

Development Finance Conference

Modern Methods of Construction (MMC)

Eco-Building & the Code



Bench Mark – Traditional Build?

Traditional Build in the UK - Often referred to as a 'brick & block' cavity wall, but in reality the first cavity wall constructed as we know it was not in evidence until the early 1920's!

(Cavity not insulated at that time).



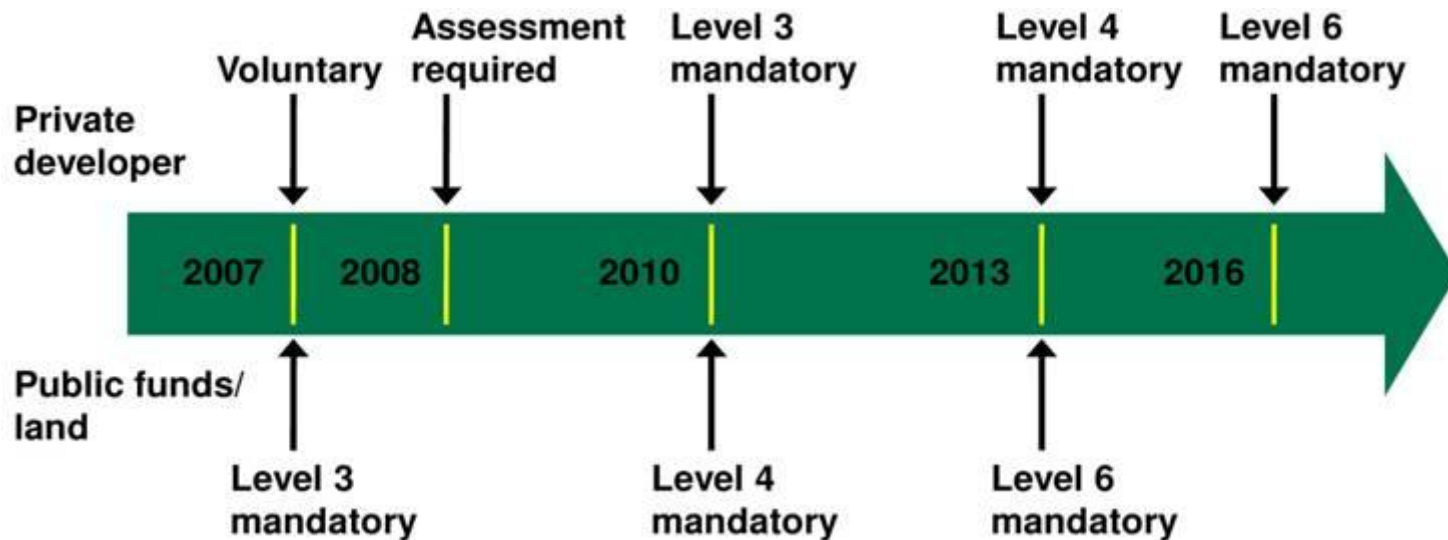
'Traditional' – Typical Example:

- Brick or Stone External Skin
- 50mm Cavity (Non Insulated Traditionally)
- Block Inner Skin
- Clay, Concrete or Slate Tiled Roof
- Internal Loadbearing Concrete Block Walls

(Foundations and Ground Slabs not Considered for this discussion)

The Code for Sustainable Homes:

Minimum Standards			
Code Level	Standard (Percentage better than Part L 2006)	Points Awarded	Additional Points Required to achieve the Code Level
1 *	10	1.2	33.3
2 **	18	3.5	43.0
3 ***	25	5.8	46.7
4 ****	44	9.4	54.1
5 *****	100	16.4	60.1
6 *****	A zero carbon home	17.6	64.9

