Eurocodes: opportunity for cross-border science, education and business cooperation

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The Eurocodes are a set of standards for structural design, which has been recently implemented in the EU and EFTA Member States. The world-wide interest in implementation of the Eurocodes is based on the opportunity to have a new common standardization environment, which is adaptable to the particular requirements of each country and region. The Eurocodes provide a framework for a successful market uptake of high quality products, services and innovation and thus foster the sustainable competitiveness of the construction industry and its customers.

Valuable and positive exchanges between EU and Russian authorities and experts have been established in the framework of the EU–Russia Regulatory Dialogue/Construction Sector Subgroup, and on four workshops on the Eurocodes held in Russia and EU, Italy. Moscow State University of Civil Engineering (MSUCE) organises seven training courses on the Eurocodes and translated twenty designers' guides and standards on material testing. These information exchanges and activities opened the door for future reinforced cooperation: three working groups with Russian and EU experts have been created to facilitate the application of the Eurocodes for bridges in Russia.

The EU–Russia collaboration in the Eurocodes offers opportunity to boost the bilateral trade with goods and services in the construction sector, and to take advantage of the expertise of each partner in the further development of design methods, technical specifications and standards.

Keywords: construction, Eurocodes, cooperation, science, education.

1. Introduction

At the EU–Russia Summit of 10 May 2005, a new framework for EU–Russian relations was agreed in the form of four Common Spaces: the Common Economic Space, the Common Space for Security, Freedom and Justice, the Common Space for External Security, and the Common Space for Research and Education. The Common Economic Space (CES) foresees, among others, closer co-operation and dialogue on regulatory, industrial and enterprise matters.

The construction sector is one of the most important fields, in which it is possible to develop a long-term, strong and fruitful co-operation between the Russia and EU. The exchanges at both, the political and scientific/technical level during the last six years demonstrated that the regulatory matters and standardization for construction could be a major topic for cooperation, and that the codes for structural design in particular could be looked at as a particularly appropriate instrument to enhance the safety and reliability of buildings. The scientific exchange, which started in 2008, contributed to create a common agenda in areas of mutual interest, such as research for standardization, higher education, technology and innovation. Since 3 March 2010, the construction sub-group of the EU–Russia Regulatory dialogue supports the development of bilateral co-operation in technical regulations and standards, conformity assessment, and exchange of information on new regulatory legislation and standards.

The paper presents the achievements in the EU–Russia cooperation in the Eurocodes — the new European standards for structural design.

2. The Eurocodes

The Eurocodes are a set of European Standards (EN) for the design of buildings and other civil engineering works and construction products, produced by the European Committee for Standardization (CEN) under

EN 1990	Eurocode: Basis of structural design
EN 1991	Eurocode 1: Actions on structures
EN 1992	Eurocode 2: Design of concrete structures
EN 1993	Eurocode 3: Design of steel structures
EN 1994	Eurocode 4: Design of composite steel and concrete structures
EN 1995	Eurocode 5: Design of timber structures
EN 1996	Eurocode 6: Design of masonry structures
EN 1997	Eurocode 7: Geotechnical design
EN 1998	Eurocode 8: Design of structures for earthquake resistance
EN 1999	Eurocode 9: Design of aluminium structures

EN Eurocodes contents

Fig. 1. *The EN Eurocodes*

a mandate of the European Commission. They embody national experience and research output together with the expertise of CEN Technical Committee 250 (CEN/TC 250) and of international technical and scientific organisations and represent world-class standards for structural design. The Eurocodes suite is made up by 10 Standards, as shown in Figure 1, and covers in a comprehensive manner all principal construction materials, all major fields of structural engineering and a wide range of types of structures and products.

The publication of the Eurocodes in May 2007 marked a major milestone in the European standardisation for construction, since they introduced common technical rules for calculation of the mechanical and fire resistance, and the stability of construction works and construction products. The on-going implementation of Eurocodes in the Member States of the European Union (EU) and the European Free Trade Association (EFTA) does enhance the competitiveness of the European construction industry by removing the obstacles arising from different national practices and by providing a Pan-European framework for a successful market uptake of high quality products, services and innovation.

