

The Database for Technical Regulations in the Area of Railway Infrastructure

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Abstract - European Union has made a series of regulations with the purpose to achieve opening, linking and adjustment of national railways within the framework of European railway network. In this paper is shown an overview of technical regulations in the area of railway infrastructure that have been made in the EU. Also is shown a current state of railway regulations in the Republic of Serbia. One of the essential conditions for integration of Serbian railways with Railways of European Union is harmonization of regulations with EU railway regulations and standards. In this paper the database for the harmonization of technical regulations in the area of railway infrastructure is represented. The database enables simple research and availability of all necessary data and includes European and Serbian technical regulations. This is a reason why it is of great importance for operation of the enterprises that work in the area of railway infrastructure management.

I. INTRODUCTION

The European Union has enacted various legislative measures aimed at achieving the opening up, integration and harmonization of national railways to form a European railway network. One of the essential preconditions for the integration of the Serbian Railways with those of the European Union is to approximate Serbia's railway regulations and standards to those of the EU [1,2].

Fig. 1 shows the current status of harmonization of subordinate Acts for railway infrastructure in Serbia. One of the significant barriers for harmonization is the expectance of the new Act on railway traffic safety, according to The European Railway Safety Directive (2004/49/EC) [3].

Fig. 2 shows modern concept development for creation of the management plan on Serbian railways infrastructure in accordance with European regulations. Unfortunately, existing Serbian railway regulations and logistics are in collision with those of the European Union (Fig. 3).

Solving this problem, which represents the essential barrier for integrations of the Serbian Railways to the European railway network, requires adoption of legal and technical frameworks for the application of European regulations.

In this paper the database for the harmonization of technical regulations in the area of railway infrastructure is represented. The database enables simple research and availability of all necessary data and includes European and Serbian technical regulations. This is a reason why it

is of great importance for operation of the enterprises that work in the area of railway infrastructure management.

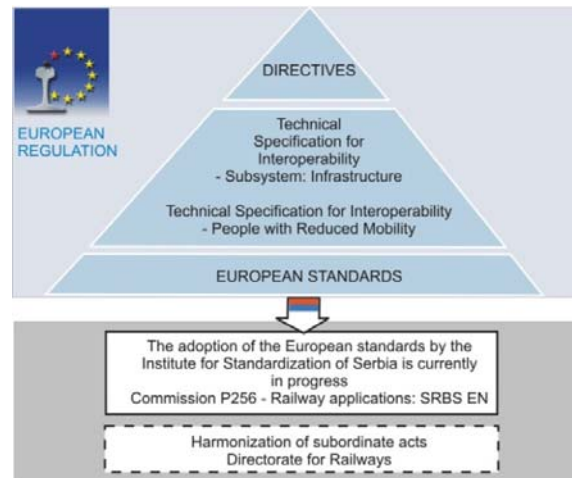


Figure 1. The harmonization procedure for technical regulations for railway infrastructure in the Republic of Serbia

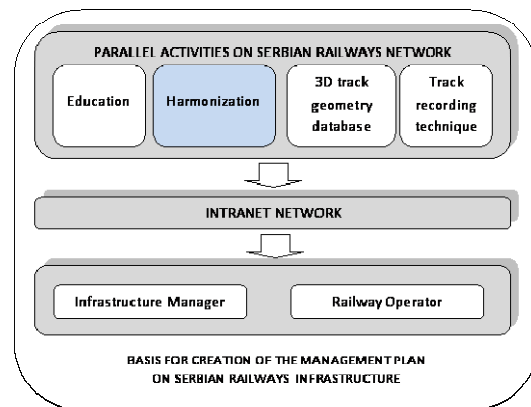


Figure 2. Concept development for creation of the management plan

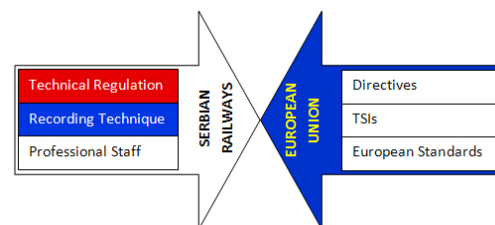


Figure 3. Collision between Serbian and European technical regulation and logistics

II. THE STRUCTURE OF THE DATABASE OF LEGAL AND TECHNICAL REGULATIONS OF THE EU AND SERBIA

Internet search of EU technical regulations for engineering applications is uncomfortable and long lasting. Therefore, database using Microsoft Office Access is developed [4]. The database should enable comfortable and fast search. The database includes European and Serbian technical regulations in the area of railway infrastructure and is bilingual [5-8].

