EU-Russia cooperation on standardisation for construction

ADOPTION OF THE EUROCODES OUTSIDE THE E.U.

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Programme Manager
BSI – Department - Construction and the Built Environment
• Programme Manager, BSI Construction Department
• BSI Secretary for CEN committees:
• CEN/TC 250 Structural Eurocodes,
• CEN/TC 250/SC 1 Action on Structures,
• CEN/TC 250/SC 4 Design of Composite Structures
• Member of UK Institute of Structural Engineers “Standing Committee for the Implementation of Eurocodes”
• Member of the Institution of Civil Engineers Committee “Eurocodes Expert Advisory Committee”
1975 – 1989
For fourteen years, the Commission, with the help of a Steering Committee with representatives of Member States, conducted the development of the Eurocodes programme, which led to the first generation of European codes in the 1980s.

1989
the Commission and the Member States of the EU and EFTA decided, to transfer the Eurocode programme to CEN and CEN/TC 250 “Structural Eurocodes” Committee was formed.

1995 – 1998
ENV pre-standards were published.

1997 – 2000
2 year reviews to decide to convert the ENVs to the EN Eurocodes. Commission The EU Commission (95%) and EFTA (5%) agree to fund the Conversion programme of ENVs to ENs through a series of 4 Mandates – to the value of approx € 3 M.

2000 – 2007
Conversion process to develop the EN Eurocodes

2002
First EN Eurocode published (EN 1990)

2003
Commission’s Recommendation to Member States to adopt Eurocodes

2007
All 58 parts published by CEN in Q2 2007

2010 March –
Europe wide implementation of Eurocodes and withdrawal of conflicting National Standards
Integrated suite of structural design codes covering all common construction materials

10 codes totalling some 58 parts

EN 1990 - Basis of Structural Design (the head code)
EN 1991 - Actions on Structures (10 individual parts)
EN 1992 - Design of Concrete Structures (4 parts)
EN 1993 - Design of Steel Structures (20 parts)
EN 1994 - Design of Composite Steel and Concrete Struct’s (3 parts)
EN 1995 - Design of Timber Structures (3 parts)
EN 1996 - Design of Masonry Structures (4 parts)
EN 1997 - Geotechnical Design (2 parts)
EN 1998 - Design Provisions for Earthquake Resistance (6 parts)
EN 1999 - Design of Aluminium Structures (5 parts)
Common set of technical rules for the design of building and civil engineering works for Member States
Replace many different existing rules in EU
Basis for Harmonized Technical Specifications for Construction Products to determine the performance linked to mechanical strength and resistance to fire
Basis for building contracts and exchange of services between Member States
Increase competitiveness and lower costs
Support of common design aids and software
Wider marketing and use of structural products
• Member States remain in control of their local differences concerning geographic, climatic and traditional building practice
• Eurocodes provide for national choice full sets of recommended values, classes, symbols and alternative methods to be used as Nationally Determined Parameters (NDPs)
• National Annex (NA) for each Eurocode part quantify the NDPs
• NA published by each CEN Member (e.g.: BSI, DIN, AFNOR) as separate documents
Flexibility of Eurocodes

Within National Annex of each Eurocode
Allow countries to choose values to suit local conditions:
  Geographical (earthquake / flooding)
  Geological (foundations)
  Climatic (wind / snow / rainfall / temperature)

Each base Eurocode has ‘default values’
(recommended values) for NDPs
Other Country Specific Data included
EU-Russia cooperation on standardisation for construction – Moscow, 9-10 October 2008

EUROCODES
A tool for building safety and reliability enhancement

Climatic and geophysical conditions

Subarctic temperatures
- 40 °C

Wind gusts up to – 150 knots (77 m/s)

Snow loads up to 25 kN/m²

Seismic activity > 7,0 Richter scale

Dry Mediterranean temperatures
+45 °C
Examples of extreme climatic conditions
Cost of developing the 58 Eurocode parts

Europe-wide Meetings - € 80M

European technical development and drafting work - € ?00 M
In Summary

• The 58 Eurocode parts have taken >30 years to develop by some of the foremost European structural engineers and have cost several hundred million Euros to produce.

• They form a coherent package of codes that are technically the most up-to-date and internally consistent codes in the world. They are rigorous and yet flexible allowing their adoption not only within Europe but also internationally.