The Eurocodes are recognised by the authorities of the EU and EFTA Member States as a means to prove compliance of buildings and civil engineering works with the basic requirements of the Construction Products Regulation [1], as a basis for specifying contracts for public construction works and related engineering services [2] and as a framework for drawing up harmonised technical specifications for construction products [1].

3. Eurocodes on the global standartisation and innovation landscape

There is a considerable interest in the use of Eurocodes outside the EU by countries who are planning to update or replace their National Standards with state-of-the-art standards, or who are interested in trading with the EU and EFTA Member States, as depicted in Figure 2.

The Eurocodes are very suitable to be used for the above purposes, since they are:

- a complete set of design standards that cover in a comprehensive manner all principal construction materials, all major fields of structural engineering and a wide range of types of structures and products,
- the most up-to-date codes of practice,
- adaptable to the particular requirements of each country with regard to the geographical, geological or climatic conditions, and to the desired level of safety.

The EU is a major actor in world trade and multilateral and bilateral trade negotiations, with a strong interest in open markets, clear regulatory frameworks and the removal of the barriers to trade. Technical and organisational support to the international promotion of the Eurocodes is an important milestone in the Strategy of the European Commission for the sustainable competitiveness of the construction sector [3], which envisages to «*...develop cooperation with third countries, in particular Africa and Latin America, but also in the context of the EU–Russia Regulatory dialogue, the EU Neighbourhood policy and the Euro-Mediterranean Partnership, concerning sustainable construction in public procurement, notably by encouraging these partners to use the Eurocodes as a tool for implementing their construction regulations*».

The Eurocodes encourage innovation, as their clauses are less prescriptive compared to most existing standards. They require and/or allow more understanding of the behaviour of structures; greater use of advanced methods for modelling and analysis; more efficient and economic design where new understanding or test evidence is available. The Eurocodes give flexibility to the designers to use design and construction practices from other countries and freedom to select among a wide range of products.

The next goal of the EU is to keep the Eurocodes as the most advanced state-of-the-art codes for structural design in the world. In 2010 the European Commission mandated CEN to develop a work programme for the second generation of the Eurocodes covering:

- the development of new standards or new parts of existing standards, e.g. new construction materials and corresponding design methods or new calculation procedures;
- the incorporation of new performance requirements and design methods into existing standards;

CEN programme envisages extending the standards to the assessment and strengthening of existing buildings and structures, to extend the existing rules for robustness, to access the potential to reduce the number of the Nationally Determined Parameters (NDPs), to produce a technical report on impacts of climate change on structural design, and to provide background documents and auxiliary guidance documents. The publication of the second generation of the Eurocodes is expected by 2020.

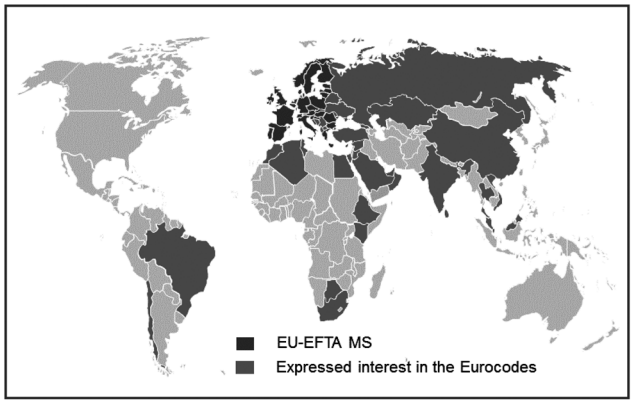

Fig. 2. *The Eurocodes on the world map*

4. EU–Russia collaboration in Eurocodes

Valuable and positive interactions and exchanges between the EU and Russian authorities and experts on standardization for construction have been established in the framework of the EU–Russia Regulatory Dialogue: construction sector subgroup. In this context JRC organised the following workshops: (i) Eurocodes: a tool for building safety and reliability enhancement — Moscow, 2008; (ii) Training the trainers: basis of design, Eurocode 1 and Eurocode 2 — Moscow 2010; (iii) Bridge design using the Eurocodes — JRC, Ispra/Italy, 2012; (iv) Worked Examples on Bridge Design with Eurocodes — St. Petersburg, Russia, April 2013. The Russian partners involved were the Ministry of Transport of Russian Federation, the Federal Highway Agency of Russian Federation, the Moscow State University of Civil Engineering (MSUCE), high-level technical managers of design departments of key Russian companies, representatives of the major research institutions. After detailed comparisons between the Russian standards for bridge design and the Eurocodes and discussions regarding both, the technical content of the Eurocodes and the administrative issues related to their implementation, it was concluded, that the Eurocodes are a very suitable state-of-the-art design tool for the design of bridges and that Russia shall start to work actively on their adoption.