The structure of the database of legal and technical regulations of the EU and Serbia is shown on Fig. 4.

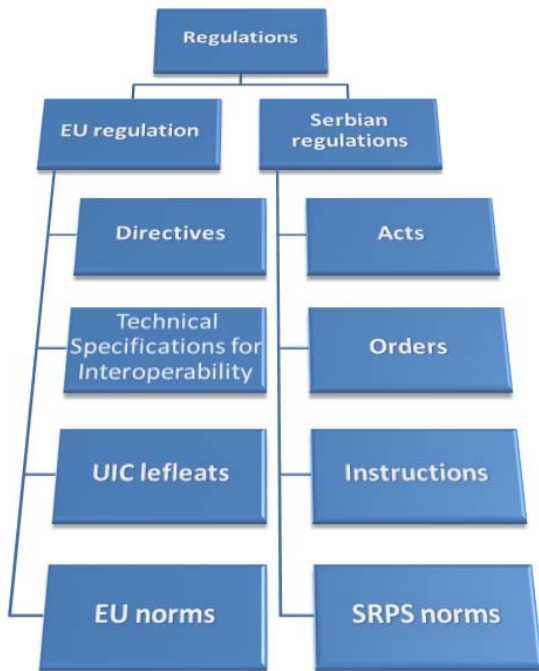


Figure 4. Structure of the database of legal and technical regulations of the EU and Serbia

Search principle is shown on Fig.5.

Figure 5. Search principle on the example of EU Directives

Navigation options enable simple use of the database (Fig. 6).

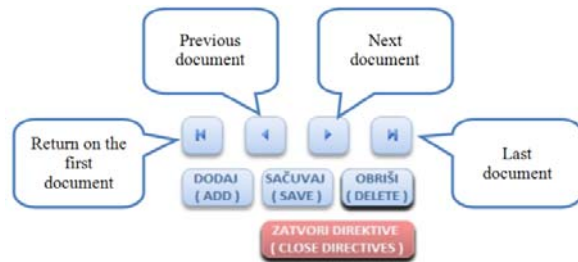


Figure 6. Navigation options

III. ADVANTAGES OF THE DATABASE USE ON THE EXAMPLE OF TECHNICAL STANDARDS

Unfortunately, the search of European Committee for Standardization website <http://esearch.cen.eu/esearch/> is complicated and it requires knowing of standard title and/or reference (Fig. 7). Also, the search gives different results using the same descriptors for the different search criteria. This is uncomfortable for everyday use in the engineering practice.

Figure 7. Search tool of EU standards in the European Committee for Standardization website <http://esearch.cen.eu/esearch/> [6]

Users have to know in advance part of the titles (in English, German or French) and/or standard references. For example, the search results for descriptors "railway applications" and "track" are shown in the following extensive list:

- EN 13674-1:2003 Railway applications - Track - Rail - Part 1: Vignole railway rails 46 kg/m and above,
- EN 13674-2:2006 Railway applications - Track - Rail - Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above,
- EN 13674-3:2006 Railway applications - Track - Rail - Part 3: Check rails,
- EN 13674-4:2006 Railway applications - Track - Rail - Part 4: Vignole railway rails from 27 kg/m to, but excluding 46 kg/m,

