Rialtas na hÉireann
Government of Ireland

Modern Methods of Construction
Introductory Guide

Modern Methods of Construction – a key way of helping to address Ireland's housing needs

Prepared by the Department of
Housing, Local Government and Heritage
gov.ie

Introduction

This guide to Modern Methods of Construction (MMC) describes a range of innovative construction processes to deliver quality and compliant housing. This includes offsite construction techniques such as mass production and factory assembly as well as onsite innovations. Modern Methods of Construction will significantly help address Ireland's housing needs in line with Housing for All – the national strategy for housing.

This guide has six parts as follows:

1. **Modern Methods of Construction (MMC)**
2. **The main benefits of MMC**
3. **The seven categories of MMC – an at-a-glance view**
4. **The most commonly used categories of MMC for housing**
5. **Quality assurance (compliance and certification) – this part is mainly for industry readers**
6. **Initiatives to promote MMC in Ireland**

1 Modern Methods of Construction

Modern Methods of Construction is an industry term used to describe a range of manufacturing and innovative alternatives to traditional construction.

MMC can:

- **help boost productivity and efficiency of housing delivery, and**
- **increase the environmental sustainability of new housing delivery.**

2 Benefits of MMC

There are many benefits of adopting Modern Methods of Construction more widely. These include:

Faster delivery of construction projects

MMC techniques can speed up the delivery of construction projects by between 20% and 60%. Both off and onsite activity can be improved. Many of the construction processes happen offsite in factory conditions where, for example, factors such as bad weather do not disrupt delivery times.

High-quality homes

MMC promotes precision through digitalisation and strict quality-control processes. Creating construction components and units using factory-standard precision and consistency adds to the quality of structures. This means that they will achieve their intended performance and durability requirements of 60 years.

Increased sustainability

MMC strengthens quality of construction such as improving air-tightness in homes. This improves the energy performance of homes and promotes higher Building Energy Ratings (BER) resulting in improved comfort, lower energy bills and reduced carbon emissions.

MMC also helps to:

- reduce manufacturing waste and energy, as well as reducing harmful emissions in transporting components,
- improve sustainability and circularity (most efficient use of materials), and
- reduce embodied carbon (which will help us meet our carbon-neutral goals as MCC can, for example, encourage the use of lower carbon-intensive materials).

More affordable

MMC can reduce construction costs when they are combined with a steady supply of standardised designs. This can mean that new housing is more affordable for the purchaser or tenant.

More diversity in the workforce

The indoor factory environment, with regular working hours and a consistent place of work is, attractive to a more diverse and localised workforce.

Overall, greater use of MMC can boost productivity in the construction sector and open new opportunities for innovation.

Figure 1: MMC factory-controlled environment

3 The seven categories of MMC – an at-a-glance view

The seven categories of MMC are:

Category 1	Pre-manufacturing – 3D primary structural systems (Volumetric)
Category 2	Pre-manufacturing – 2D primary structural systems (Panelised)
Category 3	Pre-manufacturing - non systemised primary structure
Category 4	Additive manufacturing – (structural and non-structural)
Category 5	Pre-manufacturing – non-structural assemblies and sub-assemblies, for example pods
Category 6	Traditional building product-led site labour reduction and productivity improvements
Category 7	Site process-led labour reduction/productivity assurance improvements (innovative processes and approaches)

