INTRODUCTION

This course will deal with developments and challenges in prestressed, precast concrete technology.

COURSE OUTLINE

Topics will include the factory production and quality control of prestressed precast concrete structural elements. This will be followed by design concepts and post-tensioning applications in buildings. The next part of the course will deal with prestressed precast concrete applications in bridges and viaduct construction.

Further details are given in the synopsis of the papers to be presented.

TARGET AUDIENCE

Engineers, Project Managers, Contractors, Prestressing specialists & suppliers.

Synopsis of papers:

1. Factory Production of Prestressed Precast Concrete Structural Elements
   by Mr Alec Chew

Prestressed Precast concrete technology has established itself as major structural components and evolved into a reliable method in infrastructure and building construction. As a whole, it has made significant contributions to the construction industry.

In general, topics will include the application of prestressed precast concrete, especially bridge construction in the Singapore context. This will include the overall view and type of prestressed precast concrete beams commonly used, technical specification, production flow and QA/QC inspection test plan for the manufacturing of prestressed precast beams.

The speaker will also share his experience and the common problems faced in the fabrication of prestressed precast beams.
2. **Design concept and approach to post-tensioned concrete structures**  
   by Mr Ong Guan Liong

The use of post-tensioning design has proven to be very popular in buildings in Singapore. It offers huge column-free space in modern high-rise office buildings and also high loading capacity in multi-storey factories and warehouses.

This paper does not attempt to cover the complete aspects of PT design but focuses on some relevant issues faced by designers in PT design. Following a brief coverage on the basic fundamentals on PT and its design requirements, the main emphasis of this paper will be on some selected issues. These are the commonly contentious or misunderstood topics surrounding the PT design. These topics include the use of load balancing as a design tools, how much PT to provide in a design, the accounting of loads in a flat slab design as well as the issue of ductility in PT design.

Worked examples will be used to illustrate these issues. The design of a PT transfer beam will also be discussed through a worked example.

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3. **Post-tensioning applications and practical solutions for buildings**  
   by Mr. Gary Soon

Post-tensioning in buildings had been made popular in Australia in the early 70s. This trend then spread to South East Asia in the early 80s, with its acceptance level reaching a high in the 90s. Nowadays, in Singapore, Post-tensioning has been applied in all modern buildings that require huge column free space and high loading. This is inevitable as Post-tensioned design provides an economical and fast track construction solution to building owners and builders alike.

However, in spite of its popularity and efficient design approach, there are constant lamentations from disillusioned contractors and consultants about its shortcomings. They often complain about its tendency to crack freely; its unacceptable undulating slab finish after completion of stressing; its inability to accommodate openings after construction, etc.

In this lecture, the speaker will attempt to quash all these “myths”, and provide an insight into the “dos” and “don’ts” that often give rise to undesirable defects in Post-tensioned buildings.

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4. **Post-tensioned precast applications in viaduct construction**  
   by Mr Alfred Wong

Modern long span elevated driveways were made possible as a result of postwar developments in post-tensioning systems and materials technology. Early post-tensioned concrete segmental bridges were cast in-place in cantilever using form-traveller with spans up to 120m. This central span has increased up to 200m with advancement in design and post-tensioning systems.

The application of post-tensioning and precast segments were a natural development for efficiency, standardized mass production, speed of erection, the elimination of expensive formwork in deep valleys and over waterways and congested urban areas.

In this lecture, the speaker will give an overview of how post-tensioning is used for the various elevated driveway construction methods namely:

- Precast segmental Span-by Span
- Precast segmental Balanced Cantilever
- Incremental Launching Method
- Precast segmental Crosshead with Precast Post-tensioned T-Beams
In spite of the many advantages which will be presented in the lecture, the speaker will also touch on the problems encountered from actual construction projects, which can serve as a reminder to the contractors to be aware to prevent recurrence.

5. **Prestressed precast concrete beams for vehicular bridges & viaducts**  
   by Er. Dr. Lim Ewe Chye

Prestressed precast concrete beams have been used for about forty years in South-East Asia. Such beams have been precast either in the factory and then transported and launched at the site, or have been precast at the site for beams that are too long to be transported from the factory. These are beams that are produced in full lengths, to span between supports. Another type of production is that of individual segments, usually produced in the factory and then transported to the site.

The overall concepts of using the above beams for bridges and viaducts are discussed, for example, how the beams would span between column heads or between short cantilever beams that have been cast insitu. There will also be mention of the use of bearings on which beams are seated at their supports.

The basic concept of two popular methods of bridge construction, namely the balanced cantilever method and the incremental launching method, will also be discussed.

6. **Construction of MRT and LRT viaducts using prestressed, precast concrete beams**  
   by Er. Dr. Lim Ewe Chye

This paper will discuss a few types of launching methods of beams for light rail and mass transit viaducts. These beams are usually launched in built-up urban areas, using overhead girders which run above the viaducts. As in most urban areas, there is little land on both sides of the viaduct for the use of large cranes to launch viaduct beams.