- EN 14730-1:2006 Railway applications - Track - Aluminothermic welding of rails - Part 1: Approval of welding processes,
- EN 14730-2:2006 Railway applications - Track - Aluminothermic welding of rails - Part 2: Qualification of aluminothermic welders, approval of contractors and acceptance of welds,
- EN 14811:2006 Railway applications - Track - Special purpose rail - Grooved and associated construction,
- EN 13977:2005 Railway applications - Track - Safety requirements for portable machines and trolleys for construction and maintenance,
- ENV 13803-1:2002 Railway applications - Track alignment design parameters – Track gauges 1435 mm and wider - Part 1: Plain line,
- EN 13803-2:2006 Railway applications - Track - Track alignment design parameters - Track gauges 1435 mm and wider - Part 2: Switches and crossings and comparable alignment design situations with abrupt changes of curvature,
- EN 13145:2001 Railway applications - Track - Wood sleepers and bearers,
- EN 13230-1:2002 Railway applications - Track - Concrete sleepers and bearers - Part 1: General requirements,
- EN 13230-2:2002 Railway applications - Track - Concrete sleepers and bearers - Part 2: Prestressed monoblock sleepers,
- EN 13230-3:2002 Railway applications - Track - Concrete sleepers and bearers - Part 3: Twin-block reinforced sleepers,
- EN 13230-4:2002 Railway applications - Track - Concrete sleepers and bearers - Part 4 : Prestressed bearers for switches and crossings,
- EN 13230-5:2002 Railway applications - Track - Concrete sleepers and bearers - Part 5 : Special elements,
- EN 13481-1:2002/A1:2006 Railway applications - Track - Performance requirements for fastening systems - Part 1: Definitions,
- EN 13481-2:2002/A1:2006 Railway applications - Track - Performance requirements for fastening systems - Part 2: Fastening systems for concrete sleepers,
- EN 13481-3:2002/A1:2006 Railway applications - Track - Performance requirements for fastening systems - Part 3: Fastening systems for wood sleepers,
- EN 13481-4:2002/AC:2006 Railway applications - Track - Performance requirements for fastening systems - Part 4: Fastening systems for steel sleepers,
- EN 13481-5:2002/A1:2006 Railway applications - Track - Performance requirements for fastening systems - Part 5: Fastening systems for slab track,
- EN 13146-7:2002 Railway applications - Track - Test methods for fastening systems - Part 7: Determination of clamping force,
- EN 13146-8:2002/A1:2006 Railway applications - Track - Test methods for fastening systems - Part 8: In service testing,
- EN 13232-1:2003 Railway applications - Track - Switches and crossings - Part 1: Definitions,
- EN 13232-2:2003 Railway applications - Track - Switches and crossings - Part 2: Requirements for geometric design,
- EN 13232-3:2003 Railway applications - Track - Switches and crossings - Part 3: Requirements for wheel/rail interaction,
- EN 13232-4:2005 Railway applications - Track - Switches and crossings - Part 4: Actuation, locking and detection,
- EN 13232-5:2005 Railway applications - Track - Switches and crossings - Part 5: Switches,
- EN 13232-6:2005 Railway applications - Track - Switches and crossings - Part 6: Fixed common and obtuse crossings,
- EN 13232-7:2006 Railway applications - Track - Switches and crossings - Part 7: Crossings with moveable parts,
- EN 13232-9:2006 Railway applications - Track - Switches and crossings - Part 9: Layouts,
- EN 13231-1:2006 Railway applications - Track - Acceptance of works - Part 1: Works on ballasted track - Plain line,
- EN 13231-2:2006 Railway applications - Track - Acceptance of works - Part 2: Works on ballasted track - Switches and crossings,
- EN 13231-3:2006 Railway applications - Track - Acceptance of works - Part 3: Acceptance of rail grinding, milling and planning work in track,
- EN 13848-1:2003 Railway applications - Track - Track geometry quality – Part 1: Characterisation of track geometry,
- EN 13848-2:2006 Railway applications - Track - Track geometry quality - Part 2: Measuring systems - Track recording vehicles,
- EN 13848-3:2009 - Railway applications - Track - Track geometry quality - Part 3: Measuring systems - Track construction and maintenance machines,
- EN 13848-4:2010 - Railway applications - Track - Track geometry quality - Part 4: Measuring systems - Manual and lightweight devices,

- EN 13848-5:2008 - Railway applications - Track - Track geometry quality - Part 5: Geometric quality levels,
- EN 14969:2006 Railway applications - Track - Qualification system for railway trackwork contractors.

