Introduction: Prefabricated Prefinished Volumetric Construction

With the release of details on Industry Transformation Map (ITM) last year, the focus was on Design for Manufacturing and Assembly (DfMA) in adopting effective and productive construction methods. PPVC is one such technology. With the shortage of skilled labour and rising labour costs in Singapore, the construction industry would gradually evolve towards:

- reducing labour on site by adoption factory manufactured elements such as precast and prefabricated elements;
- standardising and repetition of typical building elements in the mass market such as public housing development and some private development;
- reduction of wet trades on the construction site while promoting a higher quality controlled factory fabrication.

As a result, Prefabricated Prefinished Volumetric Construction (PPVC) is gaining traction. The PPVC features an innovative construction method where volumetric modules (complete with finishes for walls, floors, ceilings and MEP) are constructed/manufactured off site in a factory and assembled on site. With the prefinished prefabricated modular units, a majority of the labour-intensive trades, such as bricking, waterproofing, architectural finishes, fitting-out, mechanical and electrical works, can be shifted off-site and pre-assembled and prefinished at the factory and delivered to the construction site for installation. This system reduces extensively the need for skilled workers on site, saves time, improves productivity, and maintains a high quality factory-controlled product.

We have seen various application of PPVC in Singapore, such as student housing in Nanyang Technological University, Crown Plaza Hotel, 17-storey condominium Lake Grande, 36-storey condominium Parc Rivera, 40-storey condominium The Clementi Canopy, The Wisteria, Le Quest, Twin View, to name just a few. While each project is different, such as site location, site constraints, building type, function, layout, span, etc., there will be different challenges for designers and contractors. The design and construction teams have to find different methodology of prefabrication suitable for each development. Every market and economy is unique. The building and construction industry in Singapore will evolve its own uniqueness of prefabrication as it move towards industrialization, which we will see in the very near future.

Who should attend?
The Organising Committee invites speakers who are experienced in different solutions of prefabricated prefinished volumetric construction of standardized modular building units. The course is particularly suitable for:

- Practising Engineers, Accredited Checkers
- Developers, Project Planners, and Contractors seeking solutions on prefabricated prefinished volumetric construction.
- Academicians/researchers/students.
- Engineers undertaking their initial professional development.
- Other construction specialists (e.g. prefabricators, pre-casters).
Speakers:
- **Mr. Ramamoorthy Rajendran**, Director of Construction Productivity and Quality Group Technology and Capability Department, Building and Construction Authority
- **Mr. Khor Yew Chai**, Executive Director of Singapore Engineering & Construction Pte Ltd (f.k.a Singapore Piling & Civil Engineering Pte Ltd) and Singa Development Pte Ltd. Director of Moderna Homes Pte Ltd; all subsidiaries of BBR Holdings (S) Ltd.
- **Mr. Johnny Lim Chee Hwa**, Director of Team Build Construction Pte Ltd
- **Mr. Hew Man Wah**, Asst. Director of Zheng Keng Engineering and Construction Pte Ltd
- **Mr. Ben Sheng**, Snr Project Manager of China Construction (South Pacific) Development Co Pte Ltd

Programme:

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<td>Registration @ Foyer of Phoenix 1 Extension, Level 6 Novotel Singapore Clarke Quay</td>
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<td>0900 – 0905</td>
<td>Opening Address by Er. A/Prof Lok Tat Seng Chairman, IES/IStructE Joint Committee</td>
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<td>0905 – 1030</td>
<td>Talk by Ramamoorthy Rajendran Performance Requirements of PPVC Systems in Local and Overseas Projects</td>
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<td>Talk by Khor Yew Chai Steel PPVC of Integrated Building Project: The Wisteria</td>
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<td>1215 – 1345</td>
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<td>Talk by Hew Man Wah PPVC Construction of NTU Student Hostel</td>
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<td>1630 – 1730</td>
<td>Talk by Ben Sheng PPVC Construction of 17-Storey Residential Building at Lake Grande</td>
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<td>1730 – 1800</td>
<td>Q&amp;A and Discussion: Led by Mr Kang Jianhan Committee Member, IES-ISTRUCtE Joint Committee</td>
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Biography of Mr. Ramamoorthy Rajendran

Mr. Ramamoorthy Rajendran is a Director of Technology and Capability Department in the Building and Construction Authority (BCA). He is a Chartered Professional Engineer (Australia). He oversees the initiatives in raising construction productivity through implementing Design for Manufacturing and Assembly (DfMA) technologies. He also leads the taskforce of Prefabricated Prefinished Volumetric Construction (PPVC), Mass Engineered Timber (MET) and Prefabricated MEP services. Prior to joining BCA, he had gained several years of experience from private sector firms- Woh Hup and Dragages.

