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HOUSING & DEVELOPMENT BOARD

PRESS RELEASE

New Initiatives to Boost Construction Productivity in HDB Projects

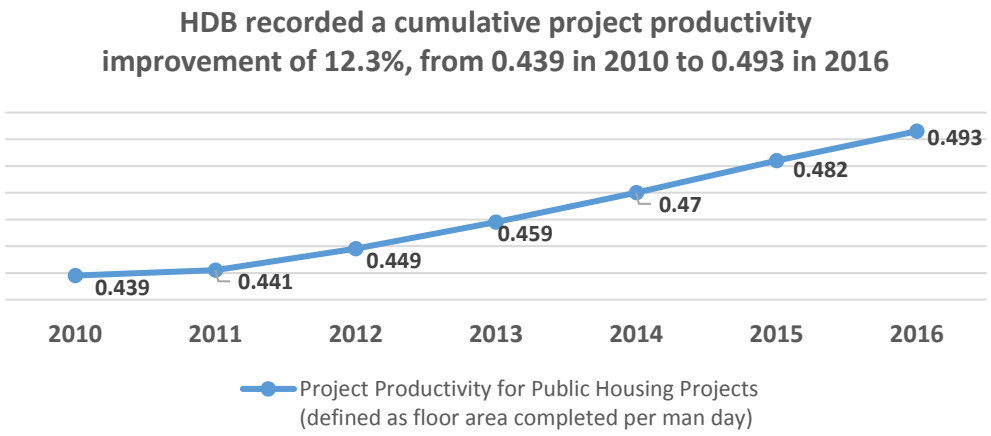
By 2019, all newly launched HDB flats will be fitted with bathroom units pre-assembled off-site. Complete with finishes such as copper piping, partial tiling, window frames, and a waterproofing system, the Prefabricated Bathroom Units (PBU) will be transported to the work site, and hoisted onto the blocks for installation.

2 Along with the adoption of PBUs, HDB will also implement the concrete Prefabricated Prefinished Volumetric Construction (PPVC) method in 35% of its projects by 2019. This method involves constructing and assembling 3-dimensional (3D) prefabricated modular units with finishes in a controlled factory environment. At the factory, the 3D volumetric components are combined in different configurations (including bedrooms, living room, household shelter, and kitchen) to create different flat layouts, and pre-fitted with floor and wall finishes, window frames and a preliminary coat of paint, before being transported to the construction site for installation.

3 The move – a departure from the conventional approach where workers need to work on the finishes at the construction site – will drive HDB's construction productivity on a larger scale, setting it on track to achieve a productivity improvement of 25% by 2020, compared with 2010.

Steady Improvement in Construction Productivity

4 As the public housing authority and largest housing developer in Singapore, HDB constantly seeks to improve its design and construction processes, to raise construction productivity even as it delivers quality homes for Singaporeans. Over the years, through the adoption of a range of initiatives, the productivity for public housing projects – defined as the amount of floor area completed per man day – has improved steadily:



Source: BCA (https://www.bca.gov.sg/productivity/site_productivity_statistics.html)

Expanding Use of Prefabrication Technology to Boost Productivity

5 One key thrust of HDB's productivity drive has been the adoption of precast technology since the 1980s. Today, up to 70 per cent of a typical HDB block's concrete structure is constructed using the prefabrication method.

6 To further raise productivity, HDB has been studying and piloting new and more productive forms of precast construction, including the game-changing PBU and PPVC methods.

7 The key benefits of using the PBU and PPVC are as follows:

- **Higher efficiency** – The pre-assembly of volumetric units can be carried out off-site, in tandem with other activities on-site. The off-site works at the ground level minimises the wastage of materials, and also reduces the need to hoist raw materials onto elevated blocks under construction.

- **Reduced need for manpower on-site and better site safety** – By fabricating the volumetric modular units off-site in a controlled factory environment, fewer workers are required on-site, thereby improving overall site safety.

- **Better construction quality** – Volumetric construction in a factory environment offers more uniform and better quality workmanship. The incidence of wet construction joints is also reduced, thereby improving the water tightness of wet areas.

- **Reduced impact on environment** – With part of the finishes done off-site, less noise and dust is generated at the construction sites, thereby minimising disamenities to surrounding residents. It also helps to improve housekeeping at construction sites.

Pilot PBU & PPVC Projects Pave the Way for Wider Implementation

8 HDB first piloted the concrete PBU in Fernvale Lea, a Build-To-Order (BTO) project in Sengkang, which completed in Jan 2016. Including this pilot project, HDB has implemented the PBU in 15 BTO projects, involving some 14,000 units. Moving ahead, HDB will implement PBUs in 60% of the flats launched in 2017, and extend PBUs to all projects launched by 2019, where feasible.

Prefabricated Bathroom Units delivered for installation at the construction site

9 The PPVC method of construction was piloted in Valley Spring @ Yishun, where construction for 824 BTO units started in March 2017. Prior to this pilot, HDB had tested the concrete Prefabricated Volumetric Construction (PVC) approach in West Terra @ Bukit Batok. Similar to PPVC, the PVC method involves the use of 3D volumetric units, but without pre-finishes such as floor finishes or painting. Expected to complete in first quarter 2018, all 1,793 units in West Terra @ Bukit Batok will also come with PBUs. The PVC pilot has enabled HDB

to refine its PPVC approach. By 2019, the PPVC approach will be implemented in 35% of new public housing projects.

