

BUILD SMART

A CONSTRUCTION PRODUCTIVITY MAGAZINE

FEB / MAR 2018

CHANGING THE WAY WE BUILD

WORKING EVEN SMARTER

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THE BUILT ENVIRONMENT
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BUILD FASTER, SMARTER,
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ARCHITECTS GET UPDATED
ON SINGAPORE'S ADVANCED
CONSTRUCTION LANDSCAPE



FEB / MAR 2018

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CEO'S MESSAGE

Dear Readers,

The Construction Industry Transformation Map (ITM) was unveiled in October 2017, marking a new chapter for the construction sector. The ITM was the outcome of collective tripartite efforts to chart out a roadmap to identify future growth opportunities for the construction sector. In this issue of Build Smart, we take a closer look at what the new Construction ITM means for Singapore's built environment and its stakeholders, and how we can all be part of this exciting transformation journey.

Our ITM espouses a shared vision of an advanced and integrated building and construction sector with widespread adoption of leading technologies, led by progressive and collaborative firms, supported by a skilled and competent workforce. The sector's transformation will result in the redesign of many jobs offering more attractive job scopes and salaries, and a more conducive and productive working environment.

The ITM describes how the built environment of the future will be shaped by the following key transformation areas – Integrated Digital Delivery (IDD), Design for Manufacturing and Assembly (DfMA) and Green Buildings. Our shared commitment to the ITM would help accelerate the sector's transformation by:

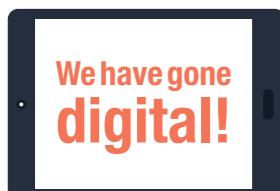
- Driving widespread adoption of IDD and DfMA;
- Facilitating a healthy and sustainable built industry; and
- Supporting the workforce and its needs and aspirations.

The adoption of technologies is key – this is why we have specially highlighted BCA's new Virtual Design and Construction (VDC) and Prefabricated Prefinished Volumetric Construction (PPVC) Guides. These guidebooks, jointly developed with the industry, have been specially designed to help builders in Singapore on their productive technology journeys, and I hope they will be of great use to you.

The successful transformation of the sector requires strong partnerships amongst all stakeholders. It is my hope that firms and industry players make the most out of the opportunities brought about by the Construction ITM to generate greater growth and create good jobs for Singaporeans. This journey will take time, but I am confident that with everyone's commitment and participation, we will get there!

Mr Hugh Lim

Chief Executive Officer
 Building and Construction Authority



Please subscribe to the e-copies at
<https://www.bca.gov.sg/Publications/BuildSmart/buildsmart.html>
 to stay up to date on the latest productivity
 news in the industry.

WORKING EVEN SMARTER

Construction Industry Transformation Map (ITM)



To navigate a world of digital revolution, rapid urbanisation and climate change, BCA is accelerating the transformation of the built environment sector. Here's what we hope to achieve and how we, together with you, can make it happen.



OUR VISION

- ✓ Advanced and Integrated Sector
- ✓ Progressive and Collaborative Firms
- ✓ Good Jobs for Singaporeans

About the Construction ITM: Future-Proofing the Industry

An advanced and integrated built environment sector that thrives through adopting productive construction methods and embracing digitalisation. Progressive and collaborative firms well set to capture business opportunities. A skilled and competent construction workforce, empowered with better career opportunities for Singaporeans. These are some of the long-term goals envisioned by the Construction ITM. And with the support of and close collaboration with industry stakeholders, Singapore's built environment will see big changes in the years to come.

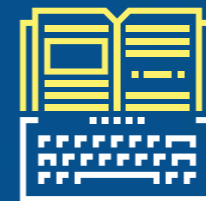
CONSTRUCTION ITM... IN NUMBERS

Find out more about this ITM, and how it is poised to transform Singapore's built environment sector.



The Construction ITM is part of the **\$4.5 billion** Industry Transformation Programme announced at Budget 2016.

Construction ITM is the **1st ITM** under the Built Environment cluster to be launched. There are **23 ITMs** in total, with 4 under the Built Environment cluster.



It targets to have **80,000** personnel trained in Design for Manufacturing and Assembly (DfMA), Integrated Digital Delivery (IDD) and green building capabilities by 2025. That's more than a two-fold increase from the current **32,600!**



Adoption of DfMA technologies is targeted to increase by up to **2** times by 2020. That's **40%**, up from the current **20%**!



