

SLIM: Efforts to simplify the EMC directive

The report of the SLIM III (Simpler Legislation for the Internal Market) team addressed many of the ambiguity problems in the EMC Directive.

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In May 1996, the European Commission started the Simpler Legislation for the Internal Market (SLIM) initiative. In its report, the name was changed to Simpler Legislation for the Single Market. The goal of the initiative was to identify ways to simplify existing single market legislation. The Commission is required to consider the recommendations of the SLIM team, and the views of others, before taking their own position in a "Communication" to the Council and European Parliament. If the Commission rejects any of the recommendations, then it must specifically justify the rejection in the Communication.

THE EMC DIRECTIVE AND SLIM

The Electromagnetic Compatibility (EMC) Directive 89/336/EEC is one of the "New Approach Directives" that have the objective of guaranteeing the free movement of goods, money and people throughout the European Union (EU) and/or the European Economic Area (EEA). The EMC Directive was adopted in 1989, although there was a transitional period until 1 January 1996, at which time the Directive became mandatory. Since that time, several events have affected the Directive. These include:

- A revision of the Global Approach

(Council Decision 93/465/EEC)

- New sectoral directives containing EMC requirements
- The revision and publication in November 1997 of the Commission Guidelines on the Application of the EMC Directive

According to the report, the EMC Directive was chosen to undergo the SLIM process for a variety of reasons. The Commission identified the following problems:

- Divergent interpretations of the Directive
- A lack of uniformity in the application of the conformity assessment procedures
- Unnecessary red tape due to the technical phenomena covered by the Directive and the lack of a coherent approach to the same category of products/phenomena in different pieces of Community legislation

The areas investigated were:

- Basic principles of the Directive
- Large machines and installations
- Conformity assessment procedures
- Standards
- Dealing with the EMC requirements of other directives (horizontal versus vertical)
- Impact of the Commission guidelines on the application of the EMC Directive

The SLIM Team finished their assessment of the EMC Directive and has issued their report. The report is a public docu-

ment and should soon be available on the web and various other places. Nevertheless, most of the report follows. The report includes 20 recommendations. The analysis and recommendations are broken down into headings that are repeated here.

FREE MOVEMENT OF GOODS

ANALYSIS

The EMC Directive is a total harmonization Directive based on Article 100a of the Treaty, thus removing technical barriers to trade. It prevents member States from imposing divergent national EMC legislation or added technical EMC requirements as a pre-condition for placing products on the market and/or taking the equipment into service.

The Directive does in principle ensure the free movement of goods. However, the Treaty also requires that "any action shall not go beyond what is necessary to achieve the objectives of this Treaty." This limits the scope of any directive to that which is strictly necessary to achieve the objectives, and also the extent to which the applied regulation translates into technical requirements.

RECOMMENDATIONS

- R1** The EMC Directive should remain a total harmonization directive by which free movement of goods is ensured.
- R2** The text should ensure that no additional national measures related to EMC are created. The Directive should cover all relevant aspects of EMC which would otherwise allow for such national measures on the basis of Article 36 of the Treaty.

GLOBAL CONSIDERATIONS

ANALYSIS

The market for products covered by the EMC Directive is global, a fact now recognized by both multinational companies as well as Small and Medium-sized Enterprises (SMEs). Harmonization on a global scale is therefore of great importance to facilitate EEA/World trade. The sim-

plest way to achieve global harmonization is to minimize legislation. Having minimized legislation to the level necessary to achieve the objectives, steps must then be taken to ensure that the EEA legislation does not diverge from legislation in force in some regions of the world except when absolutely necessary.

RECOMMENDATIONS

When assessing the EMC Directive, the global dimension should be taken into account to ensure that:

- R3** EMC legislation should not result in added costs for consumers due to unique requirements where this cannot be appropriately justified as being essential for the European market only;
- R4** European industry should address a global marketplace without unjustified additional costs and delays.

