Harmonized European standards for construction in Egypt

Summary and Roadmap

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Organised with the support of the Egyptian Organization for Standardization and Quality
Harmonization in Europe

Removing technical barriers between States = Free Movement of Goods

European Economic Area = 31 States
The Eurocode suite of codes

• Integrated suite of structural design codes covering all common construction materials

• 10 generic 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 Structures (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)
Eurocodes – Actions

EN 1990 - Basis of Structural Design
EN 1991 - Actions on Structures
EN 1992 - Design of Concrete Structures
EN 1993 - Design of Steel Structures
EN 1994 - Design of Composite Steel and Concrete Structures
EN 1995 - Design of Timber Structures
EN 1996 - Design of Masonry Structures
EN 1997 - Geotechnical Design
EN 1998 - Design Provisions for Earthquake Resistance of Structures
EN 1999 - Design of Aluminium Structures
Eurocodes – Materials

EN 1990 - Basis of Structural Design
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BSi
Example of European standardisation system for the construction of bridges

EN 1990
Basis of Structural design
Combinations of actions

EN 1991
Self-weights + Imposed loads + Climatic actions + Accidental actions +

Design Eurocodes
EN 1992, EN 1993
EN 1994, EN 1995

Product Standards
EN 1337
Bearings

EN 1997
Geotechnical Design

EN 1998
Design of structures for earthquake resistance

Execution Standards
EN 13670
Concrete
EN 1090
Steel

Material Standards
EN 201-1
Concrete
EN 10025
Steel

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Climatic and geophysical extreme conditions

- Subarctic temperatures: -40°C
- Seismic activity > 7.0 Richter scale
- Wind gusts up to -150 knots (77 m/s)
- Dry Mediterranean temperatures: +45°C
- Snow loads up to 25 kN/m²
Examples of extreme climatic conditions
Flexibility - National Determined Parameters (NDPs)

- Within the National Annex of each Eurocode Part:
  - 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
The Number of NDPs and their distribution throughout the Eurocode Suite – 58 parts ~ 5000 pages

EN Eurocodes NDPs (Expected about 1500 clauses with NDPs)
Elements of the national publication of a European Standard – Example of BS EN 1990

National title page

BS EN 1990: 2002
Basis of structural design

National foreword

EN title page

EN text

EN Annexes

National annex

BS EN 1990: 2002
Basis of structural design

National title page

EN text

EN Annexes

National annex

BS EN 1990: 2002
Basis of structural design

National title page

EN title page

EN text

EN Annexes

National annex
Eurocodes – Benefits

- 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
Maintaining the differences in the E.U. - Implementation

• 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
The Future

• Future Maintenance at European level
• Greater catchment of expertise
• Invite input from outside Europe
• Collaborative research at centres of excellence
• Shared costs with additional benefits
• Move towards reduction of NDPs
• Transparency of NDPs - convergence of structural regulations?
• Work towards converting to ISO standards
Future Eurocodes

Currently CEN/TC 250 are considering extending the Eurocode suite to cover the following subjects:

- Assessment of existing structures
- Structural Glass
- Fibre reinforced polymers (FRP)
- Membrane structures

plus the possible conversion of ISO standards on:

- Atmospheric icing
- Actions due to waves and currents.
How much have the Eurocodes cost?

Europe-wide Meetings - £80M

European technical development and drafting work - £3-400M
Global promotion of Eurocodes

BSI promotional conferences

EU and individual experts promotional workshops and conferences

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BSI Promotion – since 2004

BSI through UKTI, BSI has supported international promotional activity of the Eurocodes in the following countries:

- China & Hong Kong
- India and Sri Lanka
- Malaysia
- Russia
- South Africa
- Singapore,
- Vietnam,
- UAE, Oman and Qatar
- Syria
International Adoption

• Eurocodes are gaining interest globally – Singapore, Vietnam and most North African countries are adopting the Eurocodes.
  ▪ Malaysia, India, Hong Kong and Russia are considering the possibilities.

• South Africa decided to “adopt” Eurocodes by adaption of their existing SANS codes to align with the Eurocodes

• Further promotion in China where there is great interest. E.U. funded seminar in January 08.
Euro- Mediterranean (Meda) Region

- Algeria – Wadi Dib bridge
- Lebanon – Grand hotel and Mdeirej viaducts
- Libya – Bridge over Wadi Kuf

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Russia and Ukraine

Russia – second workshop held in Moscow in December 2010. Third workshop scheduled for St Petersburg in Feb. 2011

Interest in using Eurocodes for planned high speed rail-link between Moscow and St. Petersburg.

2018 World Cup to be staged in Russia, will require extensive infrastructure construction

Ukraine – already agreed to adopt Eurocodes.
Aim: **gather and make available information** on EU and Russia standardisation system.