The goal is to build up to **10 ICPHs** (integrated construction and prefabrication hubs) to boost DfMA supply capabilities and capacity by 2020.

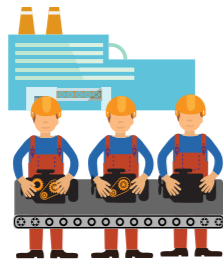
Today, there are **3 ICPHs** in operation in Singapore.

This major project saw the involvement of **11 key trade associations, over 100 C-Suite Leaders, and over 35 industry young leaders.**



WAYS TO TRANSFORM THE BUILT ENVIRONMENT SECTOR

Increasing Design for Manufacturing and Assembly (DfMA) Adoption



WHY?

Using the DfMA approach in construction shifts labour-intensive construction processes to a controlled factory environment to prefabricate quality building components before onsite assembly. This enables builders to complete their projects faster, safer, cleaner, quieter, and with better quality.

HOW?

- a) **Generate lead demand in both public and private sectors through:**
- The Productivity Gateway Framework
 - Funding support for projects which voluntarily adopt DfMA technologies
 - Introduction of more Government Land Sales (GLS) sites with appropriate DfMA conditions
- b) **Build up supply capability and capacities by:**
- Rolling out up to 10 Integrated Construction and Prefabrication Hubs by 2020
 - Providing a series of guidebooks on DfMA technologies. Launched last year, the Prefabricated Pre-finished Volumetric Construction (PPVC) Guidebook features PPVC best practices as well as case studies. Turn to page 10 to find out more.

Encouraging Adoption of Integrated Digital Delivery (IDD)



WHY?

Building and construction projects often involve many different parties – developers, consultants, builders, sub-contractors, suppliers, facility managers and more, many of whom are from different firms. IDD connects stakeholders across the project delivery process by sharing accurate and timely digital information through Building Information Modelling (BIM), Virtual Design and Construction (VDC) and other digital solutions, together with collaborative working approaches and integrated platforms. The outcome: minimised delays and reworks, better production and delivery coordination of factory-produced building parts, faster construction process, reduced noise and disruption to the surrounding environment, and better means to maintain and retrofit the building in future.

HOW?

- a) **Build up IDD capabilities through:**
- Setting up a Steering Committee co-chaired by Trade Associations and Chambers to develop an IDD plan and drive its implementation
 - Developing IDD competency levels and training programmes at BCA Academy and other Institutes of Higher Learning
- b) **Drive adoption of IDD by:**
- Funding pilot projects to test out the various IDD approaches and technologies
 - Developing an IDD blueprint for future projects
 - Working with public and private sector clients to adopt IDD for their projects
 - Establishing the Centre for Lean & Virtual Construction (CLVC) as an incubating environment to test-bed IDD solutions

Building Strong and Capable Firms



WHY?

To transform as a sector, we need to support firms in building up their capabilities by providing them with the resources they need and facilitating healthier and more sustainable competition via our procurement frameworks.

HOW?

- Review and implement changes to public procurement practices to:**
- Better differentiate quality component
 - Provide greater transparency
 - Foster greater collaboration among firms

Supporting Workforce Needs and Aspirations



WHY?

The transformation of the built environment sector needs to be supported by a competent workforce equipped with a strong engineering core and requisite skills in the areas of DfMA, IDD and green buildings.

HOW?

- a) **Attract and retain more Singaporeans by:**
- Creating new and higher-skilled jobs with competitive salaries and better working environments
 - Improving firms' human resource practices and overall image of the sector
 - Continuing scholarships and sponsorships programmes
 - Attracting mid-career entrants
- b) **Build core competencies and skills by establishing structured professional development pathways across:**
- Pre-employment training (PET)
 - Internships
 - Early job training
 - Continuous Education and Training (CET)



WELCOMING TRANSFORMATIONAL CHANGE

The Construction ITM was officially launched at the opening of the Singapore Construction Productivity Week (SCPW). Read on for highlights!



Ribbon-cutting ceremony by Minister Desmond Lee and BCA CEO, Mr Hugh Lim, at BuildTech Asia 2017

More than 10,000 industry stakeholders witnessed the launch of the Construction ITM on 24 October 2017 at Max Atria at Singapore Expo. The ITM was developed after almost a year of close engagement amongst the government, unions, trade associations, institutes of higher learning and industry firms.

