DEVELOPMENT AND APPLICATION OF DATABASE OF HARMONIZED STANDARDS RELATED TO ELECTROMAGNETIC COMPATIBILITY

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Abstract. *The free movement of products in the area of the United European market is assuring through implementation of the normative acts of European Union. The Directive 2004/108/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC is a main directive in a European technical legislation which covers a big number of contemporary products. The essential requirements specified by it can be provided by means of using of harmonized European standards.*

In this paper the authors presented the possibility for development and implementation of database of harmonized standards for the needs of assurance the field about electromagnetic compatibility. The application of the realized database has an aim to help manufacturers of the products, which are covered form the directive 2004/108/EC.

Keywords: *electromagnetic compatibility, harmonized standards, database*

1. INTRODUCTION

The technical harmonization of the national laws and standards of the Member States of European Union (EU) has an aim to regulate the significant legislative object of the European law - establishment of the European Single Market (ESM) with free movement of products, services, people and capital. As a result, it should be achieved [1]:

– Each Member State to produce and export products that meet the technical requirements defined in EU regulations;

– Each Member State to ensure the free movement of products from the other Member States to its market.

2. LEGISLATIVE REQUIREMENTS

To ensure the functioning of the ESM, Directive 2004/108/EC on electromagnetic compatibility regulates the electromagnetic compatibility of equipment. The "Equipment" means any kind of mobile apparatus or fixed installation [2]. This Directive does not affect the application of technical legislation which relates to the safety of the equipment. Member States are obliged to take the necessary measures to sell and bring into play only equipment complying with the Directive under proper installation, maintenance and use.

In order to ensure the free movement of mobile electrical and electronic equipment, the national provisions of the Member States which provide protection against electromagnetic interference must be harmonized. As the equipment covered by Directive 2004/108/EC includes both mobile apparatus and fixed installations, separate provisions for both varieties are provided. Mobile devices may move freely within the EU and fixed installations are installed for permanent use at a predefined location as assemblies of various mobile phones and other devices.

The mobile devices can be placed on the market or put into service only when it is designed and manufactured according to the requirements of the Directive. It is marked with "CE" sign in order to demonstrate compliance. Although conformity assessment can be performed by the manufacturer, without requiring the involvement of a notified body, it is also given the possibility to manufacturers to use that authority. Assessment relating to electromagnetic compatibility of equipment is made to determine whether it meets the requirements for protection under the Directive.

Fixed installations, including large machines and networks can lead to the generation of electromagnetic interference or to be their object. Interface relation between fixed installations and mobile apparatus is possible, as the electromagnetic disturbances produced by fixed installations may affect mobile apparatus, and vice versa. In terms of electromagnetic compatibility, it is irrelevant whether the installation or equipment produces electromagnetic interference.

Due to their specific characteristics, fixed installations are not marked with "CE" sign and they are not accompanied by a declaration of conformity.

3. HARMONIZED STANDARDS

The harmonized standards are European standards, adopted by the European standardization organizations - European Committee for Standardization (CEN), European Committee for Electro-technical Standardization (CENELEC) and European Telecommunications Standards Institute (ETSI). These three organizations are recognized as competent institutions on the adoption of harmonized standards in Directive 2004/108/EC. The standards are developed in accordance with the general guidelines for cooperation between the three European standardization organizations and the EU Commission as well as the procedure of Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations (Directive as last amended by the Act of Accession 2003)

Harmonized standards [3] are not specific category among all European standards. The terminology used in the directives is a legal definition of technical specifications in existing European standards, but to which it has been given special meaning of these directives. These standards have the status of voluntary application within the scope of the directives.

After approval of the harmonized standards of the European standard organizations, the Commission publishes a statement thereof in the Official Journal of the EU. With this act they actually acquire the status of harmonized to a directive.

European standards harmonized to Directive 2004/108/EC reflect the generally recognized current status, which refers to the electromagnetic compatibility of equipment. They should meet the essential requirements of the Directive [4] and to have features that are defined by standardization mandates from the EU Commission. The mandate should also be consistent with the directive that the implementation of the harmonized standard in the design, manufacture and control of the equipment leads to a presumption of conformity with the essential requirements. In the mandate most completely and accurately describes what the standard should contain. The harmonized standard may contain provisions which do not relate to the essential requirements. Then these clauses must be clearly distinguished from those covering the essential requirements. It is not necessary the harmonized standards to cover all the essential requirements. In this case, it depends on the manufacturer how to fill the gap between the harmonized standards and the essential requirements to meet the requirements of the Directive.

4. DATABASE – NATURE AND TECHNOLOGIES FOR DEVELOPMENT

Nowadays the application of engineering and technology is closely related to the activity of human resources in all sectors of the economy. Not least, it should be noted the engineering, which is an activity through which many engineering problems are solved in which in order to achieve the end result processing of large amount of information and/or the execution of multiple computing and optimization procedures should be done. In this aspect, the engineering community would accept positively the establishment of adequate applications through which the work of engineers will be facilitated and the solution of engineering problems will be supported through the use and application of modern tools and technologies. All this should be done with the main goal - reducing the resources invested in the activities: human, time, financial, energy. The environment known as "Internet" offers virtually unlimited opportunities for development and use of applications useful these days.