SAFEGUARDING THE PUBLIC INTEREST (SAFETY)

ANALYSIS

Safety aspects with regard to immunity for some types of equipment are part of the so-called functional safety. But immunity is only one factor that can influence functional safety. Therefore, functional safety has to be looked at in conjunction with other safety aspects and should be dealt with in directives containing essential safety requirements, e.g., the Machinery Directive, Low Voltage Directive, etc. This view is shared by EMC experts who have expressed precisely in the generic standard for

RECOMMENDATIONS

- R5** Functional safety should be addressed in directives containing essential safety requirements.
- R6** The impact of functional safety should be investigated in relation to both hardware and software.
- R7** The Standing Committee or the Working Parties under these directives should confirm whether or not functional safety is taken into account under their directives.
- R8** Immunity requirements should be more fully addressed in the EMC Directive to prevent new national legislation.
- R9** The protection requirements of the Directive should contain the emission and immunity requirements in such detail that only specific technical questions (e.g., levels, test methods, requirements specific to certain products or product families) are left to standardization.

SAFEGUARDING THE PUBLIC INTEREST (PROTECTION OF RADIO COMMUNICATIONS NETWORKS AND PROTECTION OF ELECTRICAL EQUIPMENT AND INSTALLATIONS)

ANALYSIS

It is accepted that such networks are of very high importance and therefore need to be adequately protected. In addition, the electromagnetic spectrum usable for communication

**The simplest way to achieve global harmonization
is to minimize legislation.**

purposes is a limited resource and should not be polluted by unintentional emissions. The definition of permissible emissions is clearly a technical matter and should be left to standardization. However, leaving the definition of EMC environments and the conditions of use for these

products within those environments to standardization is considered to lead to confusion and uncertainty.

Protection of radio communications means the protection of existing services as well as new radio services. The latter should be considered with due respect to the public interest.

All electrical equipment and installations are exposed to an electromagnetic field and, if connected to the power supply network, to disturbances from that network.

RECOMMENDATIONS

R10 The required "high level of protection" should be achieved by mandatory emission requirements as the first line of defence of the limited electromagnetic spectrum. Those emission requirements should take into account radiated and conducted emissions.

R11 The protection requirements should define certain classes of EMC environment and conditions for the intended use of products within those classified environments.

LARGE MACHINES AND INSTALLATIONS

ANALYSIS

In the context of the following section of the report, installations, which include machines installed at their work place, electrical installations and networks, are taken to be fixed.

Using the same principles of conformity assessment for installations as for apparatus is both extremely difficult and expensive, and in some cases impossible.

It is also evident that installations are presently included in the scope of the EMC Directive (under the term "apparatus") and are considered in the same way as electrical equipment which is not fixed. Subjecting installations to free circulation may require specific provisions. Given this and the uniqueness of each installation, it should be sufficient to assess

against Article 4 under the given environmental conditions.

The European Commission Guidelines on the Directive requires conformity only to the technical requirements of Article 4 but omitting all requirements which result from the objective of free circulation (e.g., EC Declaration of Conformity, CE Marking). Whilst this is useful information, it may go beyond the explicit provisions of the Directive.

There is also a need for clarification of responsibilities of all concerned interests, which are:

- Electricity suppliers to provide a supply network, which does not itself generate unacceptable disturbances
- Manufacturers to provide apparatus to users which meets the protection requirements of the Directive
- Consumers to use apparatus in accordance with manufacturers' instructions (consumers' installation can be polluting and emit disturbances on the network)

Large machines look like installations and often there is no difference at all. Small machines can be treated like apparatus. Installations are treated differently from apparatus. Therefore, a definition has to be found in order to separate both categories.

In practice, installations rarely cause EMC problems to neighboring installations. Therefore, they are not subject to assessment tests now. Only in case of a complaint from a neighbor should a demand for assessment be possible. For that purpose, a proper standard (e.g., CLC TC210 - prEN50217) should be available. If assessment is necessary, a possible way to ensure compliance with the directive would be to monitor electromagnetic emissions at a reasonable distance from the perimeter of the installation or at the utilities' supply connection point. This would ensure that as a whole, the installation does not generate emissions that would impact on neighboring equipment or installations.