Minister for Social and Family Development and Second Minister for National Development, Mr Desmond Lee officiated the launch, alongside representatives from various stakeholder groups including:

- **Mr Lim Ming Yan**
 President and Group CEO of CapitaLand and co-chairman of the Future Economy Council (FEC) Built Environment Sub-Committee
- **Mr Zainal Sapari**
 Executive Secretary of Building Construction and Timber Industries (BATU) and co-chairman of the Construction Productivity and SkillsFuture Tripartite Committee
- **Mr Pek Lian Guan**
 Executive Director and CEO of Tiong Seng Holdings Limited and co-chairman of Construction Productivity and SkillsFuture Tripartite Committee
- **Mr Hugh Lim**
 CEO of BCA

Over 20 events followed, where industry stakeholders and students attended exhibitions, talks as well as workshops and games to learn about the latest developments in the construction productivity scene.



“To shape the future of real estate for Singapore, the ability to leverage cutting-edge technologies is critical. It is heartening to see the active and genuine participation of stakeholders at all levels which culminated in the industry and Government co-creating the ITM. This is especially critical as the transformation of our sector can only materialise through tripartite effort and collaboration. Beyond taking the time out to attend dedicated consultation sessions, some of the trade associations have also taken the initiative to organise talks and seminars with their members to collate and share valuable feedback.”

Mr Lim Ming Yan (4th from the right)
 President and Group CEO of CapitaLand, and co-chairman of the Future Economy Council (FEC) Built Environment Cluster Sub-Committee

“The Construction ITM is developed by the sector, for the sector. We will continue our close partnerships and collaborations with all stakeholder groups in implementing the strategies to drive the sector forward. Through the transformation process, we look forward to seeing greater investment in capability building and more collaboration among firms to capture new business opportunities, and more importantly, for more Singaporeans to join the sector as a more technologically-advanced workforce is needed.”

Mr Hugh Lim (5th from the left)
 CEO of the Building and Construction Authority

“We want cutting-edge capabilities anchored in Singapore.”

“We want strong and profitable firms that thrive locally and overseas.”

“We all want the same thing – a vibrant and successful built environment sector.”

“Let us embark on this journey together because we will succeed only if everyone plays a role. Transforming Singapore’s construction industry is a legacy that we will all share.”

“We want good jobs for Singaporeans.”

“This will be no small feat, and the journey will be tough. But we can do it together.”

“Just like the ITM, when everyone collaborates, big things can happen!”

THEY IDD IT!

Construction and property group Lendlease uses Integrated Digital Delivery (IDD) to help its people do more, build smarter, waste less and go home safe.

ABOUT IDD

Construction projects involve many different parties – developers, builders, sub-contractors, facility managers and more – many of whom are from different firms. IDD enables these stakeholders to collaborate by facilitating seamless sharing and delivery of digital information. The information is shared through smart innovations such as Building Information Modelling (BIM) and Virtual Design and Construction (VDC) throughout the project delivery process – from design, offsite fabrication, and onsite assembly to building maintenance. The outcome: minimised reworks, better production and delivery coordination of building parts, a faster and safer construction process, reduced disruption to the surroundings and more.

Lendlease Shows Us How It's Done

Imagine a future where all project stakeholders work in perfect tandem, from anywhere they are, to build faster, safer and with minimal reworks. The future is now – at Lendlease's upcoming lifestyle, business and residential hub Paya Lebar Quarter.

1



Monitor site progress from the air

DRONES

Once every two weeks, Lendlease's drone flies above Paya Lebar Quarter, capturing images and videos of the construction site for the construction management team. Having a bird's eye view of the site enhances logistics planning and provides the team with perspectives otherwise not visible from other vantage points. On top of that, staff conducting site inspections can work safer because they don't have to work at height.

2



Create a virtual construction site

360° AND GOPRO CAMERAS

Site observations that can be done from wherever you are? Yes! These cameras capture immersive views of the construction area which can be used to conduct virtual site inspections. This way, project stakeholders can observe construction activities without causing disruptions or experiencing risks. The cameras also double as tools to log site surveys. Because they can record site progress from all angles, they provide more details and effectiveness than a conventional photographic site survey can.

3



Deploy real-time alerts against danger

LOCATION SERVICES

Real-time location capabilities don't just help us navigate our way easily. At the Paya Lebar Quarter worksite, they play a huge role in making sure everyone works safe. All workers onsite wear tags that are connected to geo-location beacons in the area. These tags monitor their locations, and alert them when they are entering exclusion zones (danger zones with prohibited entry).

