Two-Day Course on "Post-Tensioned Concrete Structures"

by ***Ir. Koh Wei Sang***

THE Civil and Structural Engineering Technical Division (CSETD) organised a two-day course on "Post-Tensioned Concrete Structures" at the Armada Hotel on 6-7 April 2010. A total of 168 participants attended this course, making it one of the most successful courses ever organised by the technical division. The main objective of this course was to educate practitioners and students of engineering on the wide applications and design knowledge on post tensioned concrete structures. The course was delivered by Dr Peter Gabor who is a specialist concrete consultant as well as a lecturer at the University of Sydney. He is a committee member of the Australian Standard Committee AS3600 on concrete structures.

Dr Gabor covered several interesting post-tensioned concrete structures and enlightened the participants with several landmark projects in Malaysia and Australia during his career as a practicing engineer in both countries. His major projects in Malaysia included Menara Telekom, Menara Public Bank (Johor Bahru), UTP (Perak) and Menara Maxis. Other major projects included the upgrading of the Sydney Opera House, concrete structures for the Beijing Water Cube and the National Portrait Gallery in Canberra.

He started the course with an introduction of prestressed concrete design history from 1928 by Freyssinet, the development under Dischinger (Long term effects), Leonhart (Detailing), Guyon (Anchorage Details), T.Y. Lin (Load Balancing) and Thurlimann (Partial Prestressing).

The topic on prestress losses was discussed next, in which two types of prestress losses were explained in detail. They are immediate losses (such as elastic shortening, anchorage, draw in and friction losses) and long term losses (which include shrinkage, creep and steel relaxation).

In Session 2 of the course, effective prestressing forces, anchorage reinforcement, strut and tie models were explained. Load Balancing Method is an important topic in post-tensioned concrete design. This topic was explained in detail with typical examples given to facilitate the explanation.

In Sessions 3 and 4 of Dr Gabor's lectures on the first day, aspects on flexural design, deflection, shear and torsion for statically determinate post-tensioned concrete structures were discussed. He also covered the secondary effects and preliminary sizing of structures for statically indeterminate post-tensioned concrete structures.

On the second day of the course, Dr Gabor started off by talking about several types of floor systems, namely, the band-beam slabs, flat slabs, flat plates and two-way slabs supported by RC walls. Punching shear and edge conditions were explained. Several design examples using PT software were demonstrated. RAPT Version 6.2.1.5 was used to demonstrate the data input and structure modelling. He explained in detail the data input and interpretation of the results.

The results of the computer output were attached together with the course notes for ease of reference. The science and art of post tensioning for transfer structures, stressing access, groutings, movement joints, modification and demolition of existing structures and floor vibrations were covered by Dr Gabor in the afternoon session.

He concluded the course with several practical applications of post-tensioned concrete buildings in Malaysia and Australia that he was involved with. These include KLCC hotel in Malaysia, as well as Bond 5,6,7 and the Sydney Opera House in Sydney. The design challenges, solutions and construction methodology presented by him attracted many questions from the floor during the question and answer session. Dr Gabor ended the two-day course by briefly explaining the benefits of post-tensioned concrete in future sustainability design.

CSETD would like to thank Dr Gabor for his invaluable contribution in imparting both basic and advanced knowledge of post-tensioning to the participants of the two-day course. The technical division also appreciates the willingness of the participants in taking time off from work or study to attend the course. ■