

Are we ready for Eurocodes?



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1.0 INTRODUCTION

Malaysia is currently working very hard to update Malaysian Standards basing on latest Eurocodes. In 2004, The Institution of Engineers, Malaysia has published a position paper on concrete codes of practice in Malaysia after 2010 and recommended that Eurocodes shall be adopted after the withdrawal of structural British Standards. Traditionally, Structural Malaysian Standards are following British Standards. However, due to the publication of the Structural Eurocodes, a total of fifty Seven documents or parts of structural British Standards were withdrawn on 31st March 2010. In fact, prior to the withdrawal of the structural British Standards, many other British Standards were withdrawn either in totality or partly, after the publication of relevant Eurocodes. These include BS 5328 part I to part IV on specification of concrete (replaced by EN 206-1, BS 8100-1 and BS 8100-2), BS4360 on Specification for weldable structural steels (updated and replaced partly by BS EN 10025, BS EN 10113, BS EN 10210 etc), BS 6089:1981 Guide to assessment of concrete strength in existing structures (replaced by BS EN 13791 and BS 6089:2010) *etc.*

2.0 THE STRUCTURE OF EUROCODES

Structural Eurocodes, undoubtedly a state of art design code of the structural engineering. Hence, we have little choice except adopting the current Eurocodes. National Standards implementing Eurocodes will comprise the full text of the Eurocodes including annexes, as published by CEN and followed by a National Annex. National Annex shall cover the following aspects:

- i) Decisions for the Nationally Determined parameters specified by Eurocodes – Normally, structural Eurocodes allows the participating Nation to decide the values of some parameters. These parameters shall be changed according to the local practices.
- ii) Decisions for the status of informative Annexes;
- iii) References to non-contradictory complementary information.

Structural Eurocodes will be implemented together with other relevant codes in material specification (EN 206-1, Concrete – part 1: Specification, performance, production and conformity; EN 10025 part 1 to part 6, Hot rolled product of structural steel), execution (EN 1090-1, EN

1090-2, EN 1090-3, Execution of steel structures and aluminium structures) as well as testing, interpretation and repair (EN 12350: Testing fresh concrete; EN 12390: Testing hardened concrete; EN 13791, Assessment of in-situ compressive strength in structures and precast concrete components).

3.0 CHALLENGES

In order to successfully implement Eurocodes in Malaysia, great efforts have to be undertaken by all industry players including law makers, researchers, developers, consulting engineers, contractors and laboratory testers. Following are the challenges of adopting Eurocodes as Malaysian Standards:

- i) To update all 58 documents of the structural Eurocodes – To-date, we have completed only four documents, *i.e.* MS EN 1990, MS EN 1991-1-1, MS EN 1992-1-1 and MS EN 1993-1-1. There will be great effort to complete all other 54 documents. Various technical committees have been set up to carry out the drafting of the Malaysian Standards are MS EN 1991-1-4 (Wind loads), MS EN 1993-1-4 (Design of steel structures – Part 1-8: General – Design of joints); MS EN 1997 (Geotechnical), and MS EN 1998 (Seismic Action).
- ii) To update other related Eurocodes in specification of material, testing and execution. Various technical committees have been set up to carry out the drafting of the Malaysian Standards. These include MS EN 10025, MS 523 (basing on EN 206-1, BS 8500-1 and BS 8500-2), MS 28 (Part 1:1985, Methods of Test For Water for Making Concrete), MS29 Specification of Aggregates From Natural Sources for Concrete and EN 1504-Concrete Repair (pending ISC D approval) *etc.*
- iii) To harmonize the numbering system. Apparently Standards Malaysia has obtained the permission to use the prefix of MS EN, However, some of the codes still using running serial numbers, *e.g.* MS 522 and MS 523.
- iv) Currently, Structural Malaysian Standards refers to British Standard, JIS, Australian Standards, ASTM and ISO. Hence, we may face the situation that the design based on British Standard (or equivalent MS) but material supply to JIS or ASTM. This situation is not encouraged due to the fact that the material may failed to comply with the defining environment of the

design codes. Singapore has published BC1:2008, Design Guide on use of alternative materials to BS 5950, and BC 2: 2008, Design Guide of high strength concrete to Singapore Standard CP 65, to resolve their problem.

- v) New concepts and terminologies were introduced by Eurocodes. Reliability was introduced in Eurocodes. First time, limit state design and characteristic strength concept were introduced to the Geotechnical Codes of Practice (EN 1997). In EN 1992-1-1, Strut and Tie model was included. Whereas, in EN 1993-1-1, more extensive requirement on lateral torsional buckling was introduced. In wind loading, 10 minutes mean wind speed was specified compare to 3 seconds gust speed in MS 1553 and hourly mean speed in BS 6399 part 2. EN 1990 has also included the provision of design assisted by testing.
- vi) Extensive training and education are also needed to ensure the smooth implementation of the Malaysian Standard based on the Eurocodes. Furthermore, researches are needed to ensure the suitability of the Eurocodes in Malaysia. Currently, TC on EN1992-1-1 has written two NCCI, *i.e.* behaviour study of band beam and also thin size element (pending publication). Environment of Malaysia is different from the presumption in the Eurocodes (however, this will be overcome by specifying the National Determined Parameters). These include the exposure parameters, rate of concrete attack, hot climate concreting, level of workmanship and others. Huge funding required for Engineers to be trained in implementation of Eurocodes. However, this is not ready in Malaysia construction industry. Furthermore, lack of funding has also impeded the progress of the research and training.
- vii) Our legal framework has not been changed to adopt the application of Eurocodes in Malaysia construction industry. Currently, we relied on Uniform Building

By Law to determine the requirement of the building condition. Hence, UBBL has to be amended to provide a legal status of the Eurocodes. Furthermore, many other aspects shall also be specified, for example, the reliability of the building industry (In Eurocodes, specified target of the reliability was specified and will affect the specification for workmanship, material supply, wind load and seismic load), accidental load, the responsibility of all professional and industry player involved in the construction industry (Eurocodes allowed for the third party supervision, product certification *etc.*).

4.0 CONCLUSION

Judging from the discussion above, we would conclude that our industry are not ready to adopt the Structural Eurocodes. More efforts have to put in to enjoy the benefit of the Eurocodes. To further facilitate the industry players, existing Malaysian Standards should be remained even though it will not be updated. The co-existence period should be sufficiently long to cover the codes drafting and training period.

As usual, IEM, served as a leading organization in promoting Eurocodes, devoted huge resources in drafting the relevant Malaysian Standard and training of the fellow engineers. IEM has organized many road shows and short courses for the structural Eurocodes. Furthermore, IEM has specifically set up a section in IEM Bulletin to provide a platform for learned discussion (note 1). ■

Note 1: The section, paper series on structural Eurocodes, a section devoted to the discussion of the structural Eurocodes, is open to members to view their opinion on the Eurocodes related to local construction industry. The paper can cover any topic on any structural Eurocodes, whether it is already published as Malaysian Standard, or still in the drafting stage or no TC has been set up. The guidelines for the publication is similar to the papers submitted for Bulletin.