These events opened the door for the signature of a Joint Declaration at the meeting of EU–Russia Dialogue on 18 April 2013. The planned cooperative actions reinforce the EU–Russia cooperation in Eurocodes and envisage:

1. To facilitate the application of the Eurocodes for bridges in Russia under technical cooperation by 3 working groups: basis of design and actions on bridges, concrete bridges, and geotechnical design for bridges.
2. To identify and explore other areas of cooperation on the Eurocodes, e.g. fire resistance of construction works and accidental actions on structures.
3. To widen cooperation to other mutually beneficial areas of construction sector, such as assessment and retrofitting of existing structures, energy and resource efficiency and other aspects of sustainability.

At the Workshop in St. Petersburg the JRC and MSUCE decided to sign a Memorandum of Understanding (MoU) on scientific and technical cooperation.

Short after that, on 17 September 2013 in St. Petersburg a Cooperation Agreement between CEN, CENELEC and ROSSTANDART was signed. It provides a framework for closer collaboration on various aspects of standardization, which will facilitate trade in goods and services between Europe and Russia.

5. MSUCE — training center on Eurocodes for Russia

In 2011 MSUCE started a project aimed at to facilitate the use of the Eurocodes for education, professional training and research in Russia, encompassing the following areas:

- training of trainers on the Eurocodes,
- creating of educational and methodical sources for education on the Eurocodes,
- training of civil engineers and designers,
- Master study curriculum on Eurocodes.

A series of nine Designers Guides of Thomas Telford Publishers on EN 1990–EN 1999 were translated in Russian, edited and published. After a license of British Standards Institution (BSI), MSUCE published a Eurocodes manual for students. Upon a request by the Russian National Association of Prospectors, a two-volume Thomas Telford handbook on geotechnical design has been published. As a result of a joint project with the Federal Highway Agency of Russian Federation, five texts of Thomas Telford Designers Guides on bridge design with the Eurocodes have also been published. Experts of MSUCE have been working on comparative analysis of Russian standards and European norms relating to Eurocodes: four manuals on construction materials were published in 2013–2014.

In 2011 MSUCE organized the International Seminar «Eurocodes in Russian Federation and EU — challenges and opportunities». In 2012 MSUCE held the International Conference «Actual Issues of Application of Eurocodes and National Standards in the Russian Federation and EU Member States», attended by more than 300 leading education, research, design and construction organizations of Russia and the CIS, as well as by experts from CEN. Six master classes for training of Russian designers were held in MSUCE with more than 230 participants.

A programme for training of designers, university professors and graduate students has been developed and implemented. The lectures and practical classes are conducted by Russian academic professionals and experts trained in BSI and MSUCE. Comparative analysis of the Russian and European technical rules for cements, concretes, ceramic materials, bitumen, and hydro- and thermo-insulation materials was carried out and published as education material.

6. Concluding remarks

The Eurocodes are the most up-to-date codes of practice for structural design. Owing also to their adaptability to different regional conditions and safety requirements, they are extensively used for the design of numerous structures in Europe and worldwide. The Eurocodes provide a framework for a successful market uptake of high quality products, services and innovation and are a recurring reference for international research projects.

The application of the Eurocodes in Russia will provide its engineering community with state-of-the-art standards for construction sector and thus enhance the safety of the construction works and increase the competitiveness of the Russian construction industry, and in particular the branch related to transport infrastructures.

The EU–Russia collaboration in the Eurocodes offers opportunity to boost the bilateral trade with goods and services in the construction sector, and to take advantage of the expertise of each partner in the further development of design methods, technical specifications and standards.

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Еврокоды: возможность для международной кооперации в науке, образовании и бизнесе

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Еврокоды являются системой стандартов для строительного проектирования, которые недавно были приняты в ЕС и странах – членах Европейской ассоциации свободной торговли. Во всем мире интерес к принятию Еврокодов основан на возможности иметь новую общую нормативную среду, которая легко приспосабливается к конкретным потребностям каждой страны и региона. Еврокоды обеспечивают основу для успешного рыночного канала высококачественных продуктов, услуг и инноваций и, тем самым, способствуют устойчивой конкурентоспособности строительной промышленности и ее потребителей.