4.1. Database

According to [5] database is a "kind of organized collection of facts". Databases provide the core functionality of data storage and manipulation of them. Much of the database is called relational and use SQL [6] as the main language.

Relational database is composed of tables interconnected by set by the developer of the system criteria. Each table contains information about each object stored in it. The order contains the data for a single object and it is composed of columns describing the characteristics of the object. Each database file can contain many sheets. Tables are available through view - logical subset of a table or combination of tables. The view defines how to access and review the data in the table, but it does not contain data and it allows creating further logical relationships between tables without creating further copies of the data.

Widely used system for creating databases is "MySQL". "MySQL" is relational, control system database using SQL. "MySQL" is "Open source" and it has the ability to add data to the database. "MySQL" stands out from other available database with speed, security and flexibility.

The advantages of "MySQL" as a system of relational databases are:
1) Provides an application programming interface (API) for C, C++, Java, Perl, PHP, Python.
2) "MySQL" is "the Open sourc" and it is compatible with Linux, UNIX and Windows operating systems.
3) to "MySQL" has an interest of Oracle, IBM, and Informix.
4) Recent trends in software development is "MySQL" fully support the standard ANSI 99 (ISO / IEC 9075-1: 1999) and its parts.

The main disadvantage is that "MySQL" works best only in the management of content and without any input-output information processing on the data contained in it, but modern trends of development of the system are in the direction of elimination of this disadvantage.

4.2. PHP (*H*ypertext *P*re*p*rocessor)

PHP [7] is a scripting language whose syntax is based on C and Perl. It is used most often in Web programming environment for the realization of a wide range of services. PHP is released under an open license which license allows free distribution of the source code of the interpreter of the language, and creates derivative interpreters under other licenses on condition that they cannot include "PHP" in its name. Free distribution of PHP makes it very suitable for a build Web server based on Linux, Apache, MySQL. In "inquiry" by a user, PHP is interpreted by the Web server where it is uploaded, and the result returns to the Web browser. Access to the contents of the PHP code is difficult, and thus a particular attention to information security is paid.

5. DATABASE OF HARMONIZED STANDARDS FOR ELECTROMAGNETIC COMPATIBILITY OF EQUIPMENT – DEVELOPMENT AND APPLICATION

5.1. Database Structure

The database development is based on information presented in [8]. The proposal presented in this publication is to develop a relative database composed of three tables. Structure of the database is presented in Fig. 1.

The database is structured by three tables, the contents of which describe different necessity for engineering activities related to electromagnetic compatibility parameters. Database 1 ("Keywords") in this database introduces information about keywords, through which the search will be performed. The analysis of keywords is subjective, based on the expertise and experience in the field of electromagnetic

