Evolution of IEM Study Group

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(Photos and details of authors on page 44.)

In 1959, Institution of Engineers Malaysia (IEM) was established with the primary function to promote and advance the science and profession of engineering as well as to facilitate the exchange of information and ideas related to engineering. IEM is divided into different engineering divisions. One of these is Civil And Structural Engineering Technical Engineering. Since it was established as an engineering society, the Civil And Structural Engineering Technical Division had taken the initiative to conduct courses and workshops for consulting engineers and academicians to develop their practical and academic skills.

IEM EARTHQUAKE TECHNICAL COMMITTEE AND WG1

The earthquake disaster in Sumatra in 2004, raised concerns in Malaysia. To address these concerns, the Civil and Structural Engineering Technical Division took the initiative to form a Technical Committee (TC) on earthquakes. Publishing a position paper in 2007 (IEM, 2007), it looked into mitigation policies and design guidelines on earthquake safety. Since the primary concern was long distant earthquakes in Indonesia, the local scenario was neglected until a small earthquake of M4.2 was recorded in Bukit Tinggi. Such recent activities in what was already considered an inactive intraplate fault, further spiked concerns among the IEM technical committee.

With the adoption of Eurocode by Malaysia and most countries worldwide, the Malaysian government appointed IEM to develop the Malaysian National Annex (NA) to EC8 (CEN, 2004). Different working groups were established, with the technical committee assigned to various tasks. Ir. Adjunct Prof. M.C.Hee headed Working Group 1 (WG1) which was assigned to the development of the response spectrum model and looked into both regional earthquakes in neighbouring Indonesia and here.

Since Malaysia is a country with low to moderate seismicity, we lack local data which is required to support the development of a representative seismic hazard model by the conventional approach of modelling. The task of quantifying local seismic hazard is a unique challenge that requires fundamental research input to resolve. There are many other challenges that are unique to regions of low and moderate seismicity. So the conventional approach of seismic hazard modelling will not produce a satisfactory solution in Malaysia. In view of this, IEM chose to work in consultation with a study group comprising local experienced engineers and international experts to integrate input over a number of years instead of hiring a commercial consultant to undertake the task on a contractual basis. Facilitated by this international (industry-academia) partnership, IEM was able to produce the draft of the NA which was accompanied by a seismic design handbook which is suitable for use in the country.

YOUNG ENGINEERS

In developing the draft of Malaysian NA to EC8, under the above-mentioned industry - academia partnership, the WG1 industry side was led by M.C.Hee while the academia side was led by Associate Prof. Nelson Lam from University of Melbourne, Australia, and Dr H.H. Tsang, Swinburne University of Technology, Australia. With the technical committee's focus on development of young engineers, the WG1 of the IEM Earthquake TC initiated a programme where young engineers would be developed and groomed to advance in the field of earthquake engineering, under the guidance of professional engineers and academicians of the study group.

To kick off the programme, Daniel T.W. Looi was picked as the prime candidate for the working group. Under the mutual trust between IEM Earthquake TC and Nelson Lam, Daniel was sent to The University of Melbourne for technical knowledge transfer training which encapsulated the essential elements of seismology and earthquake engineering from the structural engineer's perspective. These include the use of:

a) Component Seismological Modelling through GENQKE to generate artificial time history on rock site with the combination of earthquake magnitude (M) and distance (R),
b) Finite difference method through ETAMAC to transform time history into response spectrum and,
c) Dynamic site response analysis using SHAKE.

The above tasks were completed within a month, with enormous support from two PhD students (Ali Altheeb and Abdulrahman Albidah) from Nelson Lam's research group. The parameters were determined based on research work published in the book, Seismic Hazard Assessment in Regions of Low-to-Moderate Seismicity (Tsang and Lam, 2010).

Continuous development on the topic of Probabilistic Seismic Hazard Assessment (PSHA) to draft Malaysian NA to EC8 was supported by IEM TC, through the invitation of HH Tsang to Malaysia. A two-day technical knowledge transfer was carried out to complement the training in Melbourne. All work done was summarised in written reports and presentations made to the WG1 and the Technical Committee.

After Daniel Looi was fully groomed into the study group, Ahmed Zuhal Zaeem was brought in as candidate No. 2. Working directly under M.C.Hee, he was involved in the cost implication work of the WG1, which aimed at giving a clear cut presentation to the consulting

engineers on the cost implications and design progress under EC8. Daniel Looi held a knowledge transfer and training session for Ahmed Zuhalon the development of Response Spectra and the knowledge he gained in Melbourne. As the NA to EC8 took shape and the workload increased, Ir. EP Lim joined the WG1 to offer input on the ongoing work from a practicing engineer's perspective. With his help, the current updated draft NA to EC8 was developed for both academicians and engineers, with special attention given to the development and training of young engineers.