В рамках Регулятивного диалога ЕС–Россия/подгруппа строительный сектор и во время четырех рабочих встреч по Еврокодам, организованных в России и в ЕС (Италии), между руководящими лицами и экспертами из ЕС и России состоялся ценный и позитивный обмен информацией. Московский государственный строительный университет (МГСУ) организовал семь сессий обучения (мастер-классов и курсов повышения квалификации) и перевел двадцать руководств по Еврокодам. Этот информационный обмен и образовательная деятельность открыли дверь для будущей расширенной кооперации: были сформированы три двусторонние группы экспертов из ЕС и России для облегчения применения Еврокодов в России в области мостостроения.

Сотрудничество ЕС–Россия по Еврокодам дает возможность для роста двусторонней торговли товарами и услугами в строительном секторе и для использования экспертизы каждого партнера в дальнейшей разработке методов, технических спецификаций и стандартов.

Ключевые слова: строительство, Еврокоды, сотрудничество, наука, образование.

Фонд содействия продолжает прием заявок совместных российско-французских проектов

Фонд содействия развитию малых форм предприятий в научно-технической сфере, совместно с Французским инновационным агентством BPIFrance объявляет о продолжении сбора предложений на проведение совместных франко-российских проектов, направленных на создание инновационной продукции и технологических разработок.

Данная инициатива проводится в рамках Соглашения о сотрудничестве в области промышленных и технологических разработок между Францией (от имени BPI France) и Россией (от имени Фонда содействия развитию малых форм предприятий в научно-технической сфере) от 16.06.2009 г. Основная цель программы – стимулирование и развитие двусторонней научно-технологической кооперации между российскими и французскими малыми инновационными предприятиями, проводящими прикладные исследования.

Поддержка может быть оказана франко-российским исследовательским проектам, направленным на приоритетные, с точки зрения французской и российской сторон, технологии, без ограничения по тематическим областям.

1. Обязательные требования, предъявляемые к поступающим предложениям.

Ожидаемые результаты от выполнения проекта должны включать в себя: производство нового продукта или создание технологии, а также укрепление сотрудничества между двумя компаниями, планы по созданию совместного предприятия или производства, а также выходы на новые рынки для обеих компаний. В предложениях должны учитываться следующие обязательные условия:

a) Заявка/Предложение должно быть подано с обязательным участием как минимум двух партнеров: одного российского малого инновационного предприятия и одного французского малого/среднего предприятия. Участие других организаций, таких как университеты или исследовательские институты, возможно и приветствуется, но только в качестве дополнительных партнеров в консорциуме (основным заявителем должно выступать малое предприятие). Средства, выделяемые финансирующими организациями, могут быть переданы этим организациям только по договорам субподряда в соответствии с внутренними правилами финансирования каждой из сторон.
b) Франция: малые или средние предприятия.
c) Россия: требования, предъявляемые к малым предприятиям: в соответствии с законодательством, регулирующим деятельность субъектов малого предпринимательства (Статья 4, Федеральный закон № 209).
d) Проект должен продемонстрировать видимые преимущества и добавленную стоимость, возникающую в результате сотрудничества малых компаний двух стран (коммерческая выгода, доступ к исследовательской инфраструктуре и т. д.).
e) Проект должен продемонстрировать ощутимый вклад со стороны участников из обеих стран (выполнение работ должно быть распределено между заявителями).
f) Продолжительность работ должна составлять от 18 до 24 месяцев.

2. Порядок финансирования проектов

Предложения, одобренные экспертным советом, могут рассчитывать на получение финансирования в следующем порядке: французские компании получают доступ к беспроцентному кредиту на сумму до 500000 евро; российские компании могут рассчитывать на выделение не более 7 миллионов рублей на проект (со стороны Фонда содействия), при условии, что финансирование работ должно вестись на паритетной основе (НИОКР за счет средств Фонда, остальные, необходимые для создания продукта, работы – за счет заявителя).

Финансирование проектов в каждой стране будет осуществляться в соответствии с правилами и процедурами каждой финансирующей организации.

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