

TITLE	: CRACKS IN CONCRETE – CAUSES, PREVENTION, INSPECTION & RECTIFICATION (25 th Run)
DATE	: 30 April 2018 (Monday)
TIME	: 9.00am – 4.30pm
VENUE	: Devan Nair Institute, 80 Jurong East St 21 Singapore 609607 (To confirm)
CPD PROGRAMME	: 6 STU (Structural) (Confirmed), 6 PDU (Confirmed)
FEES	: \$246.10 (IES Member) / \$288.90 (Non-Members)
CONTACT PERSON	: Verline Chiam 6460 4241 verline.chiam@iesnet.org.sg

Introduction

Reinforced concrete continues to be used as the most common construction material in structures. In most instances, concrete have a natural tendency to shrink as it cures and harden. When the shrinkage of the concrete exceeds the tensile capacity, cracks form. Cracks in concrete can also occur due to other reasons related to workmanship and design. Concrete is also liable to crack in both the plastic and hardened states due to stresses which it intrinsically (naturally) sustains by the nature of its constituent materials. This course looks primarily at this kind of cracks.

Based on site, Resident Engineers (REs) and Resident Technical Officers (RTOs) are often faced with issues of cracks in concrete as the structure is constructed. This course is primarily designed for them to equip them with technical knowledge on the causes, prevention, inspection and rectification of cracks. Emphasis on the inspection methodology will benefit the participants on what to do when cracks are detected. Accordingly, the appropriate repair method should be considered when the reason and nature of cracks are determined.

Objective

The objective of the course is to impart knowledge to the participant on the causes, prevention, inspection and rectification of cracks in concrete. In particular, cracking in concrete is explained and the allowance of its formation in design is covered. Cracks formed arising from workmanship issues are also covered. *Appropriate references will be made to the Singapore Standard SS EN 1992 series on Eurocode 2 Design of concrete structures that allow cracks to form and possible ways of preventing cracking is also covered.* Emphasis on how to assess the severity of the crack through a methodological approach is covered. Finally, various methods of rectification of the crack lines are covered including the appropriateness of the method to the type and nature of the crack being considered.

Course Outline

1. Types of cracks

- a. Why does concrete crack?
- b. Intrinsic cracking of concrete
- c. Types of intrinsic cracks
- d. Approach and repairs of cracks
- e. Principles affecting cracking in concrete

2. Prevention and control

- a. Avoid cracking or control cracking?
- b. Influence of reinforcement on cracking
- c. Principle of crack spacing
- d. Causes, prevention and recommendations
- e. Plastic, early age thermal & long term drying shrinkage cracks

3. Inspection and assessment

- a. Guides and references
- b. From assessment of cracks to repairs
- c. Testing techniques
- d. Assessment
- e. Choosing repair methods
- f. Selection of materials

4. Rectification of cracks

- a. Considerations before repairing
- b. Suitable materials
- c. Repair methods
- d. Quality control

Program Outline

Time	Description
8.30am – 9.00am	Registration
9.00am – 10.30am	Types of cracks
10.30am – 10.45am	Tea Break
10.45am – 12.15pm	Prevention and control
12.15pm – 1.15pm	Lunch
1.15pm – 2.45pm	Inspection and assessment
2.45pm – 3.00pm	Tea Break
3.00pm – 4.30pm	Rectification of cracks
4.30pm	End of programme

CV of Lecturer

Fong Weng Khiong is a Director of a consultancy firm, Ascent Facilities Engineering Pte Ltd, specialising in inspection, appraisal and remedial measures of structures. Prior to setting up the company in 2004, he worked as a graduate engineer from 1991 to become the Singapore office manager of Taywood Engineering Ltd (UK) in 2000. He was Head of Department, Building Performance, at SETSCO Services Pte Ltd, from 2000 to 2004. He has inspected more than 100 projects to date, dealing with problems in new construction as well as existing structures affected by deterioration. His expertise is in assessment of deteriorated concrete structures, mitigating and providing repair proposals.

Fong Weng Khiong is also a Director of the Singapore Concrete Institute. He has lectured as one of the course leaders in SCI's course, "Deterioration of Reinforced Concrete – Inspection, Assessment & Repairs". His conference speaking and paper *"Investigation, Remedial Recommendations and Finite Element Analysis for Delamination Problems on a Façade"* was awarded the "Highly Commendable Paper" Award 2006 at the 10th International Conference on INSPECTION, APPRAISAL, REPAIRS & MAINTENANCE OF STRUCTURES, 2006, Hong Kong organized by CI-Premier Pte Ltd. He also delivered a conference paper *"Durability Investigation, Service Life Prediction and Life Cycle Cost Analysis of Rehabilitation Options for a Pier Structure"* at the 3rd Asian Concrete Federation International Conference on SUSTAINABLE CONCRETE TECHNOLOGY AND STRUCTURES IN LOCAL CLIMATE AND ENVIRONMENT CONDITIONS, 2008, in Ho Chi Minh City, Vietnam.

