





NBCO CPD - Modern Methods of Construction: Light Gauge Steel Modular Systems for Smarter Building Solutions

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- Our Processes
- Testing and Analysis
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# About us

- Framespace Solutions were set up in 2016
- We are based in Longford, Ireland.
- We Design & Manufacture Light Gauge Steel building systems for the Residential & Commercial sectors in Ireland in 2D and 3D Solutions



## What we do

- 2D Panelised System (Category 2): Closed Panel System assembled in the factory with an enclosed LGS structure, insulation and protective sheathing layers
- 3D Volumetric (Category 1): Modules providing at a minimum a weather tight unit with or without external and internal finishes, internal fit out fully completed offsite.



#### 2D Closed Panel +> 3D Volumetric

- PMV 30-40%
- Fit out Completed Onsite
- Flexible Solution as it can be incorporated at later stage of design process
- Cost and Programme Certainty when it comes to Frame and Façade of buildings
- Fit out still to be completed as site activity.



- PMV +90%
- Fit out Completed Offsite
- Early Engagement/Consideration Important Needs to be considered early as part of design.
- Cost and Programme Certainty High level of cost and programme certainty. With civils and substructure, the only site activities.



### Design & Build Workflow

We operate with fully digital workflows from design to handover

- Design Coordination and Development completed with 3D Models
- Deep analysis and control of all aspects of our manufacturing operations
- Industrial best practice built into all software



### Factory Production Control

WrxFlo System utilized for Digitized Factory production Control:

- Latest Manufacturing Information and Drawings available in Realtime
- Manufacturing Quality Checks and Passports
- Warehouse Management Tracking Material Consumption and giving Full Traceability on all components within each panel and module.
- Project Scheduling and Planning built into Platform for each Project.



# QA/QC Systems

- Project Specific Inspection and Test Plan Developed and Agreed for each project prior to commencement.
- ✓ Factory Checks carried out on WrxFlo
- ✓ Quality Passport Produced for each panel
- ✓ 100% traceability of every profile manufactured in our plant
- ✓ Site and Install Checks carried out on ACC Build

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# Installation Process

- Panels are delivered on stillages, arranged to match the installation sequence.
- A suitably sized crane lifts the panels and modules into position.
- The installation team consists of a mix of direct employees and a select number of trained third-party subcontractors
- Framespace Project and Site Management oversee and supervise the entire installation process.





# Testing and Analysis Structure (Part A)

- All elements of the structure are designed for project specific conditions such as location, building height and elevation.
- Designed and Certified by a competent qualified structural engineer.
- All LGS and HRS elements are all modelled inhouse using 3D steel detailing software.





# Testing and Analysis Fire (Part B)

- We have carried out a full suite of Loaded Fire Testing on our System (External Wall, Compartment Wall, Compartment Floor, Load-Bearing Internal Walls).
- Covering 30min, 60min and 90min fire resisting requirements.
- We do not rely on any 3rd Party Assessment of our system.





### Testing and Analysis **CWCT Testing**

- Full scale CWCT test carried out on external wall build-up.
- Testing for:
- o Air Permeability
- Weather Resistance (Dynamic Water Resistance)
- o Wind Resistance
- Hard and Soft Body Impact Testing





# Testing and Analysis Hygrothermal Testing

- Testing involved :
- Subjecting the sample to repeated heat/rain cycles followed by repeated heat/cold cycles at controlled humidity conditions designed to simulate naturally occurring condition
- Post weathering cycles Bond Strength and Impact Testing was carried out on the panel finishes.

AIRO Report No. L/3506

Sound Reduction Index (R) according to BS EN ISO 10140-2:2010					
Test No.	L/3506/21			Date of Test:	
Client:	Framespace	e Solutions Ltd			
Specimen:	Wall Panel – Wall No. 10WD				
Installed by: Framespace Solutions Ltd					
Specimen are	ea: 8.77 m²			Mass per unit	area: 47 kg/m²
Chamber C	onditions	Volume	Air Temperature	Relative Humidity	Air Pressure



# Testing and Analysis Acoustic (Part E)

- Suite of Acoustic Lab Tests carried out during system development.
- Acoustic Testing carried out in line with Part E requirements for projects.
- Significant amount of site test data completed to date verifying the acoustic performance of the wall and floor build-ups.







