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Buildoffsite

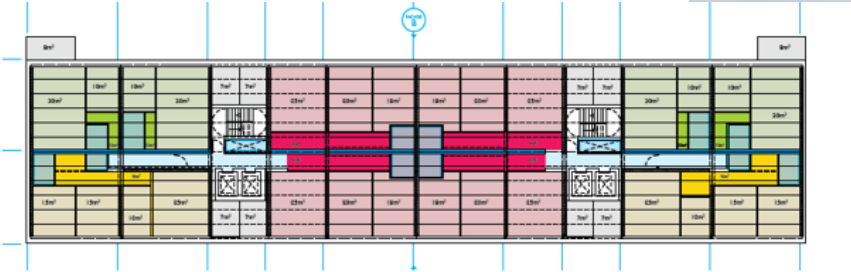
31 October 2018

"Ensuring costing is not a barrier to offsite"

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- ainea Offsite Experience
- Further Research – Knowledge Journey
- Early Experiences / Lessons Learnt
- Perception and view as ‘Cost as a barrier’
- The Future...

Relevant Experience





Can we fix the housebuilding crisis piece by piece?
September 2015

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knowledge



Residential Timber Cost Model
For Building Magazine June 2017

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knowledge

ECONOMICS

analysis / facts / forecast

CONSTRUCTION METHODS MODULAR

Modular construction is touted as the future of the building industry, but while the sector is rapidly growing in some areas, there are still obstacles to overcome. **Alex Hyams** of **Alinea**, **Ed McCann** of **Expedition Engineering** and **Hugh Ferguson** assess the pros and cons of volumetric modular offsite construction

01 / INTRODUCTION

Is modular construction the future for the UK building industry as its supporters have long maintained, or is it a hopeless effort to translate factory techniques into an unworkable industry? The question has divided opinion since the benefits of modular were hyped up 30 years ago.

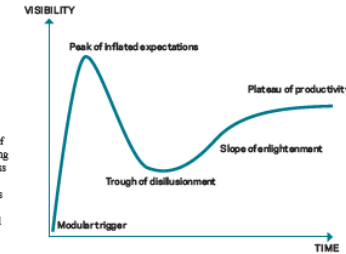
In the wake of the 1998 Egan report, Rethinking Construction, enthusiasts claimed the quality, speed and cost savings achievable with factory production of modular units offered irresistible benefits to the building industry. The anticipated revolution did not happen, and those who experimented found the benefits did not always materialise.

The pattern has all the hallmarks of the Gartner hype cycle for emerging technologies, which

shows the way technology is adopted, with the "peak of inflated expectations" followed by the "trough of disillusionment" (see figure 1). The 2016 Farner review put modular in the spotlight again as part of the solution to the building industry's ills. So is modular now climbing Gartner's "slope of enlightenment" to reach the "plateau of productivity"?

To find out, this study rehearses the potential benefits of modular construction and explores the barriers that have limited uptake of prefabrication in the UK - including a failure to understand the business model and an overwhelmingly negative public image. It examines where successes have been achieved, where they have not and where the greatest potential for future development is.

Figure 1: Gartner hype cycle, showing a technology's journey to mainstream acceptance



WHAT IS MODULAR CONSTRUCTION?

Modular construction describes substantial elements of a building that are factory-produced and delivered to site for assembly. It comes in several forms - the principal focus of this article is volumetric modular systems.

■ Volumetric modular systems - prefabrication is used to create complete 3D structural units, usually using a steel framing or light-gauge steel sections but also precast concrete, timber or a combination of these.

The modules may be fully fitted out in the factory, including services and internal fixtures and fittings. They are then driven to the site and craned into position, with combinations of modules - often stacked - used to create larger buildings.

Some volumetric modules have load-bearing walls. They rely on the wall panels for structural strength, either for vertical load bearing or for diaphragm action to resist lateral loading.

Other volumetric modules are "frame +infill", using posts and beams - typically formed from hot-rolled steel sections - to frame the units. Non-



structural infill panels are inserted between the posts to form the walls, providing greater flexibility in room layout than a solid-wall module. Floors and ceilings span to the perimeter of the frame.