4

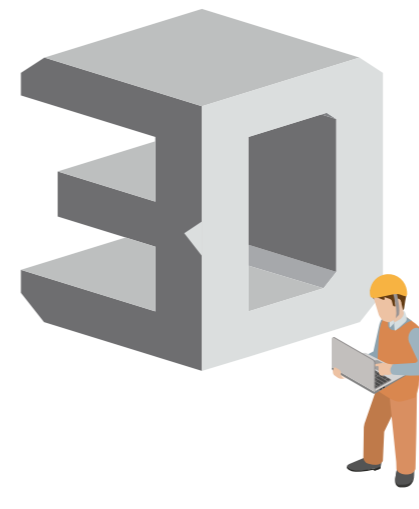


Survey surroundings with cutting-edge precision and flexibility

LIGHT DETECTION AND RANGING (LIDAR)

Documentation of existing structures may sometimes differ from what is actually being built, which can cause delays or reworks of new buildings. The Paya Lebar Quarter team uses LIDAR's laser capabilities to accurately determine interferences with existing infrastructure located nearby. For example, LIDAR's surveying of the Paya Lebar MRT station infrastructure provided the team with confidence to design the new building that would interface with the MRT station with minimal disruption.

5



Take 3D mapping to the next level

PHOTOGRAMMETRY

BIM (virtual 3D construction modelling) is the answer to the future of construction. And it can be even more powerful when paired with photogrammetry which captures real-life aerial photographs from different angles. The photos are then stitched together to form a 3D model of the Paya Lebar Quarter construction site and its surrounding environment. This way, the team can compare actual site activity with the virtual model – that's even greater design and building accuracy!

BUILD FASTER, SMARTER, SAFER

Two new guidebooks to help you on your productive technology journey.



YOUR PPVC JOURNEY, MADE EASIER.

Download the PPVC Guidebook:



THE BUILDING BLOCKS OF CONSTRUCTION PRODUCTIVITY

Take the first step towards building with Prefabricated Volumetric Construction (PPVC). PPVC is a construction innovation which enables the bulk of construction work to be done offsite, reducing time, manpower as well as disruptions to the environment. The first in our series of guidebooks featuring Design for Manufacturing and Assembly (DfMA) technologies, this 84-page PPVC Guidebook will bring you through the ins-and-outs of managing PPVC projects, from start to finish. Featuring insights from key technical agencies and industry representatives comprising architects, builders, consultants and specialist contractors, this guidebook will arm you with the foundation to kick-start your PPVC journey.

YOU CAN EXPECT TO:

-  **LEARN PPVC BEST PRACTICES**
 Appreciate and get industry insider tips on reaping the full benefits of offsite manufacturing.
-  **RECEIVE EASY-TO-UNDERSTAND TIPS**
 Get bite-sized tips that will take you through the entire PPVC process – from design, fabrication, inspection, delivery and installation.
-  **BUILD CAPABILITIES TO FURTHER IMPROVE PPVC PRACTICES**
 Pave the way for more and better PPVC technologies to transform the way you build.

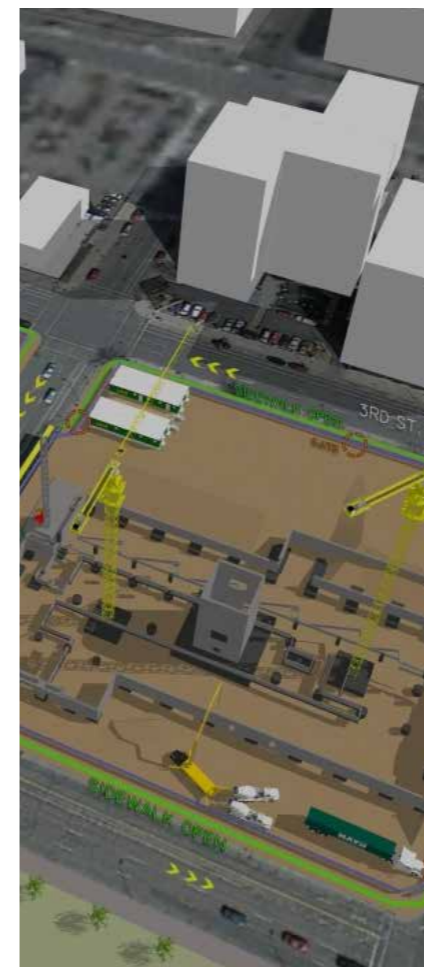
COMING SOON!