compatibility of equipment. Based on it, a list with selected search words in the relevant field is prepared. Database 2 ("Standards") is a database of numbers and names of the harmonized standards relating to electromagnetic compatibility of equipment under the Directive. Database 3 ("Generalization") is a database that summarizes information about the correlation between keywords and their containment in the relevant harmonized standards. Links between databases are bidirectional. All interconnected in order to ensure the information security of consumers applying standards relating to equipment and brought it to electromagnetic compatibility requirements.
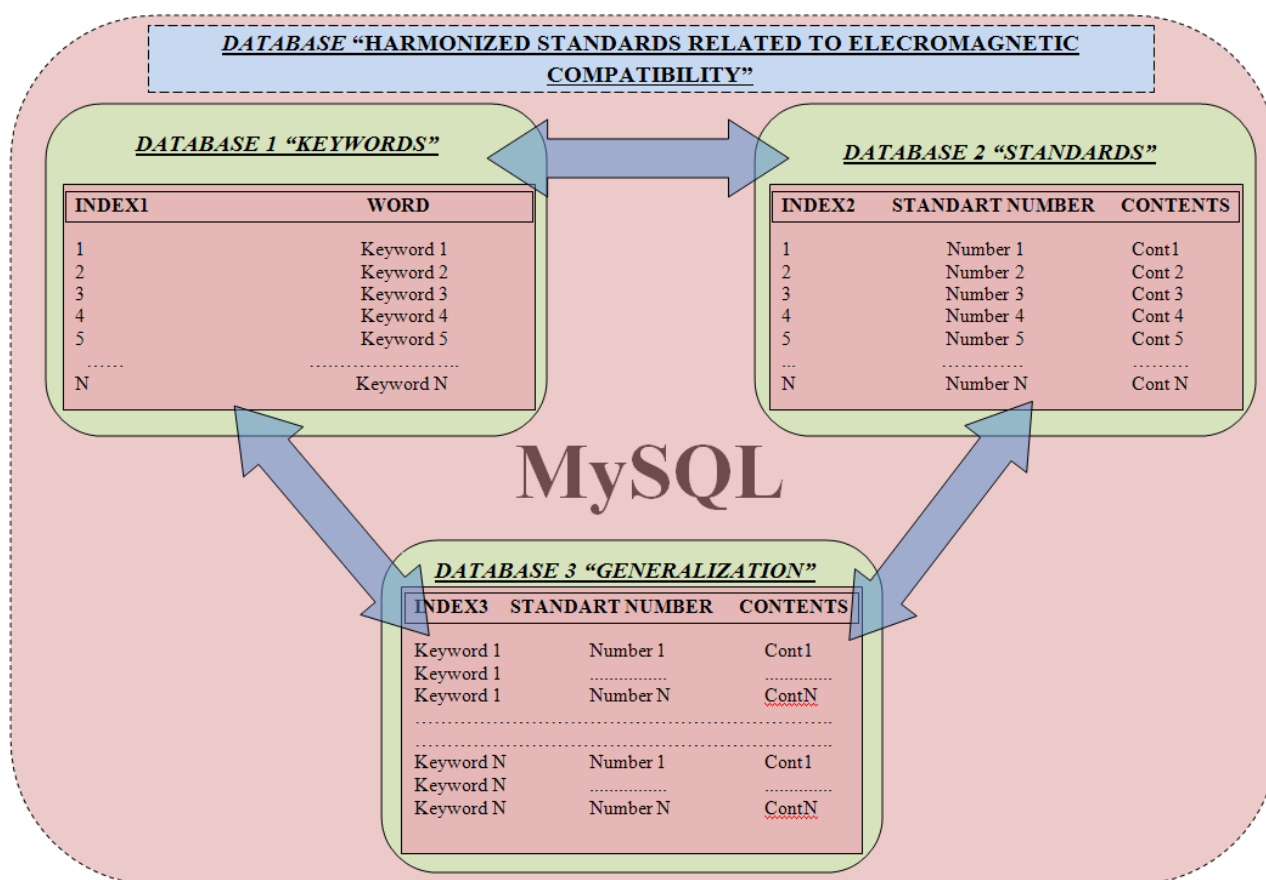

Fig. 1. Database Structure

5.2. Database development

On the Fig. 2 it is shown a step of the development of the database. Its components and connections between them are presented. Later its applications will be upgraded.

6. CONCLUSION

In this paper the authors make an analysis of the legal requirements relating to electromagnetic compatibility in order to justify the need to create a database of

harmonized standards in this area. Thus the proposed database developed in MySQL, would be useful for manufacturers to design and manufacture their products.
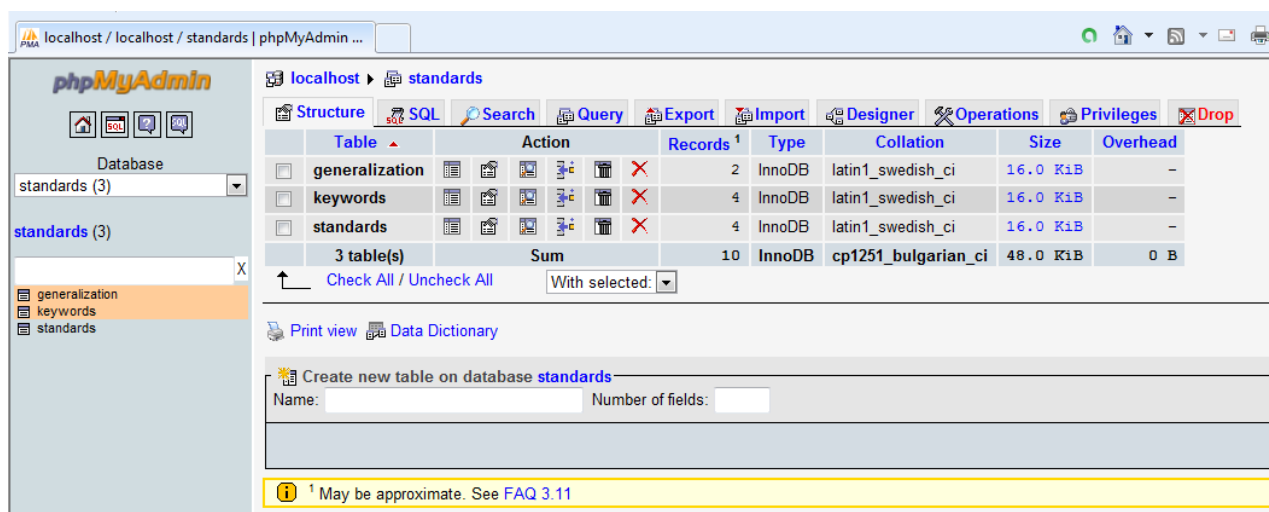

Fig. 2. Database in development process

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