Hence, specially fabricated launching girders are well suited for such types of construction. One type of girder will enable full lengths of prestressed, precast beams to be launched between column heads. Another type of girder uses a mechanism to lift individual precast segments from road level and then position them at final viaduct level, before prestressing these segments to form complete full-length beams.
CV of Lecturers

1. **Mr. Alec Chew** has about fifty years of experience in civil and structural engineering design and administration. His projects range from water schemes, flyovers, bridges, highways and building structures.

   Mr. Chew is Director of MSE Consultants Pte Ltd. Prior to his current position, Mr. Chew was Managing Director of Concrete Innovator Co. Pte Ltd (1974 – 1999), and prior to that, he worked with Sembawang Construction Pte Ltd, VSL Prestressing Pte Ltd, Hume Industries (FE) Ltd., and Binnie & Partners (Malaysia).

   Mr. Chew is a registered Professional Engineer in Singapore and Malaysia. He is also a Fellow of the Institution of Engineers, Singapore; a Member of the Institution of Engineers, Malaysia; and a Member of the Institution of Structural Engineers (United Kingdom).

2. **Mr. Alfred Wong** started his career as a Heavy Lifting Engineer for VSL Singapore upon graduation from Nanyang Technological Institute in March 1990. He was involved in the heavy lifting works for VSL in the region in countries like Hong Kong, Thailand, Taiwan, Malaysia and Indonesia. In July 1996, in line with the expansion plan, he was given the opportunity to head a new department, Major Projects Department which did structural projects of large contract value (e.g. structural works for factories, precast components and steel fabrication).

   He joined Utracon Structural Systems as a Manager for Major Projects in April 1998, and was involved in a few prominent projects in Singapore namely, SATS In-house Catering Centre 3, HDB Hub in Toa Payoh, numerous LTA projects: Kallang Paya Lebar Expressway C422 and C425, Viaduct from Airport Road to Tampines Ave 10, Bridge Across Pandan River, AYE-Queensway Flyover.

   He was appointed as Director of Utracon’s subsidiary in Malaysia, Utracon Structural Systems Sdn. Bhd. in January 2007, and is in charge of the design and operation of post-tensioning works for building and civil engineering contracts in Malaysia.

3. **Er. Dr. Lim Ewe Chye** graduated from University of London with a B.Sc. degree in Civil Engineering in 1969, followed by a M.Sc. degree in Structural Engineering. After graduation, he worked for several years for consultancy companies in London, Singapore and Malaysia. He then joined the academia, lecturing at Singapore Polytechnic for several years, and later at Nanyang Technological Institute / Nanyang Technological University for the next twenty years. He completed his Ph.D. degree at Loughborough University as a part-time student.

   Dr. Lim’s interests are in Civil Engineering construction and renewable energy. He is currently the Chairman of the Clean Energy interest group of the Institution of Engineers, Singapore and has conducted courses in renewable energy at the IES Academy. In 2009 & 2010, he conducted a series of lectures for The Institution of Engineers, Singapore, on Good Concrete Practice & Structural Steel Construction, for Resident Engineers & Resident Technical Officers.
Dr. Lim is a Professional Engineer registered with the Professional Engineers Board in Singapore.

4. **Mr Ong Guan Liong** graduated from Nanyang Technological University in 1995 with Bachelor of Engineering (Civil)(2nd Upper) and started his career as a Design Engineer with VSL Singapore. He joined Utracon Structural Systems Private Limited in 1998 as a Senior Design Engineer and became the Deputy Design Manager in 2001 and subsequently Design Manager in 2003. With the expansion of the Utracon group of companies, he is now the Technical Director, Design since 2008. He oversees the various design offices of the company in Singapore, Malaysia and India.

Over the years, he has accumulated almost 14 years of design experience in the field of PT structures. Some of the projects he has done includes: HDB Centre at Toa Payoh, Life Science Buildings at Science Park, Compass Point Shopping Centre, One Raffles Quay Building and the recently completed Tokio Marine Tower, as well as the ongoing 43-storey Ocean Financial Building.

5. **Mr. Gary Soon** graduated from Nanyang Technological Institute in 1988 with an Honours degree degree (conferred by National University of Singapore). He started his civil engineering career as a Project Engineer in VSL Singapore in January 1989, looking after post-tensioning and structural strengthening projects. He was later transferred to the Marketing Dept of VSL Singapore where he was later promoted to Marketing Manager in 1996.

He joined Utracon Singapore as a Marketing Manager in April 1998 when the local construction scene was at the doldrums. With the local new contracts opportunities scarce and difficult to come by, the company sent him to venture into India in 2004. He was then promoted to the Director of Utracon (India). Back home in Singapore, he continued his role as the Regional Marketing Manager and was promoted to the General Manager of Utracon (Singapore) in June 2008.

