

What do the Eurocodes mean for South Africa?

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A summit to decide the way forward for South Africa in response to the introduction of the Eurocodes in the countries of the European Union was held on 8 February 2008. It was organised by the Joint Structural Division of South Africa (JSD) and hosted by the South African Bureau of Standards (SABS) on the SABS campus in Tshwane (formerly Pretoria).

The summit was attended by representatives of major stakeholders in the materials, design and construction industries in South Africa* and chaired by Ron Watermeyer (Chairman, SABS Technical Committee for Construction Standards and JSD Committee Member).

Background

The case for re-alignment of South African standards with the Eurocodes

South Africa has to a large extent based its structural design codes on those of the United Kingdom. The British Standards will in due course all be replaced by the Eurocodes, leaving many South African standards without a basis. Given that the Structural Eurocodes are considered to be perhaps the most technically advanced suite of structural engineering design codes in the world today, a general feeling has been building up in the structural design fraternity in South Africa that the country should seriously consider aligning its standards in future with the Eurocodes, particularly since a number of countries outside the EU are also inclining themselves towards the Eurocodes.

While such a shift in basis has substantial cost implications, it is recognised that South Africa may stand to benefit tremendously from the increased international competitiveness of its design and construction services, namely access to the EU market and regional markets in the Middle East, the Far East and in Africa. Of course it is acknowledged that adoption of the Eurocodes will expose the country to competition from the EU countries, but the benefits of alignment with the Eurocodes could outweigh the threat.

South African code developers also find the

in-built flexibility of the Eurocodes potentially attractive. This would allow the country to retain desired national levels of safety or to choose values of geographic and climatic parameters that are better suited to the conditions of South Africa, while operating within a fairly general framework provided by the Eurocodes.

Recent code-related initiatives in South Africa

In 1998, the South African National Conference on Loading (SANCL) recommended that the South African loading code, SABS 0160:1989, should be revised. A SAICE working group was subsequently set up for this purpose, with representation from the Joint Structural Division, the Geotechnical Division and the various material sectors. This group would also act as a working group of the SABS Technical Committee for Construction Standards. The primary reference codes during the revision process were the four Eurocodes: EN 1990 (*Basis of Structural Design*), EN 1991 (*Actions on Structures*), EN 1997 (*Geotechnical Design*) and EN 1998 (*Design for Earthquake Resistance*).

The position of South Africa with regard to the Structural Eurocodes was discussed at the April 2007 meeting of the SABS Technical Committee for Construction Standards (TC 5120.61). It was reported that the SANS 10160 subcommittee were working on a revised South African loading code which would be compatible with the Eurocodes. It was agreed that a strategic decision needed to be taken on whether to adapt or adopt the Eurocodes for structural design in the various materials. The chairman was tasked to get a group of stakeholders together to discuss the issues and make recommendations to the Technical Committee.

The University of Cape Town convened a series of one-day Eurocode symposia for industry in July and November 2007, to introduce South African structural engineers to the Eurocode system, and familiarise participants with the provisions of EN1990, EN 1991, EN 1992 and EN 1993. The general

feeling at these symposia (attended mostly by principals of consulting firms and decision makers from the construction industry) was that South Africa needs to go the Eurocode way, but the main uncertainties centred around how that will happen and when. Clarification was also needed on the future of those specialisations that opted not to go the Eurocode way. It was noted that some efforts were already underway in South Africa to revise standards along the lines of the Eurocodes, but it appeared that there was no general framework yet for a systematic switch to a Eurocode basis, neither was there a common national policy providing guidance on the usage of the Eurocodes.

It is against the above background that the Committee of the Joint Structural Division in South Africa decided to organise, with the support of SABS, a national summit on the Eurocodes, where the various stakeholders in the industry would be able to express their views on the issue.

The issues explored

South Africa is different to the UK and other EU nations in that it is not obliged to adopt the Eurocodes. Accordingly, each material sector (concrete, steel, masonry, timber and aluminium) and the specialised sectors (bridges, containment structures, geotechnical design and seismic design) needed to debate on whether to:

- (i) adopt the Eurocodes and produce South African National Annexes for the various parts,
- (ii) develop South African national standards based on the Eurocodes (i.e. adapt the Eurocodes), or
- (iii) update existing South African national standards independently of the Eurocodes.

The speakers on the various sectors were briefed to address the following points:

- What are the issues which drive code development in South Africa?
- Is there a need for revising current codes, and if so, why?
- Which option (adopt/adapt/reject Eurocodes) is favoured?

- What are the benefits associated with the preferred option?
- What are the resources and expertise available for adopting/adapting the Eurocodes?
- What is the estimated timeframe for implementation of the preferred option?
- What are the implications on current material specifications of adopting a Eurocode?

The issue of loading required special consideration, since work on revising the existing South African Loading Code (SANS 10160) along the lines of the Eurocodes EN 1990 (*Basis of Design*) and EN 1991 (*Actions on Structures*) had already begun a few years ago, and is approaching final stages. Here the questions which needed to be answered were:

- What is the relationship between the proposed revision of SANS 10160 and EN1990/EN1991 (what are the fundamental differences)?
- Why was it necessary to revise SANS 10160 based on EN 1990/EN1991, instead of adopting EN 1990 / EN 1991 with SANS 10160 reworked into a South African national annex?

