

# Alcimed

Press release

## Singapore:

### Fertile ground for innovation in construction, driven by state policies to increase productivity

*The Singapore government strongly encourages innovative construction techniques in order to improve productivity and reduce labor on site.*

*Alcimed, a consulting firm in exploration of new markets, releases an update on these innovations, including advanced precast and digitization of construction projects.*

Paris, April 5<sup>th</sup>, 2016 - In the context of a growing construction industry and a decreasing number of construction workers migrants, the *Building and Construction Authority* (BCA), part of the Government of Singapore, set up in 2010 a productivity improvement plan. The second phase of the plan, launched in late 2015, provides €300 million funding to encourage the skill improvement of local workers and the adoption of *Design for Manufacturing and Assembly* (DfMA) innovative technologies.

#### A growing construction economy driven by the public sector

Despite the slowdown in the Singaporean economy since late 2014, with an annual GDP growth rate which fell from 5.8% in January 2014 to 1.8% in January 2016, the construction market continues to grow. BCA expects for 2016 a value of construction contracts between €24 and €30 billion. The sector is largely driven by investment in transport infrastructure and strong demand from public sector buildings, which account for 65% of the contracts foreseen in 2016 by the BCA.

#### Innovative construction

In a context of an increasing productivity of construction, the BCA encourages the DfMA (Design for Manufacturing and Assembly), an approach to improve the quality and effectiveness of projects, and associated innovative techniques such as *Precast Pre-finished Volumetric construction* (PPVC), the *Virtual Design and Construction* (VDC) and even 3D-printing for buildings.

#### 3 construction innovations

*Precast Pre-finished Volumetric Construction* (PPVC)

*Virtual Design and Construction* (VDC)

*3D Printing*

#### **Precast Pre-finished Volumetric Construction - PPVC**

PPVC is a construction method that involves precast manufacturing of concrete modules including light work, finishings and accessories. These are then assembled on site as Legos. Modules containing so-called Prefabricated Bathroom Units (PBU) are often included in these constructions. PPVC technique reduces the need for labor by 50% and construction time by 20%.

Singapore actively promotes PPVC and PBUs in new construction. The BCA offers financing to offset the additional transport costs, which can reach 15% more than with traditional methods. Finally, in the 2014 land sale plan of the government, conditions are imposed on manufacturers: 65% of the buildings must be PPVC and 65% of the bathrooms must be PBUs.

Three flagship projects embody the Government initiatives: the construction of student residences at Nanyang Technological University; the extension of the Changi Airport Crowne Plaza Hotel and finally, a set of residential buildings in Canberra Drive is presently the most important PPVC project in Asia or even in the world. Regarding future projects, the government announced for the 2016 S1 the sale of land which are sized for 7,420 residential units with 1,460 condominium units and 272,600 m<sup>2</sup> (floor area) of commercial space.

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Currently 5 large suppliers of PPVC share the Singaporean market: Swee Hong, Unitised Building Australia, Moderna Homes, Sembcorp EOSM and Teambuild. This number is likely to increase as the BCA multiplies tenders for the installation of precast plants on State land called Integrated Construction and Precast Hub.

## THREE FLAGSHIP PPVC PROJECTS IN SINGAPOUR

### STUDENT RESIDENCE AT NANYANG TECHNOLOGICAL UNIVERSITY



**Opening date**

Early 2016

**Number of units**

1,582 rooms

**Construction company**

Singapore Piling & Civil  
Engineering Pte Ltd (subsidiary of  
BBR Holdings Ltd)

**PPVC Supplier**

Swee Hong Ltd

### EXTENSION OF THE CROWNE PLAZA HOTEL AT CHANGI PAR QUE AIRPORT



**Opening date**

Feb. 22<sup>nd</sup> 2016

**Number of units**

636 units, 243 rooms

**Construction company**

Dragages Singapore Pte Ltd  
(subsidiary of Bouygues  
Bâtiments)

**PPVC Supplier**

Unitised Building in Shanghai

### CONDOMINIUM RESIDENTIAL BUILDINGS IN CANBERRA DRIVE



**Opening date**

Jan. 2019

**Number of units**

3,300 units, 636 apartments

**Construction company**

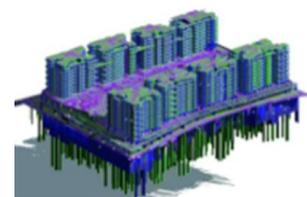
City Developments Ltd

**PPVC Supplier**

Teambuild

### Virtual Design and Construction – VDC

The Virtual Design and Construction is a set of solutions that optimize the planning ahead of the construction works so as to have a better project management. One of the key steps is the 3D building modeling using tools such as Building Information Modeling (BIM). With such methods, all stakeholders (designers, manufacturers, customers, producers of prefabricated modules ...) are working on the same virtual interface to solve most of the problems before launching construction of the building. This technique is complementary to PPVC constructions leading to low flexibility on site and therefore requiring careful planning upstream.



*Bedok Mixed Development Project  
built by Ssangyong E&C – laureate  
of 2015 BIM award delivered by BCA*

An increasing trend in use of BIM in Singapore is observed since 2010. Indeed, two BCA funding rounds were held in 2013 and 2015 with 700 companies receiving funding totaling €14 million to date. Singapore is currently the world leader in the use of BIM and made it mandatory this year for all private construction project exceeding 5,000 m<sup>2</sup> of floor area.

### 3D printing projects of buildings emerge

Singapore is also preparing the future and it is considering the revolutionary 3D printing solutions for buildings. The Singapore center for 3D printing is conducting research on how to print concrete structural elements in order to build modules to be assembled on site. The government has invested €135 million in this center to find 3D printing solutions for buildings. A special cement will be designed. The project will be presented this year to the government for approval and the first printed building prototype is expected within three years.

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*BCA : Building and Construction Authority*

*DfMA : Design for Manufacturing and Assembly*

*PPVC : Precast Pre-finished Volumetric Construction*

*VDC : Virtual Design and Construction*

*BIM : Building Information Modeling*