Currently, his appointment as Director of Singapore Operations of the Utracon Group requires him to oversee the day to day operations of the Singapore unit, where he keeps himself abreast with all the latest happenings on all the local projects (which include both Civil engineering and building contracts).
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<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
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<tr>
<td>8:30 – 9:00 a.m.</td>
<td>Registration</td>
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<tr>
<td>9:00 – 9:30 a.m.</td>
<td>Introduction to prestressed concrete technology</td>
<td>Mr Ong Guan Liong&lt;br&gt;Technical Director, Ultracon Corporation Pte. Ltd.</td>
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<tr>
<td>9:30 – 10:30 a.m.</td>
<td>Factory production of prestressed precast concrete structural elements</td>
<td>Mr Alec Chew&lt;br&gt;Director&lt;br&gt;MSE Engineering &amp; Management Consultants</td>
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<td>10:30 – 10:45 a.m.</td>
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<td>10:45 – 11:45 a.m.</td>
<td>Design concept and approach to post-tensioned concrete structures</td>
<td>Mr Ong Guan Liong&lt;br&gt;Technical Director, Ultracon Corporation Pte. Ltd.</td>
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<td>11:45 – 12:45 p.m.</td>
<td>Post-tensioning applications and practical solutions for buildings</td>
<td>Mr Gary Soon, Director, Singapore Operations, Ultracon Corporation Pte. Ltd.</td>
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<td>12:45 – 1:45 p.m.</td>
<td>Lunch</td>
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<td>1:45 – 3:00 p.m.</td>
<td>Prestressed precast concrete beams for vehicular bridges and viaducts</td>
<td>Dr Lim Ewe Chye</td>
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<td>3:00 – 4:00 p.m.</td>
<td>Post-tensioned precast applications in viaduct construction</td>
<td>Mr Alfred Wong, Director, Malaysia Operations, Ultracon Corporation Pte. Ltd.</td>
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<td>4:00 – 4:15 p.m.</td>
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<td>4:15 – 5:30 p.m.</td>
<td>Construction of MRT &amp; LRT viaducts using prestressed, precast concrete beams</td>
<td>Dr. Lim Ewe Chye</td>
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Registration Form

One-day Course on Prestressed Precast Concrete Technology

Date      :   19 May 2010 (Wednesday)  
Time : 9am - 5.30pm  
Venue : Furama City Centre Singapore. 60 Eu Tong Sen Street. Singapore 059804  
Fees : $195.00 (IES Members)  
       $235.00 (Non-Members)

Please register online/mail/fax the completed form by 7 May 2010 before 3pm to:

Address:  IES Academy  
70 Bukit Tinggi Road  
IES Building  
Singapore 289758  
(Tel) 6463 9211   (Fax) 6463 9468

Participant Details

Full Name : _________________________________   NRIC : _________________________________
Company : _________________________________   Designation: _________________________________
Mailing Address : ____________________________________
Postal Code : _________________________________   Gender : ________Male    /    Female_________
Tel / Mobile : _________________________________   Fax : ____________________________________
Email : _________________________________

Please indicate :   □ IES Members   IES M'ship No.: _________________________________   P.E. No.: _________________________________ (if applicable)
                     □ Non-Members   □ Sponsored by Company

Date : _________________________________   Signature : _________________________________

Contact Person Details (if different from participant)

Name : _________________________________   Designation: _________________________________
Tel / Mobile : _________________________________   Fax : _________________________________
Email : _________________________________

Payment Details

Bank / Cheque No.: _________________________________   Amount ($) : _________________________________

* All Fees are inclusive of 7 % GST.  
Cheque should be made payable to: “Institution of Engineers, Singapore” or “IES”.

Acceptance of Terms and Conditions for Registration of IES Academy’s Events

I agree to abide by the Terms and Conditions for Registration of IES Academy’s Events.

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 The Institution of Engineers, Singapore (IES) unless otherwise invoice to company.

All registrations must be submitted with duly completed registration form.

Email registrations will not be accepted.

Closing Date & Payment

The closing date of the event will be 7 days prior to event commencement date. Cheques should be crossed ‘A/C payee only’ and made payable to ‘Institution of Engineers, Singapore’ or ‘IES’, with the Title of The Event indicated clearly written on the back of the cheques, and submitted with the duly completed registration forms to:

IES Academy
70 Bukit Tinggi Road
Singapore 289758

Confirmation of Registration

Confirmation of registration will be given 7 days prior to the commencement date via email. If you do not receive the said confirmation email, you are required to contact IESA general admin immediately at 6463 9211 (office).

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

Withdrawals/Refunds of Fees

Notice of withdrawal must be given in writing to IESA. Policy on refund of course fee is as follows:

- FULL refund if we receive your written notice of withdrawal at least 7 days before the commencement of the Event.

- NO refund otherwise.

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

Replacement is allowed but restricted to once only. Replacement will be allowed only if written notice is received by us at least 3 days 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 at least 3 days before the commencement date.

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.

Enquiries

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