If an installation or a large machine is made up only of CE marked products, it is assumed to be in conformity with the Directive (CE + CE = CE). However, this is not the only solution. The Directive should also allow reduction systems that are incorporated as a part of the facility. It is in the best interest of the owner of a production facility to ensure that EMC does not impact production. It makes no sense from a cost or performance standpoint to duplicate these efforts at equipment level.

An installation may be constituted by either:

- CE marked apparatus (CE + CE = CE)
- Apparatus with CE marking and parts without
- Not CE marked parts at all.

If the installer or manufacturer is of the opinion that the final installation will not comply with the protection requirements of the EMC Directive, in all three situations he shall choose on his own initiative to use reduction systems at component or installation level as well, the latter such as compensation systems, which are incorporated as a part of the facility construction.

In case of a challenge, appropriate measures have to be performed either on component or on installation level (compensation measures) to bring the installation in compliance with the protection requirements of the directive.

RECOMMENDATIONS

R12 Suitable definitions of "large machines" and "installations" should be included in the directive; large machines should be treated as installations. For clarification, the definitions of small installations, "large machines" and "networks" should be added.

R13 In the absence of complaints, installations and large machines should not be subject to assessment tests. If assessment is necessary, a possible way may be to monitor emissions from the

installation at a reasonable distance from the perimeter of the installation (radiation) or at the utility supply connection point (conduction).

R14 The Directive should be amended in a way that compliance of a fixed installation with the essential requirements of the Directive should be ensured by following the EMC assembly instructions given by the manufacturer of the constituent parts and using a method of installation which is in accordance with good engineering practice within the context of the installation, as well as installation rules (national, regional or local). For fixed installations there should be no need for CE marking, an EC declaration of conformity or involvement of a competent body.

R15 The Directive should allow installations to be constituted by either:

- CE marked apparatus (CE + CE = CE),
- Apparatus with CE marking and parts without,
- Not CE marked parts at all.

In case of a challenge, appropriate measures have to be performed either on component or on installa-

obligations. However, the majority of (but not all) members could not agree to this on the basis that it seemed possible that such a change could impose new unnecessary burdens on manufacturers (i.e., the need to produce a technical file even when harmonized standards were applied) and made the market surveillance more complicated.

The group could not agree that the advantages of alignment (e.g., technical documentation and the role of the competent bodies) with the LVD and the Modules Decision would outweigh the possible disadvantages.

RECOMMENDATIONS

There were no recommendations in this area.

STANDARDS

ANALYSIS

Although standards are not strictly an issue for the SLIM team to consider because they lie outside of the legislation, given their critical importance to the correct application of the Directive, it was considered appropriate to address this area. It was also considered appropriate for inclusion because most manufacturers now choose to use the standards route to conformity, and there has been a consistently high level of

ing his own tests according to relevant standards and enjoying a presumption of conformity to the EMC Directive. However, several standards contain very complicated tests procedures, which can be carried out by Competent Bodies, and well-experienced laboratories only.

EMISSION STANDARDS

In general terms only a few standards are required. The limits should depend on the environment, which should be more clearly defined in the Directive. In addition, there is no need for different limits for different kinds of apparatus operating in the same environments in order to fulfil the protection requirements in Article 4 of the Directive. However, due to the increased usage of radio spectrum for new services, there may be a need to scrutinize the relevance of existing international standards related to emission from unintentional transmitters.

At present, there are approximately 100 published standards and many are waiting to be published. A great number of emission standards refer to some few standards, for example generic standards and CISPR 11, 14, 16 and 22.

The several numbers of standards appears to be conflicting with the CENELEC Report R110-001 "Guide

The great number of similar emission and Immunity standards should be reduced in order to make the choice of relevant standards more clear, especially for smaller enterprises.

tion level (compensation measures) to bring the installation in compliance with the protection requirements of the directive.

