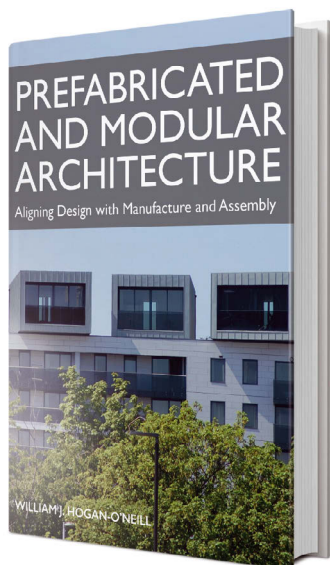


Review

Angus McFarlane recommends this book to structural engineers who wish to advance their knowledge of prefabrication and modular construction.

Prefabricated and modular architecture: Aligning design with manufacture and assembly

Author: William J. Hogan-O'Neill
Publisher: The Crowood Press Ltd
Price: £20.00
ISBN: 978-1-78500-806-1



THIS BOOK IS A MUST-READ FOR ARCHITECTS, ENGINEERS AND OTHER CONSTRUCTION PROFESSIONALS that wish to further their knowledge about design for manufacture and assembly (DfMA) in relation to prefabrication and off-site manufacture (OSM).

The book covers the whole gamut of prefabrication: ranging from its early history; through the negative perception of post-war prefabricated housing 'prefabs' and system-built tower blocks; to the renewed interest in OSM today.

The main theme of the book is that architects should embrace DfMA methodology as an integral part of their design process so that they can maintain a significant contribution to the construction industry in the future. The author contends that (as architects gain experience in the design of different prefabricated buildings), they will transform current practice and promote prefabricated architecture so that it eventually becomes recognised as a new discipline in its own right.

The author calls this new discipline PAMA (prefabricated and modular architecture) and, for PAMA to become relevant, it will require significant input from trained architects who are prepared to adopt standardisation and manufacturing as an intrinsic element of their design process.

It is emphasised that prefabricated architecture is not complicated. It relies on a small number of simple concepts involving manufacturing processes that already exist, namely: parts, components and sub-assemblies; panelised systems; hybrid construction – comprising conventional construction plus panelisation; and fully modularised systems – consisting of 3D volumetric modules.

The book clearly defines the difference between panelisation and modularisation, which are terms that (wrongly) tend to be used interchangeably. Panelisation consists of 2D elements (columns, slabs and walls) and is essentially an enhancement to the conventional construction process. Whereas modularisation consists of 3D volumetric modules.

The book highlights that volumetric modules can consist of complete buildings or parts of a building. The modules are usually completely fitted out with fixtures and fittings, leaving only the final connections to be completed as part of the on-site assembly process (sometimes known as plug-and-play). It is also noted that volumetric modular building is the only medium that can provide 95% completion of the building's superstructure from within a factory environment, with the remaining 5% being the final assembly process on site.

It is emphasised that modular buildings result in significant time savings on site because they are

predominantly constructed using a factory-based manufacturing process, with less time required for final on-site assembly. Also highlighted is that modular buildings can lead to significant savings in substructure and foundation work because they tend to be much lighter than the conventional equivalent. However, to gain the maximum benefit for the project, the decision to go modular must be made early in the concept design stage.

The book states that the greatest aesthetic impact is achieved in prefabrication when the connections forming part of the structure are expressed as part of the architecture of the building, i.e. the building's structural engineering embraces the architectural design. Consequently, the structural engineering becomes part of the architecture. Additionally, it is emphasised that the building services engineering can also contribute in a similar manner and examples of the Lloyd's building in London and the Pompidou Centre in Paris are presented.

Additionally, regarding aesthetics, it is stated that the current housing sector (and some other sectors, such as schools, are less tolerant of a standardised approach and that there is a demand for each building or project to express its own individuality, which, in former years would have been difficult to achieve with prefabricated and modular designs. Consequently, the book notes that customisation can be included in the concept design to bring in individuality to the elements and modules of a project. Indeed (although not mentioned in the book), some Japanese manufacturers of modular buildings have introduced mass-customisation methodology.

From a sustainability perspective, the book highlights that factory-produced buildings have less water usage, less pollution, less wastage, and less environmental impact when compared with conventional construction.

The final portion of the book deals with the logistics in transporting prefabricated elements from the factory to the site and it highlights the need for planning regarding element dimensions, weight, and preparing the delivery route to site.

I have no hesitation in recommending the book to those construction professionals that wish to advance their knowledge of prefabrication and modular construction. The only (minor) criticism is that book infers that DfMA is part of PAMA, whereas the converse would probably be more correct.

Angus McFarlane

Angus McFarlane is the Structural Engineering Lead in Laing O'Rourke's Engineering Excellence Group in Sydney, Australia. He is a passionate practitioner of modular construction utilising DfMA.