What is Mass Engineered Timber (MET) Construction?

Pg 2

Local Projects that have Adopted MET

Building Careers Portal for Built Environment Sector

Upgrade Your Workers to R1 Status

A CONSTRUCTION PRODUCTIVITY MAGAZINE

We shape a safe, high quality, sustainable and friendly built environment

Building and Construction Authority

JUN 2017
CEO’S MESSAGE

Fellow Builders,

I am honoured and excited, as I take over the helm of BCA, to transform our industry, with your partnership and participation. In the past 3 months, I have heard much about the productivity journey that our whole sector has already embarked on.

With strong support and participation from our industry partners, the built environment sector has come a long way in its productivity journey, as well as in adopting sustainable construction methods to mitigate the effects of climate change.

In this issue, we feature four local projects that have adopted Mass Engineered Timber (MET) construction – The Wave at Nanyang Technological University, JTC’s LaunchPad @ one-north, the Zero Energy Singapore Sustainability Academy, and the BCA SkyLab Visitors’ Gallery and Lounge.

MET construction is both a productive and sustainable method of construction. It is one of the technologies that BCA is promoting under the Design for Manufacturing and Assembly (DfMA) approach, to move on-site construction works as much as possible to off-site manufacturing in factories. Our target is to achieve a 40 per cent adoption rate for DfMA technologies, which include PPVC, MET, structural steel, advanced precast concrete and also modular Mechanical, Electrical and Plumbing systems, across the entire continuum (public and private sector projects) by 2020.

To bring down the cost premium of introducing the use of such technologies into Singapore, BCA is working with government agencies and the industry to create lead demand for DfMA technologies. Under BCA’s Productivity Innovation Project (PIP) scheme, companies can receive funding of up to 70 per cent of the cost of adopting advanced construction technologies such as MET.

Indeed, we need to develop a strong core in our workforce to support this industry transformation. Good HR practices are important to attract, retain and develop talent in firms. Following the launch of the voluntary "Pledge for a Better Built Environment Workplace" initiative in 2014, BCA has developed a HR guidebook specific to the built environment sector, in consultation with industry partners. I encourage more firms to sign the pledge, download the HR guidebook, and improve your current HR practices. Do also visit BCA’s Building Careers Portal, a one-stop portal where employers can list available jobs, look for new hires and search for related built environment information.

I look forward to your partnership and participation, as we continue to Build Singapore and transform our built environment sector.

Mr Hugh Lim
Chief Executive Officer
WHAT IS MASS ENGINEERED TIMBER CONSTRUCTION?

Mass Engineered Timber (MET) comprises engineered wood products with improved structural integrity. It can be used for the construction of various types of buildings. This method of construction falls under the Design for Manufacturing and Assembly (DfMA) approach whereby building components can be prefabricated off-site and assembled on-site.

**Cross-Laminated Timber (CLT)**
- An engineered structural material comprising layers of wood stacked perpendicularly and bonded with structural adhesives.
- Uses: walls, floors, roofs

**Glued Laminated Timber (Glulam)**
- Produced in a similar fashion as CLT but with the grain aligned in one direction.
- Uses: structural beams, roof trusses

**WHAT IS MET?**
- **Construction Productivity**
  - Reduces construction time
  - Reduces manpower on-site by up to 35%
  - High strength-to-weight ratio makes it easier to handle than steel and concrete
- **Environmental Sustainability**
  - Highly renewable
  - Reduces up to 70% of concrete use in buildings
  - Highly durable, long life cycle
  - Superior noise control, better acoustics
  - Reduces need for finishing materials
  - Less discrepancies due to dry method of construction
- **Why choose MET?**
  - Source for MET manufacturers that use timber from sustainably managed forests.
  - MET components are fabricated in factories to precision to reduce wastage.
  - MET uses the dry construction method of installation to improve productivity.
  - MET components can be delivered flat-packed which lowers transportation costs.

