

A manufacturing process approach to construction: design and application of a composite system for modular buildings

Gilles Chaillan, Patrick Condon

Dragages Singapore, a member of the Bouygues Construction group

Catherine Poirriez, Sophie Wu

Passage Projects

Contact: cp@passage-projects.com

Abstract

Singapore Authorities are actively promoting construction industrialisation through the Prefabricated Prefinished Volumetric Construction (PPVC) method so as to reduce the city-state's dependence on foreign labour. This paper features the technical options of the modular system that were engineered for the Ministry of Health Holdings' Woodlands Crescent Nursing Home in Singapore. This system, developed in response to constraints imposed by the design disciplines, factory fabrication, transport, and site erection can be used on a wide array of building types, including high rise hotels and apartments. The paper presents the choices taken in defining the modular system; unconventional structure design, especially on the influence of transfer floors and module layout; fire proofing and corrosion protection; the methodology used for the module construction as well as erection; and finally, the further development of this system.

Keywords: Modular and pre-fabricated construction, composite construction, innovative structural systems.

1 Introduction

Prefabricated and Prefinished Volumetric Construction (PPVC) is a construction method in which free-standing volumetric modules are prefabricated off-site inclusive of finishes. The PPVC building modules are made of lightweight structural systems manufactured in a controlled environment using a repetitive production line process that ensures a consistently high quality finish and better control of the construction programme relative to traditional construction. Site works are limited to installation of the modules, which reduces dust and noise pollution

as well as improves the health and safety of the workers. Singapore Authorities are actively promoting construction industrialisation through the Prefabricated Prefinished Volumetric Construction (PPVC) method, as described in [1], so as to reduce the city-state's dependence on foreign labour and reduce the nuisance caused by construction sites in the city centre.

Contrary to traditional construction methods in which adjustments can be made on site and coordination between parties can be done in parallel to construction, the PPVC method requires a high level of coordination between all parties at an early stage of the project. Because all