• Through their development they have been subjected to rigorous Europe-wide peer review and have been translated into all languages of the Member States.

• Provide Common design criteria and methods

• Their flexibility allows for differentiation according to specific levels of safety, climatic conditions, geology, traditions...

• Provide a common basis for education, research, development
Professor Jean-Armand Calgaro, Chairman of CEN/TC 250 says:

“The Eurocodes reflect a new universal technical culture in civil engineering. The transparency of their safety concepts and of their fundamental requirements, the scientific quality of their design rules and their flexible conditions of use will liberate innovation to contribute to sustainability in construction works. Undoubtedly, they will play a vital role in the development of the future built and social environment.”
Some locations where Eurocode promotion has occurred

The E.U./JRC, BSI, and experts have promoted Eurocodes globally through promotional seminars and lectures at conferences.
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Euro-Mediterranean (Meda) Region

EU-Russia cooperation on standardisation for construction – Moscow, 9-10 October 2008

Algeria – Wadi Dib bridge

Lebanon – Grand hotel and Mdeirej viaducts

Libya – Bridge over Wadi Kuf
E.U. Commission actively support the Promotion of the Eurocodes through the Joint Research Centre:

Eurocodes Workshop, Varese 27th to 29th November 2006

Delegates attended from:

Algeria, Egypt, Jordan, Lebanon, Morocco, Tunisia and Albania
Global Promotion of Eurocodes - China

EU-China Conference on Standards and Energy Efficiency in buildings

Beijing – January 08
Conclusions from the conference:

- The Eurocodes are recognised as design codes for practice of high quality and coherence.

- Especially with regard to the large number of different regions in China the Chinese are highly interested in the way of handling specific local/regional conditions.

- In addition Eurocodes are a good basis for better mutual understanding, technical discussions, and exchange of experience.

- It is thought that in the short term China is unlikely to adopt the Eurocodes, however interestingly it is believed they have been translated the Eurocodes into Mandarin.
The role of EN 1990: The head Eurocode – translated into Mandarin
ASEAN Region:

Indonesia
Philippines
Malaysia
Vietnam
Laos
Singapore
Thailand
Myanmar
Brunei
Cambodia
Singapore, Malaysia and Vietnam are adopting Eurocodes. Singapore have already published 5 Eurocodes in an “SS wrapper”
**EUROCODES**

A tool for building safety and reliability enhancement

**Adoption of Eurocodes in Singapore**

**EU-Russia cooperation on standardisation for construction – Moscow, 9-10 October 2008**

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**Seminar on Implementation of Eurocodes**

- EN 1990: Basis of Structural Design
- EN 1991: Actions on Structures
- EN 1992: Design of Concrete Structures

**Date:** 15 July 2008  
**Time:** 9.00am to 5.30pm  
**Venue:** SPRING Singapore Auditorium

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**Eurocodes Conference in Singapore – July 2008 to launch their National Annexes as DPCs**
National Annexes to SS EN Eurocodes
National Foreword to SS EN 1990:

This Singapore Standard was prepared by the Technical Committee on Building Structure and Substructure under the direction of the Building and Construction Standards Committee.

This SS EN is the identical implementation of EN 1990 : 2002 'Eurocode – Basis of structural design' and is adopted with permission of CEN Rue de Stassart 35, B-1050 Brussels.

Annex A2 ‘Application for bridges’ (normative) which is issued through CEN Amendment 1 (EN 1990 : 2002 / AMD 1 : 2005) has been incorporated after the main EN 1990 text.

Attention is drawn to the following:

- The comma has been used throughout as a decimal marker whereas in Singapore Standards, it is a practice to use a full point on the baseline as the decimal marker.

- The Singapore Standards which implement International or European publications referred to in this document may be found in the SS Electronic Catalogue at: http://www.singaporestandardsshop.sg

The EN gives values with notes indicating where national choices may be made. Where a normative part of the EN allows for national choice to be made, the range and possible choice will be given in the normative text, and a note will qualify it as a Nationally Determined Parameter (NDP). NDPs can be a specific value for a factor, a specific level or class, a particular method or a particular application rule if several are proposed in the EN.

The requirements of this SS EN 1990 : 2008 are to be read in conjunction with the Singapore National Annex (NA) to SS EN 1990 : 2008 which contains information on the Singapore Nationally Determined Parameters and is published separately.