**MET Suppliers Use Responsible Wood Sourcing**
- (the list is not exhaustive)
  - Belgium: • Korlam, • Mevo Houtindustrie
  - Denmark: • Lilleheden
  - Norway: • Moelven, • Martinsons
  - Sweden: • KLM, • Martinsons, • Moelven
  - Germany: • DERIX, • Eugen Decker, • FireForest Mark, • MEOK Timber, • HESS Timmer
  - Austria: • Binderholz Bausysteme, • Hasslacher Holzindustrie, • KLH Massivholz, • Mayr-Mahlof, • Sova Erne, • Thoma Holz, • Rubner Holz, • Wieshak Holzindustrie, • Handlos
  - Italy: • X-LAM Dolomiti
  - Spain: • Egoin, • HESS Timer
  - Portugal: • MERK Timber, • FinnForest Merk
  - Switzerland: • KLH Massivholz, • Hasslacher Norica, • BinderHolz Bausysteme
  - Germany: • Handlos, • Wiehag Holding, • Rubner Holz, • Thoma Holz, • Stora Enso, • Mayr–Melnhof
  - Austria: • XLam Dolomiti, • Egoin, • HESS Timer
  - France: • Houter & Söhne, • Holzindustrie Pfeifer, • Holzindustrie Pabst
  - Italy: • Nelson, • XLam
  - New Zealand: • Mosser
  - Australia: • Kulmer GesmbH & Co, • Weinberger Holz
  - New Zealand: • Huter & Söhne, • Holzindustrie Pfeifer, • Holzindustrie Pabst
  - Portugal: • XLam

**Fire Protection**
- Outer layer of timber burns and chars at a predictable charring rate of approximately 0.7mm per minute
- Charred layer creates a protective layer that acts as insulation and allows timber elements to achieve inherent fire resistance
- Exposed timber can be designed with additional ‘sacrificial’ timber, so layer exposed to fire can protect the inner material from damage
- Other fire protection measures include automatic fire sprinklers and use of fire-grade plasterboard

**Did you know?**
- Companies adopting productive technologies for construction, such as MET, can apply for funding under the Productivity Innovation Project (PIP) scheme. Those doing research on MET can seek funding through the 2-stage Innovation Grant (Grant) scheme.
- Visit bca.gov.sg for more info.

**Termite Protection**
- Construct 1st storey of building using concrete to prevent subterranean termites
- Physical barriers help protect foundation and other openings
- Chemical treatment to timber and soil
- Regular termite inspection
- Other Considerations: Regular checks on MET moisture content

**Did you know?**
- Companies DO NOT have to seek approval from the Building Innovative Panel (BIP) to adopt CLT and Glulam in local construction projects BUT they must ensure that it complies with the conditions stipulated by the panel agencies and SCDF.
  1. On stipulated conditions for CLT and Glulam: [https://www.gp.gov.sg/2v4hGbc](https://www.gp.gov.sg/2v4hGbc)
  2. On BIP: [https://www.gp.gov.sg/2vQGtin](https://www.gp.gov.sg/2vQGtin)
  3. On SCDF’s fire safety requirements: [https://www.gp.gov.sg/ThHhbg](https://www.gp.gov.sg/ThHhbg)

**Durability**
- With proper design and maintenance, wood structures are equivalent to other building materials in quality and service life

**Strength and Stability**
- MET offers superior dimensional stability and significant shear strength performance at a unique weight to strength ratio compared with other common structural materials

**Acoustics**
- MET building systems provide superior noise control for airborne and impact sound transmission.

**Moisture Protection**
- Proper design, detailing, physical barriers (e.g. facade cladding), ventilation, and regular checks can help address moisture concerns.
RAISING CONSTRUCTION PRODUCTIVITY AND CHANGING DESIGN AND CONSTRUCTION PROCESSES TOWARD SUSTAINABILITY

The Wave at Nanyang Technological University is the first building in South-East Asia to use Mass Engineered Timber on a large scale.

Nanyang Technological University Singapore’s newest sports hall ‘The Wave’ is the first in a series of the varsity’s initiatives to adopt Mass Engineered Timber (MET) as one of its main construction materials. It does away with traditional design and construction processes, and pushes the frontiers of sustainability and productivity. The Wave is the first building in South-East Asia to use MET on a large-scale in order to construct a low-carbon building.

The building provides five times better heat insulation than concrete and is able to support a continuous 72-metre wave-like roof without the need for internal columns. This is possible because MET is much stronger than concrete or steel in terms of weight-to-strength ratio.