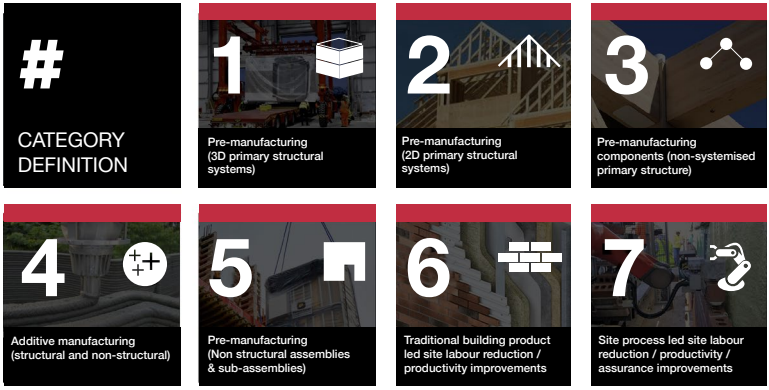


Figure 2: Categories of MMC

4 The most commonly used MMC for housing

This section describes four of the most commonly used MMC categories for housing. They are categories 1, 2, 5 and 7.

Volumetric housing units (category 1)

These are three-dimensional units and are made in factories. They are then delivered to site where they are installed.

Figure 3: Volumetric unit

The units' level of finish can vary from a basic structure to one with all services installed, ready to "plug and play".

The category includes structural framing with roofing. The category comes:

- **with or without cladding (an external surface to protect buildings such as block with plaster to prevent against ingress of water from rain), and**
- **with or without internal fit-out such as kitchens or bathrooms.**

Several volumetric units can be combined to make up a building, or a single volumetric unit can be a small dwelling. They can also be combined with other forms of construction such as pre-manufactured roofs or bathroom units (pods).

Panelised components (category 2)

This MMC category uses flat panel units such as panelised walls, which can be made from a range of materials. They are made in factories and assembled onsite to produce a house or apartment.

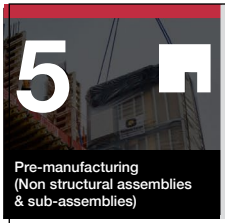
Panelised components can include:

- **walls, roof and floors,**
- **insulation and linings, and**
- **cladding, windows, roofing and doors.**

They can be made from different materials such as:

- **Timber Frame**
- **Light Gauge Steel Frame (LGSF),**
- **Precast Concrete Panels and Structurally-Insulated Panels (SIPs), or**
- **Cross Laminated Timber (CLT).**

Figure 4: Panelised unit'



Pre-manufacturing assemblies and sub-assemblies (category 5)

This applies to:

- **partition wall systems,**
- **weatherproofing or insulation roofing finish assemblies, and**
- **non-load-bearing volumetric assemblies known as 'pods', often used for kitchens and bathrooms.**

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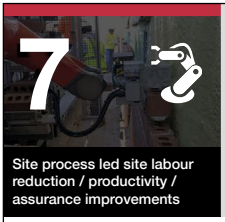

Innovative site processes and approaches (category 7)

This includes drones, robotics, and insulated concrete formwork. These methods improve onsite construction.

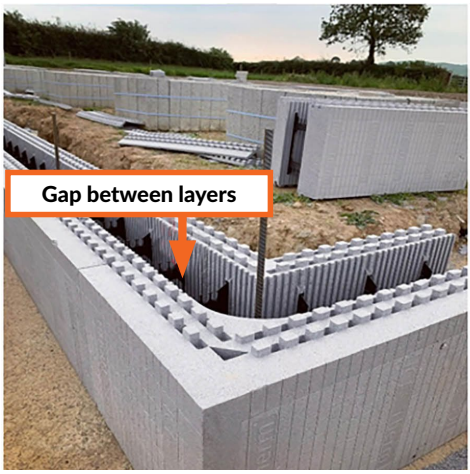

Figure 5 (left):The external wall of an Irish house under construction onsite. It uses Insulated Concrete Formwork (ICF). The builders will fill the gap between the two layers with reinforced concrete.

Figure 6 (right): View of this external wall after the reinforced concrete has filled the gap, using Insulated Concrete Formwork (ICF) onsite.

This category of MMC uses innovative construction techniques that improve on site processes.