#### Testing and Analysis Fabric Performance (Part L)

- Full suite of thermal models complete on 2D and 3D Junctions
- Hygrothermal Analysis has been carried out on the Floor, Wall and Roof Build-Ups.
- Achieve an average air tightness of 2m3/hr/m2.





### Certification

- CE EN 1090 Certified
- NSAI Agrément Certified to construct buildings up to 20m to the top floor
- UL Certification for External Wall Build-Up.
- ISO 9001 Certified

Certifica	te for the UL Mark – Performan	ce of Curtain and Clade	4705
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asomer Address:	Agnarao, Longford, Ireland, N39E337	Address	Telford Shropshire TF7 4QH
L cheme:	BSFO - Performance Cladding and Cladding Support Systems Issue 2	Certificate Number:	R40892-1
ate of ertification ommencement:	26 <sup>th</sup> April 2023	Date of Certification Expiry:	25 <sup>th</sup> April 2026
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#### SCOPE

This Certificate relates to the Framespace LGS Building System, for the manufacture and erection of structurel cold-formed Light Gauge Steel (LGS) Frame Buildings. The Framespace Solutions LGS Building System is certified to be used in the following purpose groups: 1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a) and 5 as defined in Technical Guidance Document B of the Irish Building Regulations 1997 and subsequent amendments.

The system is used for structural walls and floors in the above purpose groups where the height to the upper floor surface of the top floor is not more than 20m from ground level on the lowest side of the building, and where the full structure is designed, manufactured, supplied and erected by Framespace Solutions Limited. The system may also be used to construct the upper storeys of a concrete or steel framed building where the height of the complete building to the upper floor surface of the top floor is not more than 20m in height. The system can accommodate a wide range of custom designs.

The Framespace Solutions LGS is also approved for use in non-loadbearing infill panels. The infill panels are used within reinforced concrete, steel frames and traditional construction that possess their own independent lateral stability systems.

Readers are advised to check that this Certificate has not been withdrawn or superseded by a later issue by contacting NSAI Agrément, NSAI, Sentry, Dublin 9 or online at <u>http://www.nael.in</u>

### Case Study: NSAI MMC Ancillary Certification Process

- In 2024 Framespace was awarded NSAI's first MMC ancillary certification for a 2D panelised Light Gauge Steel modular building in Harolds Cross, Dublin.
- This offering was developed by the NSAI to help support the delivery of government's Housing for All initiative with the use of MMC.
- Supporting project design teams and Assigned Certifiers with the inspection and certification of MMC Systems that hold an Agrément Cert



#### Case Study: NSAI MMC Ancillary Certification Process

Process involved rigorous NSAI assessment, including:

- Desktop study of the manufacturing and construction drawings
- Inspection of the ongoing offsite manufacturing and installation of LGS and façade processes
- Assessment of site preparation, prior to assembly onsite
- Inspection of the LGS internal and external finishes









Design & Engineering Precision Manufacturing Installation & Assembly Fit Out & Handover



#### **Construct Innovate Associate Member**

- Awarded 2 Construct Innovate Seed Fund Projects in 2024 in collaboration with University of Galway
- Ongoing Research Projects:



Reducing Embodied Carbon in the Manufacture of LGS Modular Construction



Optimizing Slot and Stud Panel Connectors for Light Gauge Steel Framing Systems: Development and Testing









# Embodied Carbon Study on **3D Modular Houses**

Light Gauge Steel: GWP Results per LCA Stage:

	Building life-cycle stage		GWP, kgCO2e	GWP intensity, kgCO2e/m2	Stage contribution % for A1-C4 GWP
Product stage	A1-A3 Extraction of raw materials – Their transportation to manufacturing plant – Manufacturing and Fabrication	a) 🔅 🖬	36132.8	368.7	69%
Construct. Process	A4 Transport to project site		1609.2	16.4	3%
	A5 Construction and Installation process	A	640.1	6.5	1%
Use stage	B1 Use (Refrigeration leakage was included)	C	Excluded	Excluded	Excluded
	B4-B5- Replacements & Refurbishment		6746.5	76.0	13%
	B6 Energy use	( )	Excluded	Excluded	Excluded
	B7 Water use		Excluded	Excluded	Excluded
End of life stage	C1-C4 Deconstruction and Demolition	<b>L</b>	7304.1	74.5	14%
	Total A1-C4 (excluding B1, B6 & B7	stages)	52432.7	535	100%