Eco Features

- Motion and photo sensor for external corridor and staircase lighting
- Passive displacement ventilation
- High efficiency chillers
- LED lighting
- Heat recovery system for hot water

Sporting Facilities

The Wave (Figure 1) is a three-storey sports facility located at 110 Nanyang Crescent. Stretching close to 9,800 square metres, the complex is equipped with mechanised retractable seats that can house close to 1,000 participants. It can also be configured into 13 full-sized badminton courts or three volleyball, netball, or basketball courts. In addition, the new hall is also equipped with facilities such as a weights-training room, three activity rooms for aerobics and dance, two teaching rooms, a VIP lounge, and a student activity space.

Owner and Project Manager
Nanyang Technological University, Singapore (NTU Singapore)

Design Architect
Toyo Ito Associates and Architects

Project Architect
SEMBCORP Architects & Engineers Pte Ltd

C&S and M&E Engineer
T. Y. LIN International Pte Ltd

Main Contractor
B19 Technologies Pte Ltd

MET Sub-Contractor
Struts Building Technology Pte Ltd

Completion Date
December 2016

Benefits of Using Mass Engineered Timber

The adoption of CLT and GLULAM allowed the project to move conventional on-site construction activities to prefabrication, off-site manufacturing, and subsequent installation on site.

When The Wave was constructed in April 2016, the massive arched roof of structure was erected without any supporting temporary supports, hence, creating a safe working environment for other construction activities to proceed concurrently.

The use of MET reduced labour as an average of only 11 workers were needed for construction due to the usage of engineered wood. An average of 60–80 workers would have been required if the project adopted steel or concrete construction.

MET also provides a higher level of thermal performance thus reducing heating and cooling cost for The Wave.

The Challenge

As this was the first standalone MET project constructed in Singapore, there was a lack of expertise for the new construction technology. However, the concerns were addressed in the design phase with the help of an experienced consultant and a better understanding of the properties and behaviour of MET.

Structures and Construction Methods

Slabs on the first storey were constructed using reinforced concrete to mitigate any termite issues. Subsequent storey slabs were constructed using Cross Laminated Timber (CLT) and the beams and columns were constructed using Glued Laminated Timber (GLULAM). The roof comprises seven roof beams of 36m long halves of GLULAM. All the MET elements for The Wave were manufactured in Austria and shipped to Singapore.
JTC GETTING AHEAD WITH PRODUCTIVE AND SUSTAINABLE CONSTRUCTION TECHNOLOGY

Transforming the industry with productive construction innovations.

Developer
JTC Corporation (JTC)

Architect, Structural Engineer and M&E Engineer
Parsons Brinckerhoff

Main Contractor
Lian Ho Lee Construction Pte Ltd

Specialist MET Consultant
Ronnie & Koh Consultants Pte Ltd

MET Sub-Contractor
Venturer Pte Ltd

Completion Date
December 2016

As Singapore’s lead government agency responsible for the development of industrial infrastructure, JTC has been adopting productive construction innovations to keep up with evolving industry needs and overcome challenges in today’s fast-changing built environment.

To achieve higher productivity in the second phase development of JTC LaunchPad @ one-north, Mass Engineered Timber (MET) was adopted for the construction of Block 81, which is a 3-storey multi-user light industrial building that comprises plug-and-play spaces to support the startup ecosystem.

Reinforced concrete is used to construct the first floor of Block 81. The building structure frames were constructed using Glued Laminated Timber (GLULAM) while Cross Laminated Timber (CLT) was used for slabs. The roof comprised of roof beams of GLULAM and steel purlins. Easy onsite assembly translated to manpower savings of 10 to 15 per cent, compared to conventional construction methods.

By pioneering the adoption of productive construction technologies, materials, and processes, JTC hopes to influence and play a part in the transformation of the industry.

CONSTRUCTION MATERIALS FOR SINGAPORE SUSTAINABILITY ACADEMY – FIRST IN SINGAPORE TO BE VERIFIED BY NATURE’S BARCODE™ SYSTEM

For the first time, a private-sector developer and non-profit organisation have teamed up to set up a major training and networking facility on sustainability.

In support of Global and National Climate Actions, the SSA aims to promote a low-carbon economy, resource efficiency, and sustainable practices among businesses and the community, in particular, youths. The SSA will focus on key areas of advocacy, building capacity and collaboration, education, training, and information and resource sharing as well as user engagement.