- Structural Steel Guidebook
- Advanced Precast Guidebook
- Mechanical, Electrical and Plumbing Guidebook
- Mass Engineered Timber Guidebook



YOUR VDC JOURNEY, MADE EASIER.

Download the VDC Guidebook:






FIRST VISUALISE. THEN BUILD

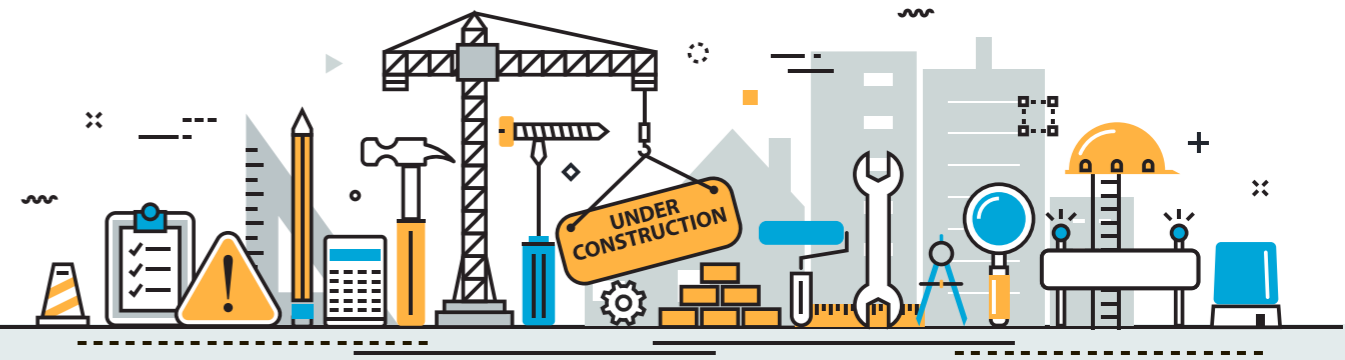
Learn to use this cutting-edge 3D modelling technology to take your building efforts to the next level. Filled with insider information and tips from local and international built environment industry experts, this 204-page guidebook is the result of an 18-month effort by BCA together with the industry-led BIM Steering Committee and BCA BIM Award winners. Discover the best VDC practices that firms in Singapore have used and benefited from, and use them on your own projects. The Singapore VDC Guide is for industry stakeholders across the construction value chain, such as:

- Developers
- Project managers
- Architectural consultants
- Engineering consultants
- Quantity surveyors
- Fabricators
- Specialist contractors

YOU CAN EXPECT TO:

-  **DISCOVER TRIED-AND-TESTED VDC SOLUTIONS**
 - Learn from other practitioners who have practiced VDC in major local projects such as High Park Residences, JTC Furniture Hub, LTA Amber Station and the National Centre for Infectious Diseases.
 - See how VDC has helped these projects achieve 30% reduction in abortive works, and up to 80% reduction in change orders.
-  **LEARN FROM THE PROS**
 Our contributors include leading practitioners from the trade associations such as ACES, REDAS, SCAL, SIA, SISV.
-  **READ EASY-TO-UNDERSTAND TIPS**
 - Identifying core information in the design BIM suitable for downstream use
 - Implementing the "Intensive Collaboration Period" approach between designers and contractors
 - Workflows to carry out Virtual Construction for key activities and trades, such as site logistics and planning, PBU installation, MEP installation and architectural fit-outs.

ARCHITECTS GET UPDATED ON SINGAPORE'S ADVANCED CONSTRUCTION LANDSCAPE



Amidst increasing labour costs in a high density, land-scarce nation like Singapore, the built environment sector is moving towards more advanced construction technologies. These technologies include the Design for Manufacturing and Assembly (DfMA) approach, as well as tools for better coordination and integration across the construction value chain, from digital modelling to technical coordination and project delivery.

Recognising the importance and benefits of DfMA such as higher productivity, quality and sustainability, the Singapore Institute of Architects (SIA) organised a seminar on Singapore's Advanced Construction Landscape during the Archifest event in October 2017.



Photo credits: SIA



“It is encouraging to know that DfMA projects are gaining traction. We sense a growing recognition among practitioners that new advanced construction methods will have a profound impact on the profession and an evolutionary leap towards re-thinking architectural design must be made,”

said Mr Lee Kay Lian (pictured on the left), Section Head for Advanced Building Technologies, SIA Education Thrust.