National choice is allowed in EN 1990 through the following clauses:

- A1.1.1(1)
- A1.2.1(1)
- A1.3.2(1)
- A1.3.3(1)
- A1.3.4(2)
- A1.4.2(2)

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

At the time of publication, this standard is expected to be used as a reference in the Building and Construction Authority’s ‘Approved Document – Acceptable Solutions’.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. SPRING Singapore shall not be held responsible for identifying any or all of such patent rights.

Note:

1. Singapore Standards are subject to periodic review to keep abreast of technological changes and new technical developments. The changes in Singapore Standards are documented through the issue of either amendments or revisions.

2. Compliance with a Singapore Standard does not exempt users from legal obligations.

National Foreword to NA to SS EN 1990:

This National Annex was prepared by the Technical Committee on Building Structure and Substructure under the direction of the Building and Construction Standards Committee.

This standard is an adoption of UK National Annex to Eurocode 0 – Basis of structural design and is implemented with the permission of British Standards Publishing Ltd.

Acknowledgement is made to BSI for the use of information from the above publication.

This Singapore NA contains information on those parameters which are left open in EN 1990 for national choice, known as nationally determined parameters. The Singapore NA is to be read in conjunction with the SS EN 1990 : 2008 – Eurocode 0 : Basis of structural design.

At the time of publication, this standard is expected to be used as a reference in the Building and Construction Authority’s ‘Approved Document – Acceptable Solutions’.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. SPRING Singapore shall not be held responsible for identifying any or all of such patent rights.

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Australian and New Zealand structural codes based on British Standards

Australia considered joining CEN/TC 250 as a CEN Partner Standardization Body

New Zealand is revising its codes to align with Eurocodes.

Stop press – aluminium bridge to be built in Auckland designed to Eurocodes
• The current Australian and New Zealand structural codes are based on British Standards.
• New Zealand are currently updating their steel code which includes guidance in the form of commentary and this will be based on the philosophy of Eurocodes.
• This will make a possible future transition to Eurocodes a straight-forward change.
• Australia have currently “frozen” their codes with a possible view to accepting the New Zealand codes as joint Australian/NZ code.
• New Zealand are awaiting implementation in Europe before further committing to Eurocodes
Aluminium bridge for Auckland harbour designed using Eurocodes

To see an animation of the bridge:

India and the sub-continent

BSI have held Eurocode Conferences in:
Mumbai (Bombay)
New Delhi
Bengaluru (Bangalore)
Chennai (Madras)
Sri Lanka (Colombo)
India and Sri Lanka have structural codes based on British Standards and as such recognize that in time they will be less relevant as no further updating will occur.

- India will probably adopt Eurocodes however the cost of developing National Annexes is of concern.
- Sri Lanka have made the decision to adopt Eurocodes and asked BSI to retain British Standards until support to develop their National Annexes can be sourced.
Key points in Africa

South Africa have codes based on British Standards and have decided to align their codes with Eurocodes.

Angola (Luanda is the fastest growing city in Africa) and Mozambique are Portuguese speaking countries.
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>STATUS</th>
<th>EUROCODE RELEVANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA Loading Code</td>
<td>At an advanced stage of development</td>
<td>Referenced to <strong>nine Eurocode Parts</strong> related to the scope of the Standard</td>
</tr>
<tr>
<td>• SANS 10160</td>
<td>· In the process to be presented publicly through a series of seminars</td>
<td>· From EN 1990, EN 1991, EN 1997, EN 1998</td>
</tr>
<tr>
<td></td>
<td>during October 2008</td>
<td>· <strong>Early application of Eurocode outside Europe</strong></td>
</tr>
<tr>
<td></td>
<td>· <strong>Expected to be ready for publication by early 2009</strong></td>
<td>· Similar time frame as that of Member States</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Introduces Eurocode to SA,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Leading to extended local application of Eurocode</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td>STATUS</td>
<td>EUROCODE RELEVANCE</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Structural Eurocodes Summit</td>
<td>Held on 8 February 2008 in Pretoria</td>
<td>Consensus: Future SA structural standards should apply Eurocode – adoption</td>
</tr>
<tr>
<td></td>
<td>· Arranged by Joint Structural Division of SAICE &amp; IStructE</td>
<td>· Concrete committee already active since 2007</td>
</tr>
<tr>
<td></td>
<td>· Take a common view on Eurocode w.r.t. SA structural standards</td>
<td>· Geotechnical design apply EN 1997 per SANS 10160</td>
</tr>
<tr>
<td></td>
<td>· No official program could be launched,</td>
<td>· Steel, timber, masonry – no urgency, await &amp; learn from British experience</td>
</tr>
<tr>
<td></td>
<td>· Use SABS committee structure to ensure coordination</td>
<td>· Bridge standards need revision</td>
</tr>
<tr>
<td></td>
<td>· Respective standards committees to take the coordinated view further</td>
<td>· Too early to make a decision.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>· Stand-alone bridge standard preferred</td>
</tr>
</tbody>
</table>
The SA Loading Code represents an application of Eurocodes beyond the European Member States