Embodied carbon (Global Warming Potential) results - Breakdown per Life-Cycle Stage



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# **Case Study Projects**

- 1. URMH Modular Homes
- 2. KCR Apartments
- 3. Riverside Manor Kilcullen
- 4. Drumhierney Hideaway
- 5. Modern Methods of Construction (MMC) Demonstration Park



PROJECT NAME URMH Modular Housing

**CLIENT** Sisk / OPW

COMPLETION DATE Ongoing

SCALE OF PROJECT 166 Units full modular units

SCOPE OF WORKS Turnkey full modular construction

TOTAL GIFA Approx 90,000 sq. ft.

#### **PROJECT OVERVIEW**

The emergency project was procured and delivered in an incredibly short period of time. Some units have been manufactured and occupied within a four month window. These units are a self-contained two bedroom unit including all finishes and fixed furniture with built-in wardrobes and TV units. Phase 1 is complete. We're well underway on phase 2 a mix of two story modular three bed houses and single story modular two bed houses.

#### **JRMH Modular Homes**

# Single Store

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PROJECT NAME KCR Apartments

CLIENT Crestland Ltd

COMPLETION DATE Complete

**SCALE OF PROJECT** 15 Apartments in Dublin

#### **SCOPE OF WORKS**

Manufacture and install with a fully finished off-site 2D panelised system

#### **TOTAL GIFA**

Approx 90,000 sq. ft.

#### **PROJECT OVERVIEW**

This project involves the construction of 12 x 2 and 3 beds apartment at the entrance of KCR industrial estate in Kimmage. Our scope includes a weather & airtight frame solution, including render and brick slip facades along with the provision of bathroom pods. With concrete floors and a green roof, this project demonstrates the flexibility of our system.











**PROJECT NAME** Riverside Manor & Riverside Green

**CLIENT** Alchemy Homes

COMPLETION DATE Phase 2 Complete Phase 3 Ongoing

SCALE OF PROJECT 180 Units including housing, apartments and duplex units

**SCOPE OF WORKS** Turnkey, Design & Build

TOTAL GIFA Over 80,000 sq. ft.

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#### **PROJECT OVERVIEW**

The project involved the turnkey Delivery of 180nr homes and associated Sitework on a greenfield site. The project was constructed utilising Framespace LGS closed panel wall panels, closed panel floor cassette and 3D Volumetric roof panels. The façade was completed leaving the factory with all of the render and brick slip already installed

## Riverside Manør - Kilcullen



PROJECT NAME Drumheirney Woods Holiday Village

CLIENT King & Moffatt

COMPLETION DATE Complete

SCALE OF PROJECT 16 holiday chalets

SCOPE OF WORKS Turnkey with a fully finished off-site 2D panelised system

**PROJECT OVERVIEW** We provided the turnkey delivery of 16 high end holiday chalets in this unique development just outside Leitrim Village.

These architecturally designed units were delivered to BER "A" rating and utilise our innovative screw pile solution eliminating the need for any concrete in the delivery of the units.



#### **Drumhierney Hideaway**

#### **PROJECT NAME**

Mount Lucas - Modern Methods of Construction (MMC) Demonstration Park

CLIENT LOETB – Mount Lucas

COMPLETION DATE Ongoing

**SCALE OF PROJECT** 1 BED and 3BED full ZEB modular units

SCOPE OF WORKS Turnkey full modular construction

**TOTAL GIFA** Approx 150 sq. ft.

#### PROJECT OVERVIEW

The Modern Methods of Construction Demonstration Park aims to support the Governments Housing for All (HfA) Strategy, and the governments commitment to delivering high-quality, affordable homes to meet the housing needs of all citizens. The HfA strategy sets out ambitious targets to increase the supply of homes, improve the quality of housing, and make housing more affordable for everyone..









# Thank you!

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