Search tool of EU standards in the European Committee for Standardization website provides insight into the scope and the opportunity to purchase the selected EN standards. This is an expensive solution, and the purchased standard is not available for all employees in the enterprise.

On the other hand, database developed using Microsoft Office Access provides bilingual search using key words (common in engineering practice) and access to complete documents. Requirement for access to the complete document for all users of the intranet of the enterprise is purchasing EN standards from the Institute for Standardization of Serbia. This is a cost-effective and a more comfortable solution. Besides, the search tool provides insight into the status of the document. Addition and update of the EN standards in the database is done using an advanced search engine on the Institute for Standardization of Serbia website (Fig. 8).

Figure 8. Advanced search engine on the Institute for Standardization of Serbia website [8]

Fig. 9 presents the simple window for the search of EN standards in the developed Microsoft Office Access database. The database supports importing of standards in PDF format. Moreover, it is possible to import documents into other formats of interest for engineering applications.

Figure 9. Search principle on the example of EN standards

Fig. 10 shows the possibility of insight in the complete SRPS standard, as well as the possibility of the addition of new standards. The same possibility exists for the European standards by using the appropriate window.

Figure 10. The window for access and addition of the technical standards

IV. USING THE DATABASE ON THE EXAMPLE OF SERBIAN ACTS, ORDERS AND INSTRUCTIONS

The database contains the necessary legislation in the field of railway infrastructure, regardless of whether they are harmonized with EU directives. This is important for engineering practice because in that way existing, reconstructed and new railway infrastructure is equally covered.

Fig. 11 presents the window for the search of acts in the area of railway in the Republic of Serbia.

Figure 11. Search principle on the example of acts

In a similar way, the search of Serbian orders and instructions in the area of railway infrastructure is performed. Serbian orders and instructions are not yet harmonized with EU Directives, Technical Specifications for Interoperability and EN standards [9]. Despite, the

orders and regulations are valid for railway infrastructure maintenance, and therefore for everyday engineering practice.

Fig. 12 presents the window for the search of instructions in the area of railway infrastructure. The similar window is used for the search of orders.

Figure 12. Search principle on the example of acts

Fig. 13 shows the possibility of insight in the Serbian technical instruction, as well as the possibility of the addition of new instructions. The same possibility exists for the Serbian technical orders by using the appropriate window. Generally applied document's formats are PDF and DOC.

Figure 13. The window for access and addition of the technical instructions

V. DISCUSSION AND CONCLUSION

The incompatibility of the existing technical regulations in the area of railway infrastructure in the Republic of Serbia with the EU regulations is obvious.

For now, the legal barrier is anticoincidence of the existing Act on safety in the railway traffic (Official Gazette RS, No.101/05) [10] with Directive 2004/49/EC [3]. Adoption of new Serbian Act on safety in the railway traffic is in progress. On the other hand, although the Railway Act (Official Gazette RS, No.18/2005) [11] coincides with the corresponding European Union Directives, its decrees are still not applied in practice in the area of railway infrastructure

Technical limitations for the application of the European standards in the area of infrastructure planning are: lack of database on the existing Serbian Railways network, the lack of strategy and material means for filling in the base, incompetence in the level of expertise of the personnel, lack of knowledge in the area of management and maintenance of railway infrastructure, not following Directives, Technical Specifications of Interoperability and technical standards in this area.

Only after solving the given legal and technical limitations, can the Republic of Serbia possibly achieve harmonization of technical regulations in the area of railway infrastructure.

Obviously, in engineering practice there is a very large number of documents in the field of technical regulations for railway infrastructure. Inaccessibility and disorder of technical regulations hinder practical work of technical staff in enterprises. Frequent problems in practice were noted in the use of European standards due to uncomfortable search and purchase.

In this paper the database for the technical regulations in the area of railway infrastructure is represented. The database includes EU Directives, Technical Specifications of Interoperability, UIC Leaflets and EN standards, as well as acts, orders, instructions and standards in the Republic of Serbia.

The database is created using Microsoft Office Access and it enables simple search and availability of all necessary data. The database is intended for users of the intranet in enterprises. Practical implementation of the database is of great importance for successful operation of the enterprises that work in the area of railway infrastructure management.

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