The SSA is the first in Singapore to have its construction materials, Cross Laminated Timber (CLT) and Glued Laminated Timber (Glulam) verified by the Nature’s Barcode™ system as coming from responsible sources.

With better strength-to-weight ratio compared with steel or concrete, CLT and Glulam are ideal as construction materials for this project. This is especially because the SSA is a structure built on top of an existing building. The materials also provide a high level of thermal performance thus reducing cooling costs.

Prefabricating the timber components off-site improves site efficiency and keeps on-site pollution to a minimum, resulting in a cleaner and safer worksite. For the SSA, the use of CLT and Glulam increased productivity by more than 30 per cent. This project received its TOP in March 2017.

Developer
City Developments Limited

Architect
Ong & Ong Pte Ltd

Main Contractor
Woh Hup Pte Ltd

Structural Engineer
Meinhardt Singapore Pte Ltd

M&E Engineer
Rankine & Hill Pte Ltd

Specialist MET Consultant
Ronnie & Koh Consultants Pte Ltd

MET Sub-Contractor
Venturer Pte Ltd

Completion Date
March 2017
50% MANPOWER SAVINGS FOR BCA SKYLAB VISITORS’ GALLERY AND LOUNGE PROJECT

The BCA SkyLab, which sits atop the Academic Tower at the BCA Academy, is the world’s first high-rise rotatable laboratory for the tropics. The SkyLab was developed in collaboration with the Lawrence Berkeley National Laboratory in the United States. It comprises a state-of-the-art test facility for the development of innovative energy efficient building technologies. It features two configurable test compartments that enable the study of design solutions and performance validation of technologies.

Figure 1. BCA SkyLab Visitors’ Gallery and Lounge

The Visitors’ gallery, lounge, foyer, and ramp at BCA SkyLab form a total floor area of 145m² and are constructed using CLT, a structural material sourced from renewable forests. The adoption of CLT as a construction material enabled both construction time as well as manpower utilised to be reduced. The manpower savings for this project was about 50 per cent compared to conventional reinforced concrete cast-in-situ construction.

The Cross-Laminated Timber (CLT) Visitor’s gallery and lounge is a dedicated demonstration space set up to engage the industry and researchers to allow them to share their knowledge and demonstrate technologies that were tested in the BCA SkyLab.

Going forward, BCA will continue to promote productive construction technologies and lead by example by adopting these technologies in the construction of its facilities. BCA hopes to inspire the industry and students alike, to constantly innovate and be the change they want to see.

Figure 2. Installation of CLT Interior at the BCA SkyLab Visitors’ Gallery and Lounge

The BCA SkyLab Visitors’ Gallery and Lounge and Figure 2. Installation of CLT Interior at the BCA SkyLab Visitors’ Gallery and Lounge.
ADOPTION OF GOOD HR PRACTICES FOR A BETTER BUILT ENVIRONMENT WORKPLACE

To build a strong team of professionals, firms require good Human Resource (HR) practices. Understanding the importance of effective people management and adopting good HR practices can help firms become more competitive.

As part of BCA’s continual efforts to encourage firms to adopt good HR practices and for the Built Environment (BE) sector to be the Workplace of Choice, BCA has put in place the following HR initiatives for BE firms:

1. Pledge for a Better Built Environment Workplace

   To attract and retain local talents in the BE sector, it is important to adopt good HR practices. In 2014, a Memorandum of Understanding (MOU) was signed between BCA and the Construction Industry Joint Committee (CIJC) to push for the adoption of good HR practices in the sector through the Pledge for a Better Built Environment Workplace.

   This voluntary Pledge aims to transform the BE sector into a workplace of choice and it consists of five key principles:

   - Performance Management and Training
   - Recruitment and on-boarding
   - Communication
   - Rewards and Compensation
   - Wellness and Support Schemes

2. HR Guidebook for the Built Environment Sector

   To further help BE firms improve their HR practices, BCA developed the ‘HR Guidebook for the Built Environment Sector’. This Guidebook was developed in consultation with over 200 BE firms, including contractors, consultant, and developer firms and has consolidated HR best practices, tools, and resources for the BE sector.

   The Guidebook is a handy resource guide, written in clear and simple English, for HR professionals to bring the firm’s HR practices to the next level.