The performance requirements of PPVC aim to improve the quality and productivity in the built environment. An upstream consideration in the PPVC design can significantly reduce construction time and achieve better end result. The speaker will share different types of PPVC systems used in local projects and overseas. He will also share the experiences from the early PPVC projects in Singapore.

Biography of Mr. Khor Yew Chai

Mr. Khor Yew Chai is a veteran who has more than 25 years of construction experience in Singapore. Currently, he is an Executive Director of Singapore Engineering & Construction Pte Ltd (formerly known as Singapore Piling & Civil Engineering Pte Ltd) and Singa Development Pte Ltd. He is also a Director of Moderna Homes Pte Ltd; all subsidiaries of BBR Holdings (S) Ltd.

He holds a Bachelor of Engineering (Civil Engineering) from National University of Singapore, a Master of Science (International Construction Management) from Nanyang Technological University and a Master of Science (Civil Engineering) from National University of Singapore.

Mr. Khor was an invited speaker during BCA’s BuildSmart Conference in 2012 on the topic of “An Alternative Construction Technique for Landed Houses – The Light Gauge Steel and Drywall”. In 2017, he was invited again as a speaker during the same event on the topics of “Ensuring Good Quality PPVC Module in the Manufacturing Process” and “Implementing and Challenges of Adopting Steel PPVC”. He was also invited as a speaker during the AGM of Singapore Structural Steel Society presenting a talk on “Spearheading The Next Lap In Modular Highrise Construction -PPVC”.

Brief Synopsis

Steel PPVC is one of the game changing technologies that support the DfMA concept to significantly speed up construction. It can potentially achieve a productivity improvement of up to 50% in terms of manpower and time savings, depending on the complexity of the projects. Furthermore, dust and noise can be minimised as more activities are done off-site. With the bulk of the installation activities and manpower moved off-site to a factory controlled environment, site safety will also be improved.

It is important to understand its basis to ensure compliance to correct specification, design and process that one is fit for purpose. The speaker will outline some of the key manufacturing process and challenges of adopting steel PPVC in one of the near-completion integrated building project in Singapore, The Wisteria.
**Biography of Mr. Johnny Lim Chee Hwa**

Mr. Johnny Lim is the Executive Director of Teambuild Engineering and Construction Pte Ltd since July 2012. He graduated from The National University of Singapore, School of Architecture in 1990, and obtained his professional registration with the Board of Architects in 1993.

Johnny Lim is heading the new construction technologies in Teambuild and is instrumental in the adoption of PPVC construction in the company. Johnny Lim is currently serving in the SCAL council in the capacity of Assistant Secretary General. He also sits in the BCA International Panel of Experts 2017-2018. He is a member of the BCA Productivity Gateway Advisory Panel (PGAP), and member of the Construction Productivity and Skills Future Tripartite Committee. He is also the Chairman of the SCAL Productivity and Technology Subcommittee.

**Brief Synopsis**
Teambuild Engineering & Construction Pte Ltd has been credited as the pioneer and leader in the Concrete Prefabricated Prefinished Volumetric Construction (PPVC) in Singapore. PPVC is a new construction method that is a game changer in how buildings are being constructed. It is a lego-style construction method whereby entire rooms are constructed and finished in factories and transported to construction sites to be assembled. It reduces the number of workers on site, and is a cleaner, less noisy and safer way to build. Teambuild embarked on their learning journey and proto-typing of the concrete PPVC and subsequently tested this new construction method in both the public and private housing projects here. Teambuild’s innovation and adoption of Concrete PPVC in the construction of residential projects have been well-received, as concrete is the more tested, and preferred construction material for homes here. To date, two of the PPVC projects have been completed with 4 other projects currently at the different stages of design and implementation. The Executive Director, Johnny Lim of Teambuild Engineering & Construction Pte Ltd, who is instrumental in the adoption of this technology will share some insights of the journey and learnings of this new construction methodology.