CONFORMITY ASSESSMENT PROCEDURES

ANALYSIS

The group considered the merits of aligning the Directive in this area with the Low Voltage Directive (LVD) including the appropriate conformity assessment procedure modules and

complaint about EMC standards.

The great number of similar emission and immunity standards should be reduced in order to make the choice of relevant standards more clear especially for smaller enterprises. This is also increasingly important due to the emergence of multi-function products where the choice of the relevant standard is not obvious. The aim of using harmonized standards is to give the manufacturer the opportunity of perform-

on EMC standardization for product committees." According to Clause 2.3.1. (Product-family standards) it is intended that product-family standards should not normally include detailed measurement/ test methods or test instrumentation, but give reference to the basic standards. In exceptional and justified cases, specific test methods or deviations from the test in the basic standards may be necessary. Where deviations are necessary, they must be fully justified,

and the rationale shall be indicated in the product-family standards.

IMMUNITY STANDARDS

A number of immunity standards are considered by the panel to be quality standards. The level of immunity required by some standards are judged to be over-onerous and disproportionate. It is accepted that immunity should continue to be covered by the Directive. However, a standards review should be carried out in order to avoid unnecessary technical requirements.

CLASSIFICATION OF ENVIRONMENTS (CLASS A/B OVERLAPPING)

The scope to the generic standards and the CENELEC Report R110-002 "Guide to Generic Standards" seems to describe usable definitions. However, it is important that Europe does not deviate from other regions of the world in the classifications.

RECOMMENDATION

R16 The Commission should request from European standardization bodies the setting up of a strategic review panel of the EMC standards within the framework of the EMC Directive. Such a panel should consist of a representative of the Commission, standardization experts from Member States, Industry, CENELEC and ETSI. The task of the panel should be to take a critical look at all EMC standards, their relevance and their applicability. Regarding preparation of future standards the panel should further discuss the necessity of a new mandate from the Commission to CENELEC and ETSI in order to produce fewer and more usable standards.

DEALING WITH THE EMC REQUIREMENTS OF OTHER DIRECTIVES

ANALYSIS

According to Article 2.2, the EMC Directive does not apply to products

which are covered by a specific Directive containing specific EMC requirements. These provisions may be considered justified for products with a potentially strong impact on safety and/or performance (e.g., medical devices, non-automatic weighing instruments) and/or which operate in a particular EMC environment (e.g., automotive products). Given the advantages of the horizontal approach for both industry and national authorities there appears to be little justification for any further vertical EMC requirements.

RECOMMENDATIONS

R17 The Commission should not propose any new vertical EMC legislation unless it is related to safety or it is clearly demonstrated that the particular issue cannot be dealt with adequately within the EMC directive.

R18 The Commission should consider whether there is any need for EMC provisions in existing vertical directives given that relevant technical standards can be produced under the EMC Directive.

IMPACT OF THE EMC COMMISSION GUIDELINES ON THE APPLICATION OF THE EMC DIRECTIVE

ANALYSIS

The shortcomings of the EMC Directive, as detailed in this report, makes its application extremely difficult in some cases. To resolve the problem area, the Commission and Member States, assisted by industry and other interested parties have prepared a set of Guidelines on the Directives. This document has achieved broad consensus and has proven extremely useful to all parties. This leads to the conclusion that there is a need for the review of the Directive to bring it in line with the principles developed in the Guidelines.

Simplifying the EMC Directive should not mean simplifying the text (which proves to be too simple), but

simplifying the application. This is to be achieved by the clarification; there is no intention to omit any essential requirements.

RECOMMENDATION

R19 The Directive should be reviewed with a view to revision taking due account of the Guidelines, in order to incorporate:

- a) definitions specific to the EMC Directive (components, autonomous function, EMC passive equipment, etc);
- b) the EMC analysis process;
- c) the procedure for application of the Directive to installations, apparatus and systems with various configurations;
- d) any other areas which could be usefully transferred.