- With adaptation to different conditions
  - Mainly from institutional differences
- SANS 10160 consistent with Eurocode NDP tolerances
- Implementation equivalent Eurocode Member State time scale
  - Due to cooperation which allowed fast-track development in South Africa

Due to comprehensive and unified nature of Eurocodes:

- Incremental deployment in South Africa can be applied
  - Not sufficient resources, institutional sanction for scale of a Eurocode Member State
- SANS 10160 paves the way for other materials standards in SA
  - This is already underway for various materials standards
<table>
<thead>
<tr>
<th>SA Loading Code SANS 10160</th>
<th>Reference Eurocode Part</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART</strong></td>
<td><strong>TITLE</strong></td>
</tr>
<tr>
<td>1</td>
<td><strong>Basis of structural design</strong>&lt;br&gt;Basis for accidental design situations</td>
</tr>
<tr>
<td>2</td>
<td><strong>Self-weight and imposed loads</strong></td>
</tr>
<tr>
<td>3</td>
<td><strong>Wind actions</strong></td>
</tr>
<tr>
<td>4</td>
<td><strong>Seismic action and general requirements for buildings</strong></td>
</tr>
<tr>
<td>5</td>
<td><strong>Basis of geotechnical design and actions</strong></td>
</tr>
<tr>
<td>6</td>
<td><strong>Actions induced by cranes and machinery</strong></td>
</tr>
<tr>
<td>7</td>
<td><strong>Thermal actions</strong></td>
</tr>
<tr>
<td>8</td>
<td><strong>Actions during execution</strong></td>
</tr>
</tbody>
</table>
Activities in Middle East Region

Strong interest in Eurocodes from Oman

Saudi Arabia

Qatar

UAE

Designs accepted to Eurocodes but more contract based than regulatory
South Americas

Currently no activity regarding promotion or adoption of Eurocodes. Interest shown from Brazil and Argentina.

Point of significance:

As the Eurocodes have been translated into Portuguese and Spanish will facilitate ease of transition for South American countries.
The main conclusion are:

- **Eurocodes are recognized as the most advanced fully integrated suite of structural codes in the world which can be adapted for use in any region.**

- **Many countries have based their national codes on European standards – BS, DIN, NF and will need to change to maintain relevance.**

- **Several countries Singapore, South Africa, Malaysia, Vietnam have already committed to the adoption of Eurocodes.**

- **Many Countries are awaiting experiences of full pan Europe implementation in March 2010.**
Further activity

- **Further promotion in key areas is necessary – Conferences and Workshops**

- **Revisit countries which have expressed interest and support with Workshops and Training**

- **Assistance with development of National Annexes (funding and technical resource)**
Joint Research Centre – E.U. Commission (JRC) -  
http://eurocodes.jrc.ec.europa.eu/

BSI -  http://www.bsi-global.com/en/

Eurocodes Expert -  http://www.eurocodes.co.uk/

Institution of Structural Engineers -  http://www.istructe.org/

CLG – UK government -  
http://www.communities.gov.uk/planningandbuilding/planningbuilding/buildingregulationsresearch/buildingdivisionresearch

Concrete Centre -  http://www.concretecentre.com

Steel Construction Institute –  
http://www.steel-sci.org/Information/Eurocodes

and Access steel at :  http://www.access-steel.com/
New Revision

Practical guidance on Structural Eurocodes for students

PP 1990:2007 Extracts from the Structural Eurocodes for students of structural design

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PP 1990 is a user-friendly guide which introduces the principles of Structural Eurocodes to students of civil engineering, structural engineering and structural design.

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