**Biography of Mr. Hew Man Wah**

Mr. Hew Man Wah is Assistant Project Director with 23 years of experience in construction industry. He is very knowledgeable in project management, design and build, deep basement construction, Precast and Pre-fabrication, structural and architectural works.

He holds a Bachelor of Engineering (Civil Engineering) from University of Technology Malaysia. Obtained a Bachelor of Engineering and Master of Science (International Construction Management) from Nanyang Technological University. Mr. Hew was an invited speaker during BCA’s seminar on “Prefabricating the Future - A Local PPVC Experience” on Oct 2016.

**Brief Synopsis**
Mr Hew will share on the construction method adopted for the Nanyang Crescent student accommodation project, the various challenges faced by the project team in the coordination work for structural and M&E designs, as well as logistic planning, site management, monitoring and protection work required for PPVC.
Biography of Mr. Ben Sheng Yukun

Mr. Ben Sheng is senior project manager of China construction (SP) Development Co. Pte. Ltd.

Mr. Ben Sheng graduated as Bachelor Degree in Civil and Structure Engineering from Jiao Tong University, Shanghai, China in 1990, and he obtained his Master of Science (International Construction Management) from Nanyang Technological University, Singapore in 2012.

Mr. Ben Sheng has over 28 years working experience in Singapore and in China, and well versed in construction and project management with his experience in numerous challenging projects. He is recently working on PPVC residential project with four 17-storey tower blocks of residential building (710 units) with 2 basement carparks. He is also helping in the planning and advisory of PPVC projects in West Coast Vale and Stirling Road.

Brief Synopsis

Mr Ben Sheng will share on his experience on planning, coordination, construction, and installation of PPVC for the Lake Grande project, which is the first compulsory PPVC project in government land sales.
TERMS & CONDITIONS

Registration
Registration will be on a first-come-first-served basis and will only be confirmed upon receipt of full payment by the Committee unless otherwise invoiced to company.

All registration must be submitted with the completed Registration Form.

Closing Date & Payment
The closing date for registering for the course shall be Friday, 16 March 2018. Cheque should be crossed and made payable to “I StructE Singapore”, with the Title of The Event clearly written on the back of the cheque and submitted with the completed Registration Form to:

IES/I StructE Joint Committee  
c/o 3791 Jalan Bukit Merah  
#05-26 E-Centre @Redhill  
Singapore 159471

Confirmation of Registration
Confirmation of registration will be given 5 working days prior to the course via email, and you are required to acknowledge it. If you do not receive the said confirmation email, please email to The Secretariat (IES-I StructE Joint Committee) at Singapore-I StructE@ies.org.sg

We reserve the right to allow only confirmed registrants to attend the event.

Refunds and Cancellations
No refunds will be made for withdrawals. Replacement will be allowed only if written notice is received by us at least 3 working days before the course. Replacement is allowed but restricted to once only. However, when an IES/I StructE member is replaced by a non-member, the participant shall pay the difference in the relevant fees at least 3 days before the course.

Course Cancellation/Postponement
Changes in venue, dates, time and speakers for the Events can occur due to unforeseen circumstances. The Committee reserves the full right 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 the Event is cancelled by the organizer.

Enquiries
For more information, please email to: The Secretariat @ Singapore-I StructE@ies.org.sg
Or call 63538500.
REGISTRATION FORM

One-Day Seminar on Prefabricated Prefinished Volumetric Construction
Thursday 22nd March 2018, Phoenix I Extension, Level 6, Novotel Singapore Clark Quay

Please tick the appropriate box

☐ $350.00   IES/IStructE Members
IES Membership / IStructE Membership No (Circle One) : ____________________________

☐ $450.00   Non-members

☐ $200.00   Retired IES/IStructE Members, Unemployed IES/IStructE Members, Graduates

☐ $100.00   Full time students from NUS/NTU and Student Members of IES/IStructE

Salutation: Mr / Ms / Dr / Prof / Er. Name: ____________________________

NRIC No: ____________________ Designation: ____________________________

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Contact No: ____________________(HP) _____________________________ (Fax)

Email: _________________________________________________________________

PE No: ______________________ (if applicable) RE / RTO: ___________________ (if applicable)

Dietary Preference: Chinese / Muslim / Vegetarian (please delete accordingly)

Sponsored by Company (Please send an invoice to my company) ______________________________

Payment Mode: Cheque No.: ______________________ Amount (S$): ________________