FINAL RECOMMENDATION OF THE SLIM EMC TEAM

R20 The Team underlines that several individual recommendations made above relating mainly, but not exclusively, to the Commission Guidelines should result in the Directive being reviewed and amended. The Team therefore recommends that a review of the Directive be initiated by the Commission.

CONCLUSION

Many people in the EMC business are breathing a sigh of relief because, based upon the findings of the SLIM team, there were many rumors circulating within the EMC community. They ranged from removing many of the mandatory requirements to completely revising the entire Directive to the point where individual member states might try to enact national legislation concerning EMC. As we can see by the recommendations, the team has tried to cure many of the ambiguity problems and have essentially left the meat of the directive alone. The area that received the most attention in the report is the

section on large machines and installations. This is no surprise because this topic has been discussed in virtually every EMC meeting involving the EU EMC Directive since its inception.

According to Dave Imeson, Chairman of the European Commission Association of Competent Bodies (ECACB), "SLIM requires an update to the EMC Directive so first, Directorate General III (DGIII) needs to draw up legislation that implements the recommendations. Then it has to go through the whole process of rulemaking in Europe, the Commission, the European Parliament, and the Council of Ministers. Then, when all that is done, each member state has to change its national law. Hence a very long time, possibly 4 to 6 years."

In conclusion, it appears that there is considerable work required to bring the directive, guidance document and many of the specifications into line with the recommendations of the SLIM Team, but the essential requirements have not been changed.

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Reducing measurement uncertainty in EMC test laboratories ...

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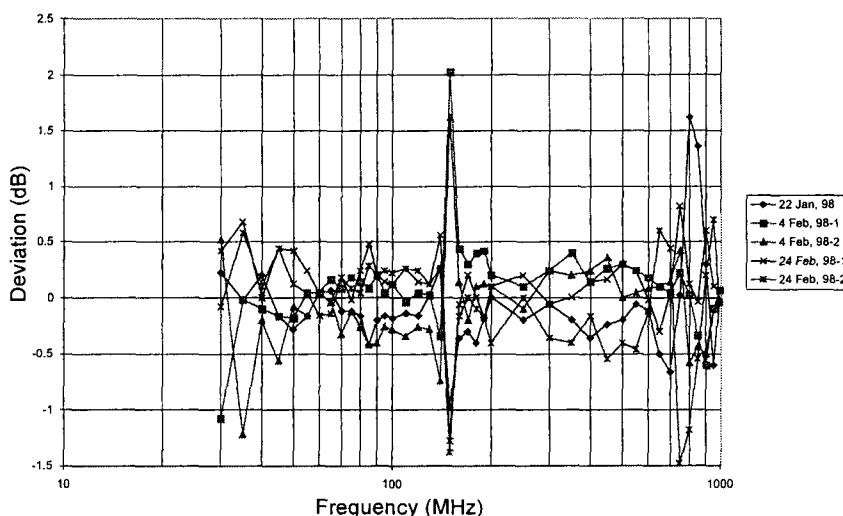


Figure 16. Lab #1 horizontal polarization measurement deviation (from NIST), with site calibration factor.

While accurate EMI measurements are difficult, and large measurement uncertainties have been accepted in the past, most companies can no longer afford to place large guard bands on their products, effectively lowering the regulatory limits to ensure that the product passes. The only way to reduce the large guard bands used by most responsible companies is to increase the measurement accuracy. This increase in measurement accuracy (and reduction in measurement uncertainty) requires additional effort and calibration by vendors beyond that which is called for by regulatory agencies. However, the tools are available today, for those wishing to use them.

REFERENCE

1. Note: because of the level feedback provided in this unit, the dependence on the signal generator calibration was eliminated.

BRUCE ARCHAMBEAULT, PH.D. received his Ph.D. from the University of New Hampshire in 1997. His doctoral research was in the area of computational electromagnetics applied to real-world EMC problems. Having been with Digital Equipment Corporation and SETH Corporation, he recently joined IBM in Raleigh, North Carolina, where he is the lead

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