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BCA ACADEMY

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International Built Environment Week (IBEW) 2022

Built Environment Technical Seminar Series #2

THE NEXT BOUND OF PPVC ADOPTION

12 Aug 2022 • 2pm – 5pm • BCA Braddell Campus, Auditorium (T1-1)

The Built Environment (BE) sector had undergone PPVC adoption journey in the last 10 years with much enthusiasm and progress. For PPVC technology to stay competitive and sustainable, BE stakeholders have been innovating the adoptions of PPVC from design to construction. This seminar touches on the latest development & innovations in design principles, digital modelling, alternative materials and PPVC fabrication techniques, in improving construction efficiency and taking project productivity to the next level.

HIGHLIGHTS

TIME	TOPICS & SPEAKERS
2.00pm	**Seminar Introduction**
	Efficiency in PPVC Design and Buildability through Modularization Ar Ng Sin Yong, Acting Principal Architect, ADDP Architects LLP
2.30pm	**Enhancement of PPVC Design Efficiency with IDD** Mr Ramamoorthy Rajendran, Director, DigitalBuild, Singapore
2.50pm	**Improving Off-Site Productivity with Modular Production Technology** Mr Raymond Chan, Director, RATEC Asia
3.10pm	**Tea Break**
3.40pm	**Light-Weight PPVC with Alternative Construction Materials** • Dr Tetsushi Kanda, Deputy Director, Kajima Technical Research Institute (KaTRI), Kajima Corporation, Japan • Dr Chae Soungho, Head of Construction Productivity Team, Kajima Technical Research Institute Singapore (KaTRIS), Kajima Corporation, Singapore
4.20pm	**PPVC Construction Planning and Management – A Case Study** • Ms Mabel Loh, Senior Production Engineer (Structural), Dragages (S) Pte Ltd • Ms Lai Zhau Yan, Jo, M&E Engineer, Dragages (S) Pte Ltd
5.00pm	**End of Seminar**

TOPIC 1:

Efficiency in PPVC Design and Buildability through Modularization

As the early adopter of PPVC in Brownstone EC since 2013, ADDP have demonstrated the need to change our mindset to embrace new way of construction. Since then, the boundaries in PPVC design and construction were pushed so that the technology could move on to the next and more advanced stages with optimum productivity gained.

The unit layout design played a crucial role that impacted the efficiency in each stage of the construction, ranging from transportation, number of modules, buildability, number of PPVC joints, structural cycle, level of finishes that can be done offsite etc. This presentation will touch on a few case studies of projects comparing the various unit layouts that directly affects the efficiency and design of PPVC projects.

Ar Ng Sin Yong
Acting Principal Architect, ADDP Architects LLP

Ar. Ng Sin Yong is currently serving as a Acting Principal Architect under ADDP Architects LLP. Graduated with a degree in Architecture in 2007, he became a Registered Architect and Qualified Person with the Board of Architects in 2013. Sin Yong is also a member of the DC sub-committee in Singapore Institute of Architects and is experienced in residential condominium design. He has designed multiple condominiums developments incorporating DfMA integrated solutions such as PPVC and PBU. Sin Yong is also a Built Environment Young Leader and a graduate from the first batch of the iBuildSG LEAD Horizon Programme.

TOPIC 2:

Enhancement in PPVC Work Processes with IDD

Significant cost savings in concrete PPVC fabrication could only be achieved when the unit layout plan was optimized to allow for more repeated usage of the mould. To design a cost-efficient layout in PPVC projects, the permutations and combinations of modules is crucial to achieve the optimum number of repetitions of volumetric steel moulds.

With the advancement in software simulations, the efficiency in modules permutation and combination could be further refined. This simulation tool uses the machine's computation capabilities to automatically generate multiple layout options with maximum variation and minimum parts. It optimizes the unit layout plan and standardizes the templates for the layouts whilst maintaining the flexibility. Besides this simulation tool at the design stage, a quite comprehensive digital solutions are available in the market to improve PPVC work processes during the fabrication and construction stages.

Mr Ramamoorthy Rajendran
Director, DigitalBuild, Singapore

Mr Ramamoorthy Rajendran is currently a director at DigitalBuild Pte Ltd. He is the former Director of Technology and Capability Department at the BCA. When he was at BCA, he oversaw initiatives in raising construction productivity through implementing Design for Manufacturing and Assembly (DfMA) technologies. He is a Chartered Professional Engineer (Australia). He also holds a Master `s degree Building Science, as well as a master's degree in Business Administration. He also holds a bachelor's degree (LLB-Hons) in Law. In his current role at DigitalBuild, he leads the digital technology development unit to improve the productivity for the construction industry.

TOPIC 3:

Improving Off-Site Productivity with Modular Production Technology

The benefits of offsite production have long been accepted and the trend of adapting modular construction is growing globally. Off-site production has the potential to be optimized with the adaptation of technologies, mechanizing or even automating traditionally manual tasks. However, technologies adaption is normally costly, involving high level of investment in capital expenditure. The decision to invest is largely influence by the returns of the investment very often in this case by improvement in productivity, quality and of course safety.