Registration Form

Cracks in Concrete – Causes, Prevention, Inspection & Rectification 25th Run

Date: 30 April 2018 (Monday)
Duration: 1 Day
Time: 9am – 4.30pm
CPD Programme: 6 STU (Structural) (Confirmed) , 6 PDU (Confirmed)
Venue: IES Academy @ Jurong East
Course \$246.10 (IES Member)
Fee: \$288.90 (Non-member)
Course Verline Chiam
Coordinator: 6460 4241
Verline.chiam@iesnet.org.sg
Last Date of Registration: 20 April 2018

Participant Details

*Name (as per NRIC): _____ *NRIC/FIN No: _____
*Designation: _____ RE/RTO/PE No: _____
Company: _____
*Address: _____
*Email: _____ Postal Code: _____
*Contact No: _____ Fax: _____
Please Indicate: IES Member No: _____
 Non-member Vegetarian

Contact Person (HR or Finance if sponsored by company or if applicable)

Name: _____
Tel: _____ Fax: _____
Email: _____
Address: _____

Payment Details

Cash / Nets / Cheque No: _____ Amount: _____
 Sponsored by company

- All fees inclusive of 7% GST
- Cheques should be made payable to "Engineers Singapore Pte Ltd"

Name: _____

Signature _____

TERMS & CONDITIONS COURSE REGISTRATION

Registration

Any registration, whether on-line or fax will be on a ***first-come-first-served basis*** and will only be confirmed upon receipt of full payment by Engineers Singapore Pte Ltd unless otherwise invoice to company.

All registrations must be submitted with duly completed registration form.

Closing Date & Payment

The closing date of the event will be 1 week prior to event commencement date or earlier. Cheques should be crossed 'A/C payee only' and made payable to '**Engineers Singapore Pte Ltd**', with the ***Title of The Event indicated clearly written on the back of the cheques***, and submitted with the duly completed registration forms to:

Att: Verline Chiam

IES Academy@Jurong East

Devan Nair Institute for Employment and Employability,

80 Jurong East Street 21, #04-10

Singapore 609607

Confirmation of Registration

Confirmation of registration will be given at least 1 week before the commencement date via email. ***If you do not receive the said confirmation email, you are required to contact IESA at 6463 9211 during office hours.***

IESA reserves the right to allow only confirmed registrants to attend the Event.

Withdrawals/Refunds of Fees

Written notice ***at least 1 week in advance*** before the commencement of the event

Full course fee shall be refunded subjected to **4.5% transection charge.**

➤ **NO** refund otherwise.

No show of participant would not be accepted as a valid reason for withdrawal/refund.

One time replacement is allowed only if written notice is received by us at least 1 week before the commencement of the event. However, when an IES member is replaced by a non-member, the participant has to pay the difference in the relevant fees.

Cancellation/Postponement

Changes in Venue, Dates, Time and Speakers for the Events can occur due to unforeseen circumstances. IES reserves the full rights to cancel or postpone the Event under such circumstances without prior reasons. Every effort, however, will be made to inform the participants or contact person of any cancellation or postponement.

Fees will be refunded in FULL if any Event is cancelled by IESA.

UTAP (Union Training Assistance Programme) is an individual skills upgrading account especially for NTUC members. As a member, you enjoy UTAP funding at 50% of the unfunded course fee capped at \$250 every year.

SkillsFuture Credit (SFC) "All Singaporeans aged 25 and above can use their \$500 SkillsFuture Credit from the government to pay for a wide range of approved skills-related courses. Visit the SkillsFuture Credit website (www.skillsfuture.sg/credit) to choose from the courses available on the SkillsFuture Credit course directory."

Please visit <https://www.ies.org.sg/iesa/Skillsfuture & UTAP.pdf> for more information on SFC & UTAP claim.

PERSONAL DATA PROTECTION ACT

I consent to the processing by Institution of Engineers, Singapore of personal data, including sensitive personal data as defined in the Data Protection Act 2014, about me for the proper purposes of Institution of Engineers, Singapore (IES). I undertake to observe the provisions of the Data Protection Act 2014 in relation to any personal data I may myself hold and process as a Members of Institution of Engineers, Singapore, and I agree to indemnify Institution of Engineers, Singapore from liability for any claims or damages that may arise from the processing of this data. For more information kindly refer to: www.ies.org.sg/PDPA.

Enquiries

For further enquiries, please contact IESA general office at Tel: 6463 9211.