferate more widely.

Solving EMI problems after installation is a costly and time-consuming exercise that consumes the profits from many trouble-free projects. It has been known for an EMI problem with one project to cause company accountants to recommend winding-up a custom-engineering company. Many examples of EMI problems, resulting in serious losses and/or bankruptcy will be found in the '*Compendium of Banana Skins*', available from the 'Publications & Downloads' page of my website www.cherryclough.com.

Panel and system builders often do not bother with EMC testing, because they think that the tests are too costly – but *there is no need to test every product*. If good EMC engineering techniques are employed, it is generally sufficient to test every so often (maybe once a year) and if necessary use the results to modify the EMC techniques employed and the choice of 'preferred components'.

The usual EMC test standards for control panels and systems are:

- EN 61000-6-4 (emissions) and EN 61000-6-2 (immunity), for industrial environments (supplied with LV mains from their own HV distribution transformer)
- EN 61000-6-3 (emissions) and EN 61000-6-1 (immunity), for residential, commercial, and light industrial environments, which share their LV mains distribution network with other users.

These are the 'generic' standards, but if there are product-specific standards that are more relevant, they should be used instead. A list of EMC Directive standards can be found at: http://ec.europa.eu/enterprise/newapproach/standardization/harmstds/reflist/emc.html), and is updated every few months.

The test standards represent typical EM environments, but they do not test with very strong radio fields – so where cellphone or walkie-talkie handsets, other radio transmitters or radio-frequency processing equipment could be used in close proximity (e.g. diathermic plastic welding, induction heating, etc.) it is best to test with increased levels in the appropriate frequency bands.

Some installations have demanding EM environments, for example some scientific and medical sites need lower emissions and/or greater immunity. Industrial sites where high-power equipment is used can need greater immunity. Some sites are more exposed to lightning, and where safety, national infrastructure or security is concerned equipment needs to operate reliably despite *foreseeable worst-case* EM disturbances, possibly including 'EM Weapons' used by terrorists or other criminals.

A guide on '*Assessing an EM Environment*' is available from my website. It includes a form that helps determine whether the usual standards are sufficient, and gives guidance on what constitutes 'close proximity' for various types of radio transmitter.

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Panel and system builders often use what is often called the ‘CE + CE = CE approach’ to EMC compliance. Manufacturers purchase ‘in good faith’ items that are CE marked, follow suppliers’ assembly instructions and assume that the result will be ‘CE compliant’ without any more work. But there has never been any technical or legal justification for this approach, and the only reason they have got away with it so far is because there has been so little enforcement.

It is usually assumed that if any legal problems arose, the investigating officer could simply be redirected to the supplier whose products caused the problem. But the law doesn’t work like that: manufacturers are *totally responsible* for all aspects of their products and systems, and buying ‘in good faith’ is no defence. The EC Guide on the new EMC Directive specifically warns against CE + CE = CE, and it is also inadequate for complying with the Low Voltage Directive for safety.

But the main problem with the CE + CE = CE approach is that it is not good EMC or safety engineering, so does not help to control financial risks.

For those who wish to investigate further, the Directives and Regulations, and their official guides, plus a great deal of useful and practical information, are available as described in the document: ‘*Some Useful References on EMI and EMC*’ posted on this site.