   The Guidebook contains:

   - BE sector customised content, aligned to the Pledge’s 5 principles
   - Case studies of HR practices in 10 BE firms
   - Baseline level of HR practices that could be adopted and how BE firms can further improve their existing HR practices
   - HR tools and templates which can be downloaded online and modified for firms’ use

   The Guidebook, along with the HR tools and templates will be made freely available in June 2017 on the Building Careers Portal: www.buildingcareers.gov.sg

   What are the Benefits of a Pledge Signing Firm?

   - Free use of ‘Pledge for a Better Built Environment Workplace’ logo in firms’ collaterals for branding purposes
   - Positive image to better attract and retain talent

   - Listed as a pledge signer in BCA’s Building Careers Portal
   - Firms may be profiled in BCA’s publicity materials and events when opportunity arises

   - Access to HR-related resources such as the HR Guidebook for the Built Environment Sector and HR tools/templates
   - Receive updates on HR-related information and invitation to HR-related seminars/trainings

Join us, and commit to adopt better HR practices in the BE sector!

To date, more than 300 BE firms have signed the Pledge to show their commitment in adopting good HR practices in their firms to better attract and retain employees.

To show your firm’s commitment, sign the Pledge at www.buildingcareers.gov.sg/pledge to receive a hardcopy of the HR guidebook and enjoy other benefits highlighted above.

For further enquiries about the Pledge and the HR guidebook, please email us at: BCA_BEcareers@bca.gov.sg
Looking for New Hires? Check out the Building Careers Portal for the Built Environment Sector

In 2016, BCA revamped the Building Careers Portal to be a one-stop portal where users can obtain all information related to Built Environment (BE), such as videos on BE professions, information on BCA-Industry scholarship and sponsorship programmes, as well as career and internship opportunities in the BE sector.

The Building Careers Portal was designed with a user-centric interface and the information are organised based on four main target audiences – jobseekers, employers, students, and educators.

Under the employer and jobseekers section, there is a free Jobs Portal, which allows employers to list available BE jobs for jobseekers to browse and apply.

Each employer account has its own dashboard, with intuitive features like the call-to-action buttons to guide users in the posting of jobs, search for candidates and viewing of job applications.

To date, the Building Careers Portal has attracted more than 1.7 million cumulative visitorship and more than 2,000 jobseekers are registered on the portal.

Moving forward, BCA is enhancing the Portal further by developing a Scholarship and Sponsorship management system. Sponsor firms under the BCA – Industry Built Environment Scholarship and Sponsorship Programmes can screen the profiles of potential scholars they would like to sponsor, arrange for interviews before eventually employing the scholars through the management system. The system would also make it easier for firms to monitor and track the scholars’ progress.

We would like to invite all BE firms to register for an Employer Account in the Building Careers Portal to enjoy the various services it offers.

Registration is free and can be easily done at: www.buildingcareers.gov.sg

For further enquiries, please email: BCA_BEcareers@bca.gov.sg
DO THE RIGHT THING! – UPGRADE YOUR WORKERS TO HIGHER SKILLED (R1) STATUS

To help employers continue to push for higher productivity, BCA worked with the Ministry of Manpower (MOM) to expand the upgrading pathways for workers in the construction sector.

**NEW ENHANCED PATHWAY (SINCE OCT 2016)**

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>EXISTING PATHWAYS</th>
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<tbody>
<tr>
<td></td>
<td>(A) CoreTrade</td>
<td>(B) Multi-skilling</td>
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<tr>
<td>LOCAL CONSTRUCTION EXPERIENCE</td>
<td>Min. 4 years</td>
<td>Min. 4 years</td>
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<tr>
<td>SKILLS ASSESSMENT (TEST)</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>FIXED MONTHLY SALARY¹</td>
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<td>X</td>
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1 “Fixed monthly salary” refers to the sum of basic monthly salary and fixed monthly allowances.
2 Employers are required to update the WPH’s fixed monthly salary of at least $1,600 or more at MOM’s Work Permit Online (WPOL) system
3 SEC(K) or equivalent trade test
4 From Oct 2016, WPHs also qualify as R1 workers if they are (i) certified in a recognized trade skill, (ii) have at least 6 years of construction experience in Singapore, and (iii) have obtained WSQ Advanced Certificate (Workplace Safety and Health) or completed 120 hours of training in approved safety-related courses SEC(K) or equivalent trade test

Benefits for firms that upgrade Work Pass Holders (WPHs)

- Employers can enjoy substantial levy savings if they reduce the proportion of R2 basic skilled worker by upgrading them to R1 through one of the four pathways.
- Longer allowable period of employment of up to 22 years for the Higher Skilled R1 workers.
- BCA provides funding support to co-fund employers in upgrading their workers through the Workforce Training & Upgrading (WTU) scheme, under the Construction Productivity and Capability Fund (CPCF). The WTU scheme co-funds the fees for training and skill certification required for CoreTrade and Multi-skilling registration. Co-funding is up to 90% for locals and 80% for foreigners.

