Concrete in Tropical Climate – Challenges & Solutions

*Course Fee:* $695.50 (incl. 7% GST) / participant

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Civil & Environmental Engineering Department

**Schedule**

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**Brief Course Description**

Developments on concrete applications are conducted much more in temperate regions than in tropical climate. Advances so achieved need to be adapted to cater for the difference in service environment, particularly influence of temperature on behaviour of concrete. The challenges to achieve similar performance in both fresh and hardened concrete in tropical climate with mitigating solutions are topics for the presentation. The new developments in types of cement, chemical admixtures and mineral additives provide opportunities to mitigate the effect of temperature. Experience gained over the past 50 years of R&D in materials for concrete and applications in building structures have enabled the differences between climatic factors to be mitigated economically.

**Topics**

1. Brief review on EN standards on cement, chemical admixtures and mineral additives and their applications in designed concretes for strength, consistence and durability to meet tropical climatic conditions for both fresh and hardened concrete.
2. High strength concrete (EN 206: C90/105) in large dimension columns, deep transfer beams/transfer plates and thick pilecaps/raft foundations, all have to meet temperature limit requirements which are challenges in hot climate.
3. The limitations of chilled water and ice in achieving target placing temperature are reviewed with typical examples.
4. Precautions for potential plastic shrinkage and plastic settlement cracking are discussed.
5. Alternate to numerical solutions of heat transfer are limited by the difficulties to simulate placing sequence often requiring many hours of casting by actual simulations.
6. The design of appropriate mock-ups to simulate the actual placing sequence on site to verify both peak temperature for DEF and potential early thermal cracking for various types of structural elements where available, will be presented, typical monitoring results will be included.
7. Introducing latest development on conditions to extend peak temperature up to 85 °C in revision of NF EN 206/CN presented in International Workshop, CONCRACK 5 in 2017.
Instructor: Associate Prof Tam Chat Tim

Dr Tam obtained degrees in Civil Engineering, BE (Hons) and ME in Australia and PhD in Canada. After working for 3 years with the Hydro-Electric Commission in Hobart and a consultancy firm in Kuala Lumpur, he joined the Department of Civil Engineering of the University of Malaya in 1963. Between 1968 and 1972, he was on study leave from the University of Malaya for his PhD in Materials Science on the topic of influence of chemical admixtures on performance of concrete.

After returning, he was Head of the Department prior to leaving in 1979 to join the then University of Singapore, now National University of Singapore, and held the position of Vice-Dean before his retirement in 1996. Currently, he continues as an Adjunct Associate Professor to conduct research on concrete materials and construction, with special interest in tropical concreting practice.

Professional qualifications and activities:

PE, Malaysia and Singapore, CE, UK, FIEM, FIES, FIstructE, FACI, FCS
Member of technical committees in SPRING Singapore, ASTM and ACI and technical adviser on large concrete pours and thick sections in Malaysia and Singapore project since 1980’s.

Honours & Awards

- Gold Medal in recognition of services to standardization, 1985, SISIR (now SPRING, Singapore)
- Distinguish Award in recognition of outstanding contributions to national accreditation programme, 2006, Singapore Accreditation Council
- Distinguish Partner Award in recognition of distinguish services and outstanding contributions towards quality and standards in Singapore, 2010, SPRING Singapore
- Singapore Concrete Institute, Past President and Life Member (inaugural first life member, 1997)
- American Concrete Institute, Singapore Chapter – Past President and Distinguished Chapter Member, 1999
- Singapore Concrete Institute – Life Time Achievement Award, for contributions and dedication to SCI and the concrete industry in higher learning and engineering achievement, 2009
- Concrete Society of Malaysia – CSM Excellent Award, in recognition of contribution made to CSM, 2008