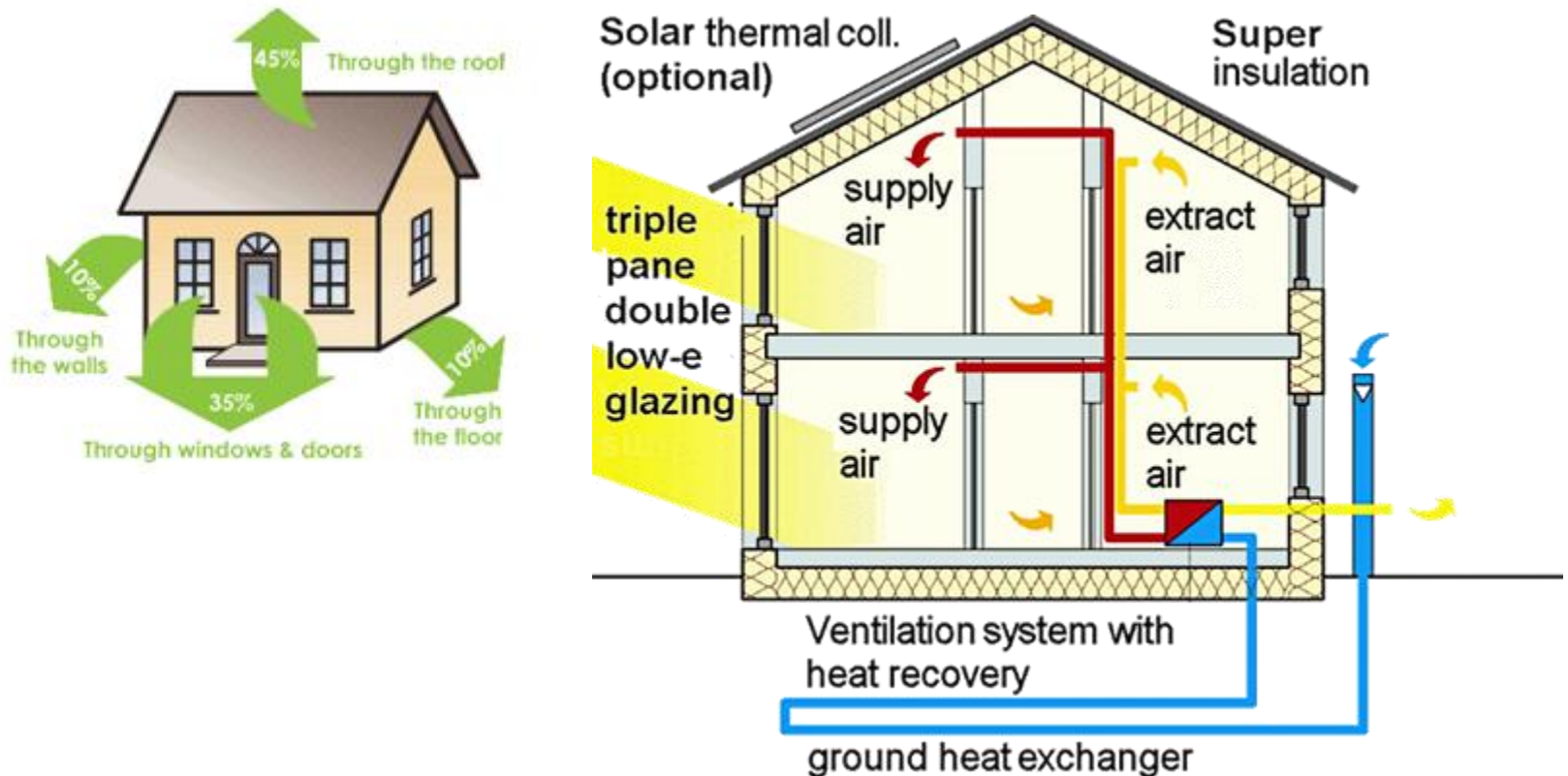


The Code for Sustainable Homes:

Categories

- 1. Energy & CO² emissions (spec)**
- 2. Water consumption (120 to 105 to 80 litres/person/day) (spec)**
- 3. Environmental impact of materials – responsible sourcing (spec)**
- 4. Surface water run off (spec)**
- 5. Waste management (design)**
- 6. Pollution (spec & design)**
- 7. Health and well being (spec & design)**
- 8. Management (process)**
- 9. Ecology (design & process)**

Passive House Standard (PassivHaus):



Passive buildings rely on high levels of insulation and tight control over airtightness – Buildings built to this standard can run effectively on low-volume heat recovery ventilations systems required to maintain air quality.