Valley Spring @ Yishun, launched in August 2016, is a pilot HDB project using the PPVC method.

Leveraging Technological Innovations in HDB Construction

10 Beyond prefabrication technology, HDB also seeks to leverage technological innovations, such as Building Information Modelling (BIM) and Virtual Design & Construction (VDC), to raise construction productivity.

11 An advanced 3D modelling technology, BIM enables professionals of various disciplines to explore the building project digitally, before it is built. With planners, surveyors, designers, and builders looking at the same 3D model, potential design clashes are easily flagged out for resolution before the actual construction on site. This leads to a better integrated collaboration of expertise, thereby optimising the cost-effectiveness and quality standards across HDB's construction value chain.

12 As one of the early adopters of BIM, HDB has been applying this advanced simulation software in its new projects since 2009. From 2012, all new HDB developments are required to use BIM in their design. To-date, about 130 projects have been designed using BIM.

13 In VDC, designers and contractors make use of 3D visualisation of the building designs and information embedded in BIM models, to address design issues collaboratively and plan the construction activities holistically. The use of VDC enhances productivity, as designers and contractors spend less time to interpret the 2D technical drawings, thus reducing misinterpretation.

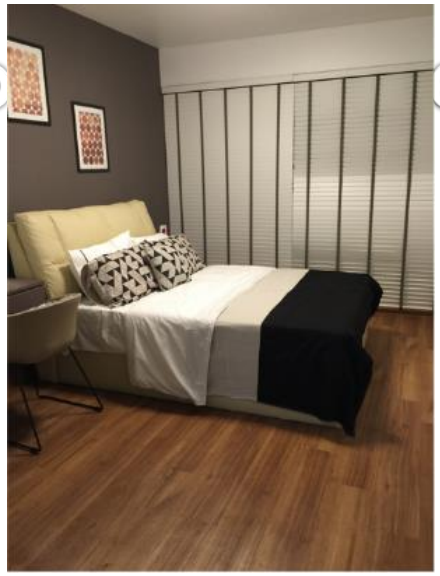
New Materials for Greater Productivity

14 In the design of its flats, HDB is also constantly searching for materials that will improve productivity and offer residents a better home. Some new materials that have been introduced in new HDB flats include:

- **Vinyl strip flooring** to replace floor tiles in the bedrooms since 2016. Resembling timber, the flooring is pre-finished off-site in factories and can be installed easily on site. It offers better slip resistance and greater comfort for residents.

- **Unplasticised polyvinyl chloride (uPVC) skirting** to replace timber skirting in all projects launched since Nov 2015. The uPVC skirting is of higher quality and can be installed more speedily.

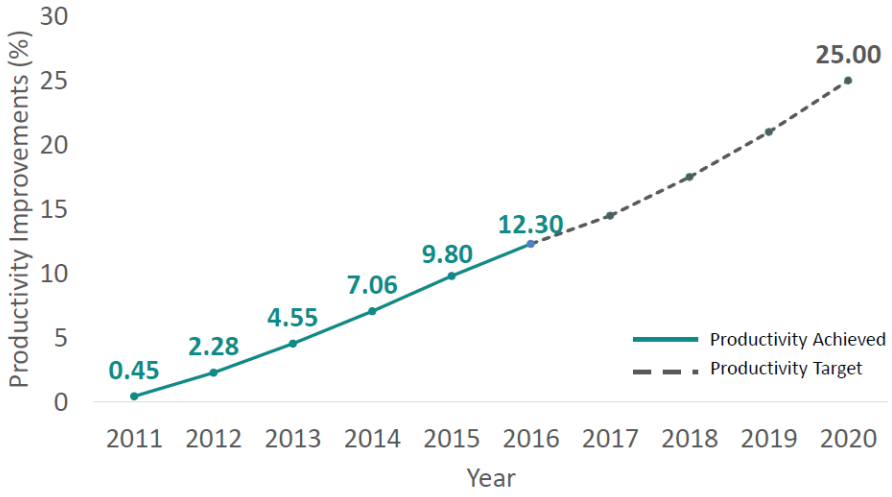
- **Laminated unplasticised polyvinyl chloride (uPVC) doors and architrave** introduced in 2017. They are easier to install and more durable than conventional timber doors and steel door frames. The uPVC doors and architrave also allow better control of workmanship and higher quality control.



(From left) The vinyl strip flooring and laminated uPVC door and architrave are examples of new materials which HDB has adopted to improve productivity.

On Track to Meet Construction Productivity Goal

15 With the implementation of game-changing construction technologies and innovations, HDB is well on track to achieving a total construction productivity improvement of 25% by 2020 – in line with the target set for the industry by the Government. In the last Financial Year (i.e. FY 2016/ 2017), it achieved a cumulative 12.3% improvement in overall productivity levels at HDB construction sites.



16 Going forward, HDB will continue to pursue advances in technology and the adoption of innovations to boost productivity, and create well-designed and quality homes for Singaporeans.

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