The sharing session was supported by the Construction Productivity and Quality Group in BCA and professionals involved in DfMA projects adopting Prefabricated Prefinished Volumetric Construction (PPVC) and Mass Engineered Timber (MET).

This is the first of a series of knowledge-sharing sessions and experiential visits rolled out by SIA for the architectural community to understand how DfMA and other advanced construction technologies can transform the way we design and construct buildings. It also presented an opportunity for fellow professionals to share their experiences with their peers to stay at the forefront of technological innovation.



The Q&A session saw fervent dialogue between the architects and presenters on how to conceive and deliver DfMA solutions in their designs – from the comparison of different PPVC systems and designs to the incorporation of MET with conventional construction materials. Participants walked away with useful information on exploring new forms of architectural expression with DfMA technologies.



Ms Leong-Kok Su Ming, Deputy Group Director of BCA, kicked off the session sharing with an overview on Singapore's coordinated efforts and journey towards delivering higher productivity and quality standards in the built environment.



Mr Johnny Lim, Executive Director of Teambuild Construction Group, illustrated Teambuild's journey and success in adopting PPVC.



Ms Ng Kim Hoon, Director of Healthcare Infrastructure Projects, MOH Holdings Pte Ltd, brought the audience through her journey, from a developer's point-of-view, on adopting PPVC for the Woodlands Crescent Nursing Home.



Mr Nick Milestone, Managing Director of Steeltech Industries Pte Ltd (Singapore), an expert who has been involved in more than 300 MET projects in the UK shared on the aesthetic building designs and how versatile, green and productive MET construction can be.

PUSHING THE BOUNDARIES IN THE TRANSFORMATION OF THE CONSTRUCTION INDUSTRY

JTC's active role in transforming the industry

As Singapore's lead government agency responsible for the planning and development of industrial infrastructure, JTC pushes the boundaries in innovation for construction productivity to respond to industry needs and overcome challenges such as manpower and resource constraints in today's fast-changing built environment. In support of the Construction Industry Transformation Map (ITM), JTC has been actively involved in three key areas to transform the sector, namely the adoption of Design for Manufacturing and Assembly (DfMA), Integrated Digital Delivery (IDD) and Green Buildings.

EARLY ADOPTER OF INNOVATIVE AND PRODUCTIVE DFMA TECHNOLOGIES

JTC has adopted the use of Mass Engineered Timber (MET) at JTC LaunchPad @ one-north and Prefabricated Pre-finished Volumetric Construction (PPVC) @ JTC Space @ Tuas to boost construction productivity, enhance safety, reduce construction time and minimise disruption to the surrounding community. Besides being an early adopter of MET, JTC is also studying the use of a highly innovative steel-concrete system for its upcoming development, the JTC Logistics Hub.

CASE STUDY

SEN ENGINEERING STRUCTURAL SYSTEMS



The three-storey Inland Container Depot (ICD) of JTC Logistics Hub has plans to use South Korean firm SEN Engineering's innovative hybrid Form-Prefabricated Steel Reinforced Concrete (F-PSRC) columns and Thin Steel-plate Composite (TSC) beams.



Use of the SEN engineering system in Korea

HOW IT WORKS:

- Columns and beams are prefabricated and onsite assembly is made very simple with straightforward bolted connections.
- The columns and beams are self-supporting, so no temporary propping or shoring is required.
- Minimal assembly and dismantling of formwork as F-PSRC comes pre-assembled with a skin-form acting as a permanent non-load bearing outer skin after the concrete has set.

BENEFITS

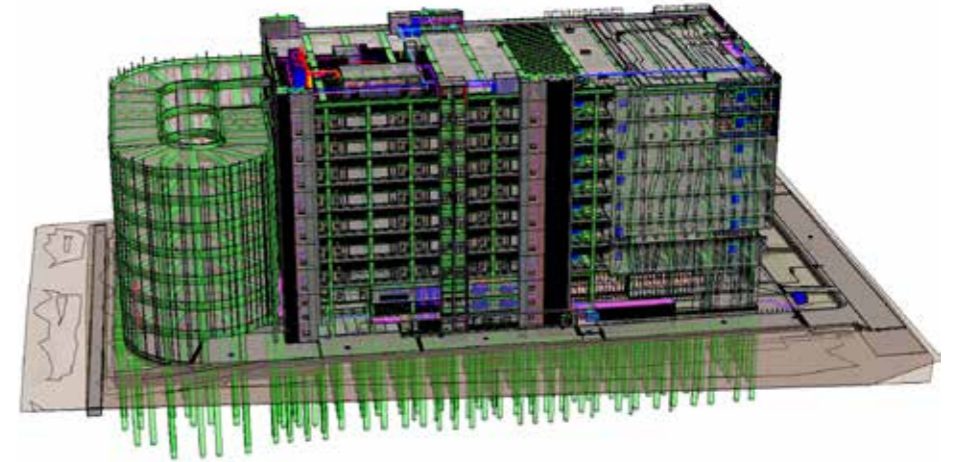
- Reduced onsite work
- Less noise and dust pollution for a cleaner and more organised worksite