Examples of category 7 MMC include:

- **weatherproofing,**
- **standardised works (such as insulated concrete formwork – a mould to form and pour concrete),**
- **virtual models of buildings (Building Information Modelling (BIM)),**
- **using technology such as augmented and virtual reality to visualise planned and final works,**
- **digital tools such as robotics, drones, driverless cranes and diggers.**

5 Compliance

Modern Methods of Construction must be high quality.

Figure 7: Completed 2D panelised system using Timber Frame

All new buildings must comply with Irish Building Regulations and Building Control regulations. For new dwellings, all key elements must have a durability of at least 60 years.

You will find more information about Building Regulations on the Department of Housing, Local Government and Heritage website. This website also contains information on regulations for the design and construction of a new building or an extension to an existing building:

https://www.gov.ie/en/publication/1d2af-building-regulations/

The Building Regulations (Part D) requires that all works should be carried out with proper materials and in a workmanlike manner.

'Proper materials' means materials which are fit for the use for which they are intended, and for the conditions in which they are to be used.

Follow the link below for full Building Regulations Technical Guidance Documents. They are available on the Department of Housing, Local Government and Heritage website:

https://www.gov.ie/en/collection/d9729-technical-guidance-documents/

Agrément Certification of MMC

Innovative systems such as MMC must comply with the Building Regulations. The process of Agrément certification applies to those products and processes which do not fall within the scope of existing construction standards, either because they are innovative or because they deviate from established norms.

The National Standards Authority of Ireland (NSAI Agrément) assesses, specifies testing, and where appropriate, issues **Agrément certificates.** This certificate confirms that new building products, materials, techniques and equipment are safe and fit for purpose in accordance with the Irish Building Regulations and with the terms of the certificate.

Certification

The NSAI offers certifications on the construction and sign-off stages for MMC products and building system installation compliance under building regulations.

https://www.nsai.ie/certification/agrement-certification/modern-methods-of-construction-certification/

NSAI also published the Agrément Guide for Modern Methods of Construction under the Housing For All plan, which can be viewed at the following link:

https://www.nsai.ie/images/uploads/certification-agrement/Guide_to_Agr%C3%A9ment_Certification_for_MMC.pdf

You can find a list of Agrément certified MMC systems here by selecting “Building Systems”:

https://www.nsai.ie/certification/agrement-certification/search-agrements-certificates/

6 Initiatives to promote MMC in Ireland

MMC Demonstration Park

A National Demonstration Park for MMC is being established **in Mount Lucas** County Offaly, at the National Construction Training Centre. The Park will showcase innovations in MMC. You can read more about this at https://mountlucas.ie/mmc/.

Construct Innovate

Construct Innovate is Ireland's national research centre for construction technology and innovation. The Centre's vision is to make Ireland a global research and innovation leader for sustainable construction, housing and construction technology.

You can find further information about the Construction Technology Centre at https://constructinnovate.ie/.

Build Digital

The Build Digital Project will transform the Irish construction and built-environment sectors. It will allow everyone involved (particularly small-to-medium sized enterprises, clients and suppliers) to develop, maintain and continuously improve their capabilities and become digitally enabled. You can read more about the Build Digital Project at:

https://www.builddigitalproject.ie/

Built-to-Innovate

Through the Built-to-Innovate programme, Enterprise Ireland is focused on improving productivity and innovation in housebuilding. This includes increasing the use of MMC. You can read more about Built-to-Innovate at:

https://www.enterprise-ireland.com/en/funding-supports/Built-to-Innovate/

Acknowledgement

The UK Ministry of Housing has published a Joint Industry Working Group MMC Definitions Framework, which we have referenced in developing this guide. It is available at the following link:

Modern Methods of Construction working group: developing a definition framework – GOV.UK (www.gov.uk)

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Figures 1 and 4 provided by Framespace Solutions Ltd.

Figures 5 and 6 provided by Castleforms Ltd.

Figure 7 provided by Cygnum Building Offsite

i https://www.gov.ie/en/publication/ef5ec-housing-for-all-a-new-housing-plan-for-ireland/

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