Definitions [1-3]: MMC & Eco Building

MMC

1(6). Offsite refers to modern methods of construction which has predominantly been manufactured & assembled in a factory controlled environment



2(6). Onsite refers to modern methods of construction which brings together systems or components which are predominantly assembled onsite



3(6). Eco Building (Green Building) refers to construction methods both 'modern' & 'old' that embrace ecological & environmental building techniques, which includes 'Natural Buildings'



[4-6] Systems, Components & Materials:

4(6). Systems - define methods of building or techniques which comprise the majority of a building thus defining it as a system rather than a component alone:

Timber Frame System, Steel Frame System, etc.



5(6). Components - parts of a building made up from singular or multiple materials which can be offsite or site assembled and can be used in a variety of 'System Types'

I Joists, Roof Trusses, SIP's Roof Cassettes, etc.



6(6). Materials - individual elements which combine to make component parts or full systems. 'New Materials' are being designed as single elements, components & the basis for full Building Systems



MMC [I] – Offsite / Benefits:

The 'Eternal Triangle' states that you cannot alter any one facet without it directly affecting the other two.

- ❖ Quicker = More cost or less quality
- ❖ Cheaper = Lower quality
- ❖ Higher Quality = More time and money



Offsite Production Benefits = Increased Quality and Reduced Time & Cost.

- 1) Reduced Prelims due to shorter time on site
- 2) Reduced Project Management costs
- 3) Reduced Professional Fees
- 4) Reduced Programme Times
- 5) Reduced Defects and Rework due to high first time quality
- 6) Reduced Wastage on site
- 7) Reduced Weather Dependency
- 8) Increased Procurement Strategies
- 9) Reduced Reliance on Transient Labour
- 10) Increased Health and Safety on Site

MMC [I] – Offsite Systems (Volumetric & Panelised):

1) Timber Frame:

- Closed Cell
- Filled Cell
- Open Cell



2) Lightweight Steel Frame

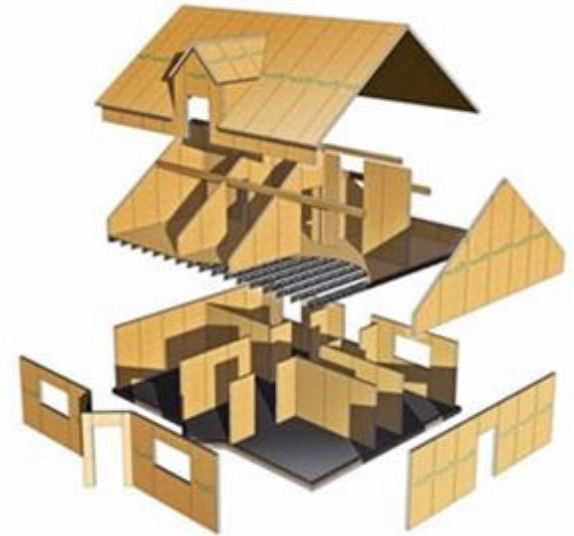
- Closed Cell
- Open Cell
- Braced Frame

3) Structurally Insulated Panels (SIP's)

4) Semi SIP's (Structural Insulation & Frame)

5) Multi-layered Engineered Timber (Solid)

6) Precast Concrete Panels



Precast Concrete & SIP's Panels



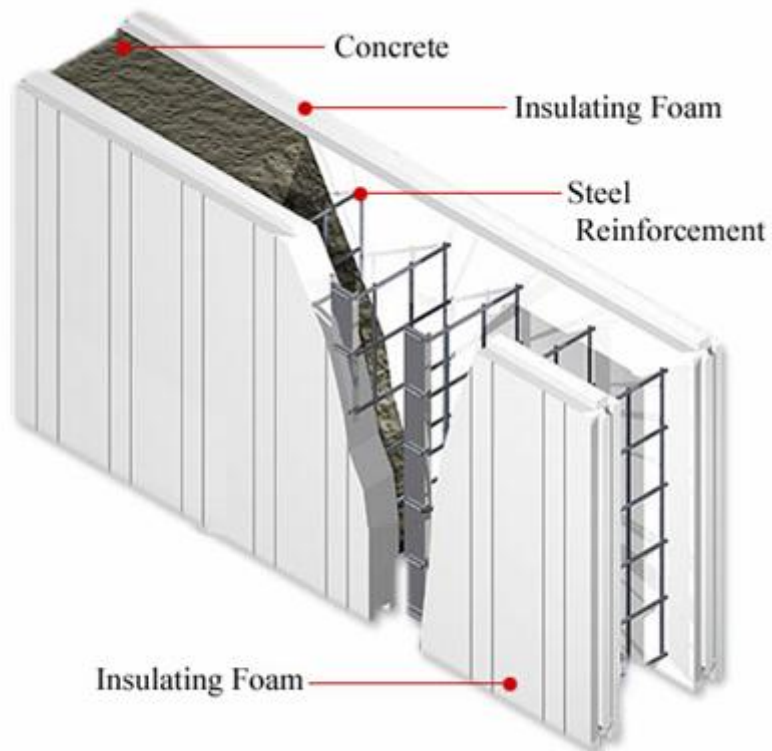
MMC [2] – Onsite Systems:

Onsite Systems comprise many methods which benefit from the use of modern materials. As the name implies, these systems are mainly assembled or constructed 'Onsite' – The methods are many and varied, the 'Systems Approach' leads to increased speed & quality.

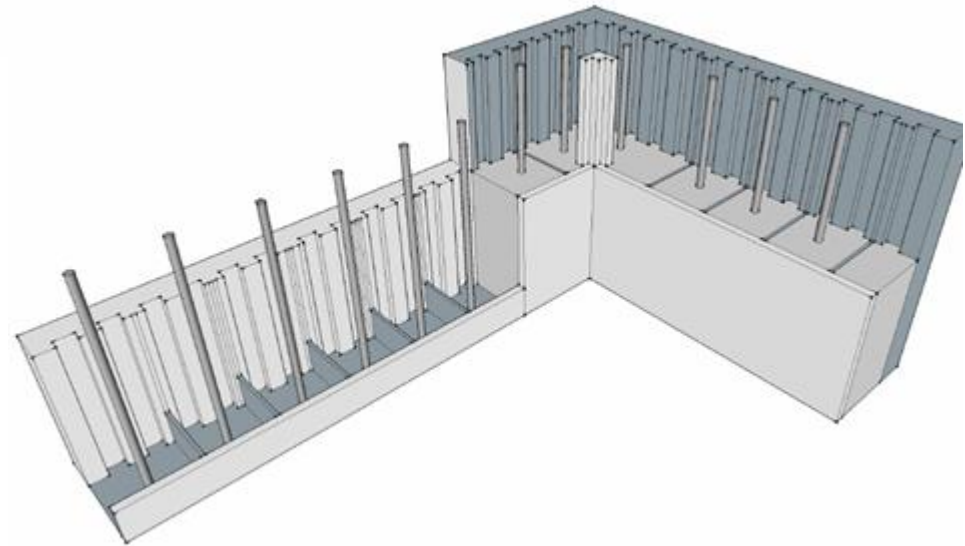
Typical Onsite MMC System Types:

- Stick Build Timber Frame
- Insulated Concrete Formwork (ICF)
- Thin Joint Blockwork / Clay Blocks
- Oak Framed Buildings (Site Assembled)
- Glulamined Framed Building (Site Assembled)