DIGITISING CONSTRUCTION TO BUILD SMARTER, FASTER AND SAFER

CASE STUDY

CREATING INDUSTRIAL SPACES WITH BIM AND VDC AT TRENDSPACE

JTC embarked on a pilot BIM in Virtual Design in Construction (VDC) for the TrendSpace project for a continuous development process up to the construction phase.



PRE-PLANNING & DESIGN

- Design is optimised as the intent and considerations for construction, operation, maintenance and safety are clearly communicated.

CONSTRUCTION

- Quality coordinated work is important when a contractor carries out the Project. This ensures construction documentation is consistently generated, enabling predictable management of construction activities on the ground.
- VDC methodology, coupled with the concept of AIP (Approved-In-Principle), provided a framework to support all stakeholders.
- At various construction stages, minor adjustments were made by the consultants to the BIM model for submission to authority.

BENEFITS

- More efficient designing, planning and building of higher-quality facilities
- Improved safety for workers

Building green for sustainability

JTC's strong commitment to environmental sustainability has also led to the organisation being accorded with the BCA Green Mark Champion Award in 2013.

JTC Chemicals Hub @ Tuas South, Jurong Town Hall and JTC nanoSpace @ Tampines, amongst six other developments, received the BCA Green Mark Awards (Platinum, Gold^{PLUS} and Gold) in 2017.

Beyond design and construction, JTC also ensures that downstream operations of its developments are optimised. Its integrated smart estate and building operating system, J-Ops, enables remote and centralised monitoring, analysis

and optimisation of building systems. JTC remains committed to creating eco-sustainable industrial estates and buildings to enable industrialists and their employees to benefit from potential energy savings and a greener working environment.

Collaborative efforts to drive industry transformation

JTC has been actively involved in the drive towards higher construction productivity, partnering BCA in various industry events such as the Public Sector Productivity Leadership Summit (PSPL) Series as well as the SCAL Productivity Innovation Awards Competition. Through these collaborations, JTC aims to transform the industry to build smarter, greener and more efficiently.

SKILLS, UP!

Find out what the Built Environment SkillsFuture Tripartite (BEST) Taskforce has in store for students and professionals in the built environment sector.



There's a new taskforce in town, and it's on a mission to ensure that students in Singapore are trained in key transformation areas such as Design for Manufacture and Assembly (DfMA), Integrated Digital Delivery (IDD) and green buildings by 2025. Introduced in August 2017, the Taskforce is a tripartite effort comprising members from Institutes of Higher Learning (IHLs), industry associations, professional boards and BCA. Its recommendations seek to train graduates in the areas of architecture, civil engineering, mechanical & electrical engineering, quantity surveying and project management to meet the changing needs of the sector.

THE BEST WAY TO FORGE TOWARDS INDUSTRY TRANSFORMATION



1. ENRICHING CURRICULUM

IHL courses will infuse more content in the key transformation areas, so as to equip students with the latest skills for the built environment sector. The Taskforce is currently reviewing the curriculum of the related courses, as well as looking into training facilities in the latest innovations so that they, in turn, can train their students.



2. ENHANCING INTERNSHIPS AND TRAINING NEW GRADUATES

Students can soon expect even richer internship experiences – this means more real-world training and projects! To get them ready for their internships, the Taskforce is also working with IHLs to develop preparatory BE formation programme.

HERE ARE THE TASKFORCE'S FOCUS AREAS TO UPSKILL THE BUILT ENVIRONMENT WORKFORCE BY 2025



3. CREATING MORE SCHOLARSHIP AND SPONSORSHIP OPPORTUNITIES

The Taskforce is also looking at enhancing partnership between industry firms and IHLs, which could attract more promising individuals e.g. through scholarships and sponsorships.