As any DfMA practitioner will highlight, despite availability of technologies, design continue to play a critical role in easing the manufacturing process. Productivity, quality and safety can be optimized if design and adaption of technologies can go hand in hand objectively. This presentation will share how mould technologies, a major part of modular production, can bring about even better improvement in productivity, quality & safety when design and mould design are objectively aligned.

Mr Raymond Chan
Director,
RATEC Asia Pte Ltd

Mr. Raymond Chan is the Director of RATEC Asia Pte Ltd. A civil engineer by training, Mr. Chan has more than 20 years' experience in the built environment with involvement as Builders, Precast Producer, Consultants and Owners. Heading RATEC's Operations in Asia, Mr. Chan together with his team is actively supporting the precast industry in the region including being appointed as the lead consultant for a modern PBU factory in the Philippines and a Precast Factory in the Saudi Arabia.

With his vast experience in project management experience, Mr Chan had obtained the Tier A-Star accreditation under the SCAL Construction Professional Accreditation Scheme. Mr. Chan has also been actively involved in development of Integrated Construction & Prefabrication Hub (ICPH) in Singapore being the key member in the design, development and operations of the 1st & 4th ICPH. He is also active in the construction & precast community being formerly a SCAL Council Member, Co-Chairing the Workgroup on Modularisation and Buildable Connections under BQAC and Digital Manpower Workgroup under the IDD Steering Committee.

TOPIC4:

Light-Weight PPVC with Alternative Construction Materials

To optimise the potential of PPVC systems, the weight of PPVC module should be lighter with reduced structural element dimension to effectively create enlarged living space. This presentation will discuss the new PPVC system, where wall thickness was reduced to around 80mm with reduction in PPVC module weight by around 20%. The reduction in module weight translated into lower construction cost with decreasing requirements for lifting capacity of cranes adopted in construction.

Besides, high strength materials (i.e. 60-80 MPa concrete and 600 MPa rebars) were applied to the new PPVC system to further lower module weight. A new connection system between modules was introduced which led to higher productivity in PPVC construction by reducing amount of grouting part by around 45%. The last part of the presentation also will touch on how to improve the site assembling process of PPVC module using the advanced methods

Dr Tetsushi Kanda
Deputy Director,
Kajima Technical
Research Institute
(KaTRI), Kajima
Corporation, Japan

Dr. Kanda is currently a deputy director of Kajima Technical Research Institute, Kajima Corporation. His research interests include carbon neutral construction materials and high performance construction materials. He has abundant experience in not only developing new materials but in effectively applying those materials in actual construction projects, for which he has received numerous academic awards.

Dr Chae Soungho
Head of Construction
Productivity Team,
Kajima Technical
Research Institute
Singapore (KaTRIS)
Kajima Corporation,
Singapore

Dr. CHAE is Head of Construction productivity team at Kajima Technical Research institute in Singapore. He is based in Singapore from 2018. After studying architecture at the Chungang University in Korea, he obtained M.S (1992) and Ph.D. (2003) in department of architecture from WASEDA University in Japan and worked as associate professor at WASEDA University before joined Kajima in 2006. His research area is building construction management with ICT (Information Communication Technology) and RT (Robotics Technology). Besides, he has research performance in evaluating the effectiveness of the advanced technologies such as image processing, sensing, measuring and visualization and applying it to construction site.

TOPIC 5:

PPVC Construction Planning and Management – A Case Study

The key success factors in delivering a PPVC project include design, prefabrication, logistics planning, installation and in progress quality assurance. The execution of these steps would not be possible without deliberate planning and decisive leadership. It is known within the industry that project management is crucial in ensuring that progress is achieved without having to take any safety short cuts and our clients received deliverables of the highest quality.

This presentation will provide insight through the journey of Dragages projects, past and present. The sharing will be on the challenges faced during the construction while adopting this technology and the different innovative solutions that have come about through meticulous planning and management.

Ms Mabel Loh
Senior Production Engineer (Structural), Dragages (S) Pte Ltd

Ms Loh is currently a Senior Production Engineer of Dragages Singapore Pte Ltd. In her current role, she is the lead engineer in charge for the site planning and management of PPVC Construction for BCA Academy Phase 2 intensification works. She is holding a bachelor's degree in civil engineering and master's degree in civil engineering. Since her graduation from NTU in 2015, she had been working in Built Environment in the various roles from design & coordination to factory production and site installation for PPVC projects.

Ms Lai Zhau Yan, Jo
M&E Engineer, Dragages (S) Pte Ltd

Ms Lai is currently a Mechanical & Electrical (M&E) Engineer at Dragages Singapore Pte. Ltd. As part of her responsibility, she played a pivotal role during BCA Academy's Phase 2 intensification Project where the Super Low Energy Building (SLEB) and Zero Energy Building (ZEB) is built. Ms Lai is a recipient of scholarship awarded by BCA with Dragages and graduated from NTU with bachelor's in mechanical engineering (First Class).

Ms Lai was subsequently invited to join the BCA's Young Leaders Program. Through this program she hopes to share her aspirations and innovations to impact the future of Singapore's building environment.

To download a copy of the presentation materials, please scan the QR code or access the website:
www.bcaa.edu.sg/ibew2022-seminar-12aug2022