**ICF's – Insulated
Concrete Formwork
On Site MMC**



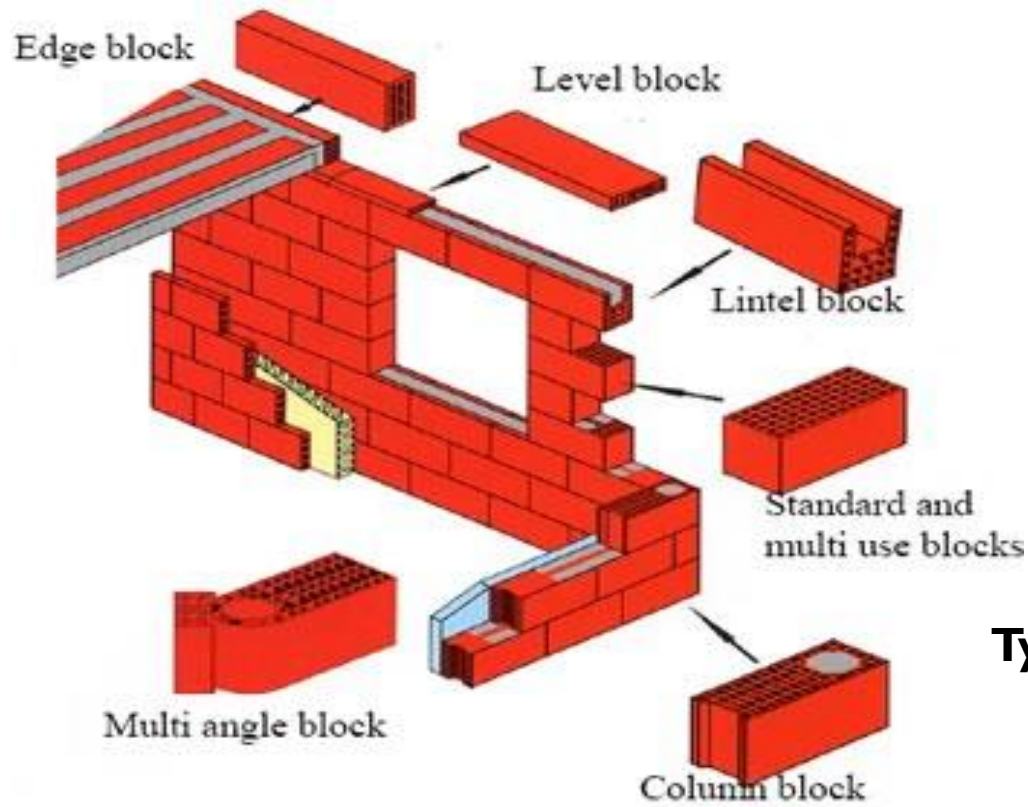
MMC [2] – Onsite Systems:

Oak & Glulam Framed Buildings – Post & Beam type systems can still be classified as MMC as often the framework is used as the Primary Structure & Insulated Panels are used to provide the walling elements.



Thin Joint Blockwork & Clay Blocks – Manufactured to high tolerances which enables very thin joints between blocks to be made - Increasing the thermal performance by reducing the joint thickness & improving Air Tightness, other benefits include increased speed on site and wastage reduction.





**Typical Lightweight Thin
Joint Blockwork
On Site MMC**

[3] Eco Building (Green Buildings):

Eco Buildings, Green Buildings & Natural Buildings – Range of Systems with a major emphasis on Sustainability using natural resources with minimal processing.

(This can include recycled or salvaged products, such as Car Tyres & Glass Bottles)

Typical Eco Building System Types:

- Subterranean
- Earth Sheltered (Bermed)
- Earth Buildings (Rammed Earth, Earth Bag, Cob)
- Hempcrete
- Straw
- Recycled Car Tyres & Glass Bottles (Earthship)



[3] Eco Building Systems Examples:

Hempcrete & Earth Buildings (Rammed Earth, Cob & Earth Bag)

Buildings constructed using natural materials such as Hemp Stalks & Lime, Straw, Clay & Sand, and Sturdy Bags filled with Sand, Gravel & Clay or materials found locally on site.



Earth Sheltered & Bermed

Can be completely subterranean or partly above ground with part or whole of the building covered with earth usually 'bermed' against the wall panel.

The type of structure can be varied depending upon the design.



MMC – [4]Systems, [5]Components & [6]Materials:

MMC is not limited to Systems, it embraces Components & Materials which make up the components themselves.

Components can form individual elements, or the assembly of many materials & Sub Components which can be used on a variety of System types previously looked at.

Typical MMC Components:

- SIP's Roof Cassettes
- Pre Assembled Roof Structures
- Pre Assembled Floor Cassettes
- I joists
- Box Beams
- Open Web Joists
- Trussed Rafters



MMC [6] – Materials for the Future:

1. There are many new materials which are being specifically designed to solve many of the problems which we now face in daily construction.
2. Technology can help with the Sustainability of new construction systems by designing new materials which are deemed 'intelligent' and can function on a number of levels.
3. There are far too many new material innovations to discuss with any detail here, but it should be realised that as the speed for change increases, so does the introduction of new materials to deal with those changes.



Regulation & Lending:

Conclusion:

- 1. As Legislation forces change**
- 2. Manufacturers continue to innovate**
- 3. Systems continually evolve**
- 4. Authorities/Warrantors become more integrated**
- 5. Training skills develop**
- 6. Lenders rely on improved overall standards**