Summit programme

Speakers and their presentations (in the order of the Programme) were as follows:

'Welcome and introductory remarks'

Ron Watermeyer (Summit Chair and Chair, SABS TC for Construction Standards)

'The case for the Eurocodes for South Africa'

Alphose Zingoni (University of Cape Town) and JSD Committee Member

'The standards development process in terms of S. Africa's WTO obligations'

S. Adam (SABS)

'Geotechnical codes'

Peter Day (SAICE Geotechnical Division and SANS 10160 Working Group)

'Aluminium codes'

Tony Paterson (Aluminium Federation of Southern Africa)

'Concrete codes'

Jan Wium (University of Stellenbosch and SANS 10100 Subcommittee)

'Steel codes'

Hennie de Clercq (Southern African Institute of Steel Construction)

'Containment structures codes'

Alphose Zingoni (University of Cape Town and JSD Committee Member)

'Bridge codes'

Edwin Kruger (South African National Roads)

'Masonry codes'

Fred Crofts (Tshwane University of Technology and JSD Committee Member)

'Timber codes'

Victor Booth (Institute of Timber Construction and JSD Committee Member)

'Loading code and basis of design'

Peter Dunaiski (University of Stellenbosch and SANS 10160 Working Group)

'Earthquake codes'

Jan Wium (University of Stellenbosch and SANS 10160 Working Group)

'Discussion and resolutions'

Ron Watermeyer and Alphose Zingoni

- What is the remaining time for the publication of the revised South African Loading Code?

Conclusions

The main observations, outcomes and conclusions of the summit are summarised below.

Broadly speaking, four areas need to be covered by codes: buildings; bridges; containment structures; foundations. South African national standards (as published by the South African Bureau of Standards – SABS) currently cover only buildings. Bridges are covered by the standards of the South African National Roads Authority. There are no South African national standards for geotechnical design or for containment structures.

It was considered justifiable and appropriate that a South African national standard based on EN 1990 (*Basis of Design*) and EN 1991 (*Actions on Structures*) has been under development. The revised standard (SANS 10160) was scheduled for publication at the end of 2008, and will cover basis of design, self-weight and imposed loads, wind actions, seismic actions, geotechnical actions, thermal actions, actions induced by cranes and machinery, and actions during execution. The new SANS 10160 is Eurocodes-compatible and can be used with the various material Eurocodes and with the geotechnical Eurocode.

The concrete material sector opted for generally adopting EN 1992 (EC 2: *Design of Concrete Structures*) for buildings, with some aspects possibly needing adapting. The estimated implementation time was 2 years.

The geotechnical sector was in favour of adopting EN 1997 (EC 7: *Geotechnical Design*) as soon as the revised Eurocode-compatible SANS 10160 has been published. Implementation could therefore start by the end of 2008.

The steel sector, while wishing to adopt the Eurocode for steel (EN 1993) in the longer term, sees no urgency to adopt this for now, since the South African steel codes have been updated fairly recently. Moreover, they would like to follow the implementation of EN 1993 in the UK over the next few years.

The masonry and timber sectors are also in favour of adopting the Eurocodes in the longer term, but see no urgency to do so now, and would also like to follow the process of implementation in the UK.

The aluminium sector is also in favour of adopting EN 1999 in the longer term (5-10 years).

For containment structures, adoption of the Eurocodes was accepted as the best way forward. The absence of South African standards covering the design of facilities like liquid-retaining concrete structures, metal silos and tanks justifies a quicker adoption of the relevant parts of the Eurocodes. However, it is acknowledged that any National Annexes required in this regard will take a few years to compile, and implementation will vary from a minimum of 3 years in the

case of liquid-retaining concrete structures, and longer (6 to 8 years) in the case of steel silos and tanks. Appropriate working groups need to be set up for this.

The bridges sector considers it too early to decide on whether to adopt or adapt the Eurocodes, and will continue to use TMH7, *Code of Practice for the Design of Highway Bridges and Culverts in South Africa*, for the foreseeable future. However, they acknowledge that the current standard for actions on bridges needs to be revised, and would like to see the symbols used in bridge design aligned with those of the Eurocodes and compatible with the building codes.

Overall, while most industry sectors supported the adoption of the Eurocodes, there is no particular urgency to adopt the Eurocodes right now, and South Africa would do well to lag behind the implementation timetables for the UK in order to benefit from the supporting documentation, guides and software that are being developed in that country to facilitate the effective implementation of the Eurocodes.

There is an urgent need for the South African Bureau of Standards to approach CEN (the European Standards body) to obtain clarity on the extent to which the material of EN documents may be incorporated into South African national standards. This is particularly so with regard to the revised South African Loading Code (SANS 10160), which draws substantially on EN 1990 (*Basis of Design*) and EN 1991 (*Actions on Structures*). The current CEN-SABS agreement (2001) may have to be revised.

In conclusion, the Eurocodes Summit was considered to have been a great success, and South African industry now has a clearer sense of direction. While implementation timetables will vary considerably (from 1-2 years to as much as 8-10 years), most sectors in South Africa have agreed the Eurocodes is the way to go, and the next few years will see increased activity in this regard. se

- The full summit report may be downloaded from the following websites: (www.jsd.co.za) or (www.jointcivils.co.za).

*Organisations represented at the Summit included:

- The Joint Structural Division of the South African Institution of Civil Engineering (SAICE)
- The Institution of Structural Engineers (IStructE)
- The Geotechnical Division of SAICE
- The South African Bureau of Standards
- The Cement and Concrete Institute of South Africa
- The Southern African Institute of Steel Construction
- The Aluminium Federation of Southern Africa,
- The Institute of Timber Construction
- The South African National Roads Agency
- ESKOM (the Electricity Supply Commission of South Africa)
- The Department of Public Works
- The Chamber of Engineering Technicians
- plus a number of local authorities, five universities and several private companies.