Newly Launched Specialist Trades

Two new specialist SEC(K) trades – Mini Crane Operation and Hydraulic Excavator Operation (as lifting machine) were launched at the end of December 2016 to facilitate upgrading.

Hydraulic Excavator Operation (as lifting machine)

Offered by P-One (S) Pte Ltd and Huatlong Contractor Pte Ltd
Recognised by Singapore PowerGrid to register as excavator operator

Mini Crane Operation

Offered by JP Nelson Equipment Pte Ltd and BS Technology Pte Ltd

Operators (without a mobile crane license) operating cranes less than 5 tonnes are required to attend this course

'O am now able to apply my lifting knowledge to operate in a safe and productive manner.'

Ong Huat Kim
Senior Excavator Operator
Jin Choon Civil Engineering Pte Ltd

Approved Training and Testing Centres (ATTCs) and Continuing Education and Training (CET)’s Providers

- www.bca.gov.sg/CoreTrade/others/ATTCcontacts.pdf
- www.bca.gov.sg/CoreTrade/others/CETFees.pdf

Videos of Trade Available

- www.bca.gov.sg/manpower/TradeTestVideos.html
## Calendar of Events

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Event Name</th>
<th>Venue</th>
<th>Organiser</th>
<th>Contact Person &amp; Details</th>
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<tbody>
<tr>
<td>30 June 2017, 28 July 2017</td>
<td>BCA – SCAL Productivity Clinic</td>
<td>SCAL Construction House, 1 Bukit Merah Lane 2, Singapore 109760</td>
<td>BCA and SCAL</td>
<td>Ms Jeanette Tel: 6278 9577 Email: <a href="mailto:jeanette@scal.com.sg">jeanette@scal.com.sg</a></td>
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<tr>
<td>14 &amp; 15 June 2017</td>
<td>Behavioural Safety for the Construction Industry (19th Run)</td>
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<td>15 Jun 2017</td>
<td>CPF8 on Temporary Electrical Installations (4th Run)</td>
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<td>19 &amp; 20 Jun 2017</td>
<td>Design of Steel-Concrete Composite Structures using Eurocode 4 (7th Run)</td>
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<tr>
<td>20 Jun 2017</td>
<td>Good Industry Practices (Painting)</td>
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<td>20 Jun 2017, pm</td>
<td>Workshop for Company CEO/Top Management (bizSAFE Level – 3) (43rd Run)</td>
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<td>20, 22, 29 Jun &amp; 4 Jul 2017, evenings</td>
<td>Geotechnical Design using Eurocode 7 (16th Run)</td>
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<td>21 Jun 2017</td>
<td>Design of Bolted and Welded Joints in Steel Structures using Eurocode 3 (9th Run)</td>
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<td>27 &amp; 28 Jun 2017</td>
<td>BIM for Structural Design and Detailing (NEW)</td>
<td>BCA Academy, 200 Braddell Road</td>
<td>BCA Academy</td>
<td>Corporate Services (Marketing) Tel: 6248 9824 Email: <a href="mailto:bca_academy@bca.gov.sg">bca_academy@bca.gov.sg</a></td>
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<tr>
<td>28, 29 &amp; 30 Jun 2017 (day)</td>
<td>Internal Audit (QHSE) Course based on Quality ISO 9001, Environmental 14001 &amp; Health &amp; Safety OHSAS 18001 (28th Run)</td>
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<td>28, 29 Jun, 4 &amp; 6 Jul 2017, evenings</td>
<td>Supervision of Piling Works (27th Run)</td>
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<td>29 Jun – 14 Jul 2017 (5 days)</td>
<td>Lift and Escalator Course for Engineers (5th Run)</td>
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<td>3 &amp; 4 Jul 2017</td>
<td>Advanced Concrete Design using Eurocode 2</td>
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<td>3, 5, 7, 10, 12, 14 &amp; 19 Jul 2017, evenings</td>
<td>Supervision of Deep Underground Construction Works (6th Run)</td>
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<td>7 Jul 2017</td>
<td>Requirements for Environmental Sustainability in Buildings and The Green Mark Scheme (9th Run)</td>
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<td>10 &amp; 11 Jul 2017</td>
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<td>13 Jul 17</td>
<td>BCA-SPM Joint Seminar 2017 Maximising Productivity through Project Collaboration</td>
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<td>17 &amp; 18 Jul 2017</td>
<td>Construction Contract Procurement &amp; Negotiations (NEW)</td>
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<td>27 Jul 17</td>
<td>Preparing and Defending Loss and Expense Claims (5th Run)</td>
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<td>Starting on 10 Jul 2017</td>
<td>Specialist Diploma in Virtual Design &amp; Construction (2nd Intake)</td>
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<tr>
<td>Starting on 24 Jul 2017</td>
<td>Specialist Diploma in Lean Construction (3rd Intake)</td>
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<tr>
<td>Starting on 24 Jul 2017</td>
<td>Specialist Diploma in Design for Manufacturing &amp; Assembly (3rd Intake)</td>
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### Construction Productivity and Capability Fund (CPCF) Courses