- Support from CMC, **CEN/TC250**
- Russian Federal Agency on Technical Regulation and Metrology, World Academy of Sciences for Complex Security
- 133 registered participants
- **Eurocodes EN 1990 and EN 1992** have been recently translated into Russian and sent to CEN for validation
Workshop in Moscow – December 2010

Workshop on **Eurocodes 0, 1, 2** held in Moscow, December 2010

The second level workshop, *Training the trainers*, is organised by TAIEX with the support of the Russian partners.
Latest News September 2010

• Kazakhstan sets Eurocodes goal - 13 September 2010

• A target of 2015 has been set by Kazakhstan for the implementation of Eurocodes.

This is according to the country's Gazeta national newspaper, which revealed that the eastern European state is putting in place steps for the implementation of the construction and civil engineering standards, Central Asia Newswire reports.

Regulations will be adopted over the coming five years in order to enhance the nation's infrastructure and strengthen buildings against disasters such as earthquakes, to which it is particularly susceptible.

Chairman of the Agency for Construction and Housing in Kazakhstan, Serik Knockin, told a recent meeting with officials "we set ourselves a task" to ensure the switch to Eurocodes.

Authorities have been analyzing the standards for the past two years and authorities have now been set the task of implementing them in order to modernize its building codes, with application commencing in 2011.
Global Promotion of Eurocodes -

EU-China Conference on Standards and Energy Efficiency in buildings

Beijing – January 08

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Global Promotion of Eurocodes - ASEAN Region

ASEAN Region:
- Indonesia
- Philippines
- Malaysia
- Vietnam
- Laos
- Singapore
- Thailand
- Myanmar
- Brunei
- Cambodia
Adoption of Eurocodes in ASEAN Region

Singapore, Malaysia and Vietnam are adopting Eurocodes.

Singapore have already published 20 Eurocodes in “SS wrappers”
Both Australia and New Zealand are considering revising their structural codes which were originally 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 (EC3 & EC4).

Aluminium bridge to be built in Auckland designed to Eurocodes.
Te Wero Bridge, Auckland

Aluminium bridge for Auckland harbour designed using Eurocodes
Global Promotion of Eurocodes - India

India and the sub-continent

BSI have held Eurocode Conferences in:

Mumbai (Bombay)
New Delhi
Bengaluru (Bangalore)
Chennai (Madras)
Sri Lanka (Colombo)
Eurocodes in India and Sri Lanka

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.
Global Promotion of Eurocodes - Africa

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.
### Eurocode development in South Africa

<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 nine Eurocode Parts 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 during October 2008</td>
<td>• From EN 1990, EN 1991, EN 1997, EN 1998</td>
</tr>
<tr>
<td>• For buildings and similar industrial structures</td>
<td>• Expected to be ready for publication by early 2009</td>
<td>• Early application of Eurocode outside Europe</td>
</tr>
<tr>
<td></td>
<td></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>
</tbody>
</table>
## Comparison between SA codes and Eurocodes

<table>
<thead>
<tr>
<th>SA Loading Code SANS 10160</th>
<th>Reference Eurocode Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART</td>
<td>TITLE</td>
</tr>
<tr>
<td>1</td>
<td>Basis of structural design</td>
</tr>
<tr>
<td></td>
<td>Basis for accidental design situations</td>
</tr>
<tr>
<td>2</td>
<td>Self-weight and imposed loads</td>
</tr>
<tr>
<td>3</td>
<td>Wind actions</td>
</tr>
<tr>
<td>4</td>
<td>Seismic action and general requirements for buildings</td>
</tr>
<tr>
<td>5</td>
<td>Basis of geotechnical design and actions</td>
</tr>
<tr>
<td>6</td>
<td>Actions induced by cranes and machinery</td>
</tr>
<tr>
<td>7</td>
<td>Thermal actions</td>
</tr>
<tr>
<td>8</td>
<td>Actions during execution</td>
</tr>
</tbody>
</table>
Global Promotion of Eurocodes – South America

South America

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.
Forecast of global acceptance of Eurocodes

2015 – Population 1.033 Billion people
Application outside Europe

- Common design criteria and methods
- Flexibility allows for a differentiation according to specific levels of safety, climatic conditions, geology, traditions…
- Common basis for education, research and development
- Competition with other building sector standards
Sources of good information on Eurocodes

• Many websites on Eurocodes are now operating which are a source of good information and assistance on:
  ▪ Training - events
  ▪ Background documents
  ▪ Free downloadable information
  ▪ Worked examples
  ▪ Helpdesks
Important Websites


• BSI - http://shop.bsigroup.com/en

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

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


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

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