4. ENCOURAGING LIFELONG LEARNING

There will soon be more Continuing Education and Training (CET) courses in the key transformation areas, as the Taskforce is working with industry associations and IHLs to forge closer partnership and collaboration in CET provision. Existing built environment professionals will have more opportunities to upgrade their skills and knowledge.

NO.	DATES	EVENT	VENUE	ORGANISER	CONTACT PERSON & DETAILS
1	20 Mar – 8 May 2018, evenings	Project Management for Professionals in the Building and Construction Industry (14th Run)	BCA Academy, 200 Braddell Road	BCA Academy	Customer Services Tel: 62489999 email: bca_academy@bca.gov.sg
2	22 & 23 Mar 2018	CP5 on Low Voltage Electrical Installations (8th Run)			
3	22, 23, 26 & 27 Mar 2018	Building Energy Modeling and Thermal Simulation (23rd Run)			
4	23 Mar 2018, am	Integrated Digital Delivery – Are You Ready? NEW			
5	27 & 28 Mar 2018	Practical Applications of WSH Legislations in Construction Projects through Case Studies (4th Run)			
6	28 Mar 2018, am	Building Control Regulations for Site Supervisors (50th Run)			
7	28 Mar 2018	Contract Drafting – The Technicalities and Legalities (30th Run)			
8	3 Apr 2018	Good Industry Practices (Waterproofing for External Wall)			
9	5 & 6 Apr 2018	Energy Efficiency for Electrical Systems (5th Run)			
10	9 & 10 Apr 2018	Managing Project Teams Effectively (18th Run)			
11	10 Apr 2018	Good Industry Practices (Timber Flooring)			
12	11 Apr 2018 (pm)	Basic Concept in Construction Productivity Enhancement (BCCPE)			
13	11 & 12 Apr 2018	Effective People Management for Construction Professionals (4th Run)			
14	12 & 13 Apr 2018	Developing a Lifting Plan for Crane Lifting Operations NEW			
15	12 & 13 Apr 2018	Construction Contract Procurement & Negotiations (3rd Run)			
16	12 & 13 Apr 2018	BMSMA for Building Management Personnel (19th Run)			
17	13 Apr – 8 May 2018	Certification Course for UNIVERSAL DESIGN (UD) ASSESSORS (14th Run)			
18	16, 17 & 18 Apr 2018	Essential Knowledge in Local Regulations and Construction Practices (29th Run)			
19	18 Apr 2018, am	Building Control Regulations for Site Supervisors (51st Run)			
20	23 & 24 Apr 2018	Construction Contract Administration (Re-run)			
21	23, 26 & 30 Apr 2018, evenings	Site Management of Precast Concrete Construction (25th Run)			
22	27 Apr 2018	Requirements for Environmental Sustainability in Buildings and The Green Mark Scheme (40th Run)			
23	3 May 2018	CONQUAS Training for Developers & Consultants (Re-run)			
24	3 & 4 May 2018	Managing Workflow and Achieving Plan Reliability (5th Run)			
25	7 May 2018	The Security of Payment Act – Technicalities and Practicalities (5th Run)			
26	10 – 31 May 2018	Lift and Escalator Course for Engineers (7th Run)			
27	16 – 18 May 2018	Certified QM/CONQUAS Managers Course (60th Run)			
28	(Full-time – 11th Intake) Starting on 30 Jul 2018	Bachelor of Construction Management (Building) (Honours) FULL TIME (awarded by The University of Newcastle, Australia)	BCA – University of Newcastle	Ms Bernice Ang (Programme) / Ms Zhuo Xiuyun (Enrolment) Tel: 62489944 / 6248 9881 email: bernice_ang@bca.gov.sg / zhuo_xiuyun@bca.gov.sg	
29	(Full-time – 2nd Intake) (Accelerated Pathway) Starting on 30 Jul 2018	Bachelor of Civil Engineering (Honours) FULL TIME (awarded by The University of Newcastle, Australia)			Er Lim Yaw Shyan (Programme) / Ms Ang Geok Lung (Enrolment) Tel: 62489915 / 6248 9887 email: lim_yaw_shyan@bca.gov.sg / ang_geok_lung@bca.gov.sg

BUILD **ON TOMORROW** **FORGING AHEAD WITH** **INDUSTRY TRANSFORMATION**

/// Built Environment Career, Education and Training Fair 2018 ///



CAREER FAIR

24 March 2018 (Sat) 9am to 5pm
Devan Nair Institute for Employment & Employability
Hall 1 to Hall 4