LIST OF MEETINGS, SEMINARS AND SYMPOSIUMS

1. 2-Day Course on Analysis & Design to EC8 Demystified (Armada Hotel Petaling Jaya, 2-3 November 2011)
2. 1-Day Symposium and 1-Day Workshop on Earthquake Engineering in Malaysia and Asia Pacific Region. (Armada Hotel, Petaling Jaya, 6-7 December 2011)
3. Sequel to 2-Day Course on Analysis & Design to EC8 Demystified. (Hotel Armada, Petaling Jaya, 5-6 November 2012)
4. 2-Day Symposium/Workshop on Earthquake Engineering in Malaysia and Asia Pacific Region. (Armada Hotel, Petaling Jaya, 10-11 April 2013)
5. Final Sequel to 2-Day Course on Analysis & Design to EC8 Demystified. (Armada Hotel, Petaling Jaya, 28-29 November 2013)
6. 2-Day Workshop on Recommended Earthquake Loading Model in The Proposed NA to EC 8 for Sabah, Sarawak & Updated Model for Peninsular Malaysia. (Armada Hotel, Petaling Jaya, 16-17 July 2014)
7. 2-Day International Seminar and Workshop on Presentation and Reviewing of the Draft Malaysian NA for EC8. (Armada Hotel Petaling Jaya, Selangor, 9-10 February 2015)
8. 2-Day Course on How to Utilise Our Proposed EC8 Malaysian NA for Our Practising Consulting Engineers. (Armada Hotel, Petaling Jaya, Selangor, 29-30 September 2015)

LIST OF PUBLICATIONS AUTHORED BY THE IEM STUDY GROUP

1. D.T.W. Looi, M.C. Hee, H.H. Tsang and N.T.K. Lam, (2013) "Recommended earthquake loading model for Peninsular Malaysia", *JURUTERA* (the monthly bulletin of the Institution of Engineers, Malaysia). April Issue. pp 6-20.
2. D.T.W. Looi, M.C. Hee, H.H. Tsang and N.T.K. Lam, (2013) "Earthquake loading model in the proposed National Annex to Eurocode 8 for Peninsular Malaysia", Proceedings of presentation IStructE Conference on Structural Engineering in Hazard Mitigation 2013, 28 October – 31 November, Tsinghua University Beijing and Tongji University Shanghai, China.
3. D.T.W. Looi, M.C. Hee, H.H. Tsang and N.T.K. Lam, (2015) "Drafting the Malaysia National Annex to Eurocode 8: Recommended Seismic Loadings and Cost Implication" IStrcutE International Conference.
4. D.T.W. Looi, M.C. Hee, H.H. Tsang and N.T.K. Lam, (2015) "Draft National Annex to Eurocode 8 for Malaysia and

cost implication for residential buildings with thin size elements" Proceedings of the Ninth Pacific Conference on Earthquake Engineering Building an Earthquake-Resilient Pacific 6-8 November 2015, Sydney, Australia

5. D.T.W. Looi, M.C. Hee, H.H. Tsang and N.T.K. Lam, (2015) "Seismic analysis in the low to moderate seismicity region of Malaysia based on the draft design handbook", Proceedings of the Ninth Pacific Conference on Earthquake Engineering Building an Earthquake-Resilient Pacific 6-8 November 2015, Sydney, Australia.

TIMELINE FOR THE DEVELOPMENT OF EC8 NA

In 2007, IEM formed The Technical Committee for Earthquake, with different working groups assigned to different tasks. The aim was to produce the first National Annex for EC8. Working Group 1 (WG1) was assigned to produce the response design spectrum for Malaysia. In 2012, the first design spectrum with a return period of 2,475 years was produced for the peninsula on rock sites. In 2013, the design spectrums for Sarawak and Sabah were produced. In 2014, the design spectrums with the latest research was developed into a spectrum with a return period of 2,475 years. Together with this modification, the soil spectrum was developed in 2014 and, with a symposium backed by international experts in 2015, it was introduced to the public. ■

REFERENCES

[1] CEN (2004) EN 1998 1. 2004. "Eurocode 8: Design of Structures for Earthquake Resistance – Part 1: General Rules, Seismic Actions and Rules for Building". European Committee for Standardisation, Brussells.

[2] IEM position document (2005, approved 2007). "Position paper on issues related to earthquake" The Institution of Engineers Malaysia. http://www.myiem.org.my/content/position_papers-301.aspx.

[3] The Institution of Engineers Malaysia (IEM). http://www.myiem.org.my/content/introduction-261.aspx

[4] H.H.Tsang, and N.T.K.Lam(2010). "Seismic Hazard Assessment in Regions of Low-to-Moderate Seismicity".Lambert Academic Publishing.