- Certificate in Interior Finishing Coordination
- Certificate in Pavement Construction and Maintenance
- Certificate in Precast Concrete Construction Supervision
- Certificate in Waterproofing Supervision
- Certificate in Building Measurement
- Certificate in Geotechnical Instrumentation for Supervisors
- Certificate in Levelling and Setting Out
- Certificate Course for Structural Steel Supervisors
- NBQ in Project Supervision
- Higher NBQ in Project Supervision
- Advanced NBQ in Project Supervision
- NBQ in Supervision and Coordination of MAE Works
- Higher NBQ in Supervision and Coordination of MAE Works
- Advanced NBQ in Supervision and Coordination of MAE Works
- NBQ in Operation & Maintenance
- Higher NBQ in Operation & Maintenance
- Advanced NBQ in Operation & Maintenance

16 New Courses are now available. Up to 50% to 80% of the training cost can be subsidised under the CPCF scheme.

The additional courses are:

- Certificate courses (PMETs)
- Certificate course in BIM Modelling
- Certificate course in BIM Management
- Project Management for Professionals in the Building and Construction Industry (in collaboration with SPM)
- Construction Productivity Management (in collaboration with SCA)
- Design of Precast Concrete Structures for Engineers
- Workshop on Site Management of Precast Concrete Construction

**Trade Diplomas (Foremen / Supervisors)**
- Structural Steel Supervision
- Reinforced Concrete Supervision
- Plumbing Technology
- Electrical Technology

**Certificate courses (Tradesmen / Foremen)**
- Builders Cert in Plumbing and Pipelining
- SEC(5) in Precast Concrete Components Erection
- SEC(5) in Structural Steel Fitting
- SEC(5) in Interior Drywall Installation
- System Formwork Training
- Mechanical Elevated Work Platform

**For Enquiries, Please Contact:**

BCA ACADEMY
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CONSTRUCTION PRODUCTIVITY AND CAPABILITY FUND (CPCF)

WORKFORCE TRAINING AND UPGRADING (WTU) SCHEME
Facilitates upgrading of workforce at all levels by co-funding up to 90% of the cost for selected skills assessment and training courses*

MECHANISATION CREDIT (MECHC) SCHEME
Provides assistance to builders to defray up to 70% of equipment costs*

PRODUCTIVITY INNOVATION PROJECT (PIP) SCHEME
Provides assistance to companies to defray up to 70% of the cost for adopting more productive work processes*

SCHOLARSHIP AND SPONSORSHIP PROGRAMMES
In partnership with built environment firms, BCA will co-fund scholarship and sponsorship programmes at the undergraduate, diploma, ITE, supervisory and foreman levels*

BUILDING INFORMATION MODELLING (BIM) FUND
Co-funds up to 70% of the supportable cost incurred by firms when levering BIM technology to improve multi-disciplinary collaboration*

*Terms and conditions apply.

For more information, please visit www.bca.gov.sg/CPCF/cpcf.html