



### **Performance Evaluation For Concrete To Concrete Connection: From Qualification To Design” – IEM Sabah**

by Ir. Ng Beng Hooi

Ir. Ng Beng Hooi is currently a committee member in Civil and Structural Engineering Technical Division (CSETD).

The Civil and Structural Engineering Technical Division (CSETD) and IEM Sabah Branch had successfully join organized 1 day seminar on 24<sup>th</sup> October 2019 titled “ Performance Evaluation for Concrete to Concrete Connection: From Qualification to Design” The talk was held at IEM Sabah Training Center and the invited speaker are;



**Dr. Daniel Looi** is a Lecturer at Swinburne University of Technology (Sarawak campus), Malaysia. He specialises in the field of earthquake engineering, with particular interest in reinforced concrete. He is a key contributor to the development of the National Annex to Eurocode 8 on the seismic design of building structures for Malaysia. His research in concrete structures was recognised by the HKIE Outstanding Paper Award for Young Researcher/Engineer (2015).

He has been researching in the design methods for post-installed reinforcement when he was a Post-doctoral Fellow at The University of Hong Kong. He authored a design guidebook on post-installed reinforcement for Hong Kong engineers, expected to be published by end of 2019.

He is a frequent speaker and co-speaker in IEM seminars, authored and co-authored engineering research articles in IEM Jurutera Bulletin and international journal since 2011. Daniel worked as a structural application engineer in a multi-national company, specialised in structural analysis and design computation for buildings and plant. He was trained by the late Ir. MC Hee in his early career as a structural engineer. He is an alumnus of the Civil Engineering Department, University of Hong Kong (PhD in 2017) and University of Malaya (B.Eng in 2006).

**Ir. Ng Beng Hooi**, graduated from Universiti Teknologi Malaysia, Johor in 2005 with a B.Eng in Civil Engineering. He worked in consultants and suppliers for more than 14 years. He has been working in Hilti Malaysia since 2015 and has undergone basic and advanced training by Hilti in post-installed anchor and rebar design concepts.

Currently he is working as Head of Engineering in Hilti Malaysia, leading engineering team in providing post installed anchor, post installed rebar and firestop (Fastening and Protection) for Structure, M&E and Façade applications.



**Ir. Mun Yew Fai**, graduated from University of Malaya in 2008 with a B.Eng in the field of Civil Engineering. He worked in a C & S consultant firm for more than 9 years and involved in various residential and commercial projects. He has been working in Hilti Malaysia since August 2018 and has undergone basic and advanced training by Hilti in post-installed anchor and rebar design concepts. Currently he is working as Engineer in Hilti Malaysia, providing technical supports and solutions to consultants and contractors for post-installed anchor, post-installed rebar & firestop system.

The talk was chaired by Ir Tan Kok Yon and was attended by almost 50 participants. The participants consist a pool of professional from difference industries background ranging from practicing consultants, contractor, Authorities, academician and students. The talk was divided into 3 session that Ir Ng Beng Hooi delivered the first session, second session by Dr Daniel Looi and last session by Ir Mun Yew Fai. The seminar divided into 5 Topics:

- 1.0 Overview of Post-Installed Rebar Technology in Malaysia
- 2.0 Qualification of Post-Installed Rebar System
- 3.0 Design Method – Rebar And Anchor Theory or Bonded Anchor Theory
- 4.0 Design Recommendation – Strut and Tie Method and Simplified Design to Bonded Anchor Theory
- 5.0 Demonstration of Design Software “Profis Rebar and Profis Engineering”

The seminar mainly presented on technical issues related to Concrete-to-concrete connection in Malaysia construction industry. Post-installed rebar (PIR) is one of the technology used for the concrete-to-concrete connection. PIR is drilled and installed into cured concrete, bonded by a qualified adhesive system on one side of the interface, and usually served as starter-bars and/or to create lap splicing with the reinforcements in new concrete structures on the other side of the interface. Despite the common adoption of PIR in the construction industry in Malaysia, there is no holistic design provision for PIR explicitly given in the modern international RC design codes.

Designing PIR as per cast-in rebar may result in longer anchorage length, which appears to be impractical in many cases. Recently, Eurocode 2 released its Part 4 on anchor design theory (EN1992-4, 2018) to supersede EOTA TR 023 (2006). EN1992-4 is applicable to shorter anchorage length design of PIR, depending on various failure modes (pull-out, cone and splitting failures). In recent years, a few latest qualification documents for PIR were published, e.g. EOTA EAD 330087 (2018), AC 308 (2016) and seismic assessment by cyclic test as per EOTA EAD 331522 (endorsed draft 2018).

Thus, this seminar is to provide an introduction and some insights into the state-of-the-art qualification and design of PIR including long term behavior, seismic and fire, to promote appropriate and technically-sound use of qualified PIR technology in Malaysia as per international practice.



Participants during the seminar

At the end of the session, there was Q&A session and all the questions from participants were answered by the speakers. The talk ended with Ir Tan Kok Yon presented a token of appreciation to the speakers.



Ir. Tan Kok Yon presenting memento to Ir Ng Beng Hooi, Dr Daniel Looi and Ir Mun Yew Fai