■ Panel systems (or flat panel systems) - 2D panels are prefabricated, delivered to site and craned into position, then connected to form a structure. Materials are typically precast concrete, timber, cross-laminated timber or structural insulated panels. Finishes and services are usually installed on site after assembly.

■ Pods are relatively small prefabricated modules, usually fully fitted out, which may be used in conjunction with another construction method. Common examples are bathroom or kitchen pods.

■ Hybrid systems may combine volumetric or panelised systems with other precast elements and/or a primary structural frame.



Early Experiences / Lessons Learnt

- Based on schemes of a certain size / complexity ~ 100nr units +
- Majority of cases but not exclusive



Element / Description	Total (£)	£ / m ² (GIFA)	Percentage of Work (%)
Substructure	5,248,535	183	11%
Excavation; including disposal off site and 10% EO allowance for treatment of nonhazardous material (5,078m ³ @£60)			
Pilling mat; including disposal (7,357m ² @ £50)			
Bored piles; 600mm diameter, 25m deep, including setting up rig, disposal of pile arisings off site, trimming tops of piles, pile / integrity testing (450nr @ £3,750)			
Reinforced concrete to pile caps; including reinforcement, formwork and blinding layer (2,002m ³ @ £520)			
Reinforced concrete to ground slab; 350mm thick, including insulation, reinforcement and formwork (7,357m ² @ £200)			
Allowance for lift pits (6nr @ £7,500)			
Below ground drainage (7,357m ² @ £45)			

Reduced level of cost detail vs Traditional



Section 2 - Summary of Key Elemental Costs - INTERNAL USE ONLY

No	Project	Scheme Details and Price Basis				Design and Bill Mix						Area Metrics				Net	Apptment	
		Location	Cost Basis	Date	TR	Value	Struct (%)	Inst (%)	Adhesive (%)	Intermedia (%)	Other (%)	MA	GA	NetGross	Net			Apptment
1	125-127 Warwick Street	W11	Stage E	2013	2007	£1,800	8	15	0	0	0	16,549	-	16,549	20,715	70%	£14	£17
2	22 Redway Road	W2	Final Account	2011	1361	£100	7	119	0	0	0	84,519	-	84,519	10,700	63%	£107	£59
3	Greenwich Peninsula - Plot 104	SE10	Stage C	2013	2007	£100	31	277	101	0	42	76,453	116,470	192,923	227,548	76%	£145	£29
4	21 Camden Road & 10-12 St Pancras Way	WC1	Stage C	2013	2112	£1	7	107	47	0	38	43,267	61,270	124,496	143,620	67%	£179	£44
5	Kingston Riverside - Phase 1 & 1A	KT2	Contract Sum	2012	1,900	£100	14	93	0	0	0	73,480	-	73,480	86,261	69%	£142	£58
6	Manorham Loft Gardens	E20	Stage D	2013	2080	£1,000	40	348	0	0	0	195,900	-	195,900	243,511	74%	£172	£148
7	South End Road, Egham	TW20	Feasibility	2013	2040	£750	10	207	0	0	0	142,847	-	142,847	179,648	69%	£120	£76
8	Three Mills West, Stratford	E15	Feasibility	2013	2066	£1	26	147	14	0	0	97,698	10,851	108,549	136,773	79%	£149	£74
9	Harold Road - Phase 1 - Phase 1	EC1	Stage C	2013	2046	£100	14	374	44	0	100	189,361	40,247	199,608	244,896	78%	£146	£80
10	Harold Road Residential	W13	Contract	2012	1,900	£1,000	8	4	0	0	0	4,209	-	4,209	4,572	48%	£225	£147
11	Pulton Place	W10	Final Account	2012	1,900	£1,000	6	11	0	0	0	8,805	-	8,805	12,440	70%	£134	£106
12	Riverside Square - Brook Street	W15	Cost Plan	2012	1,900	£10,000	7	6	0	0	0	11,233	-	11,233	15,577	43%	£256	£94
13	Riverside Square - Phase 1B	W10	Final Account	2011	1,900	£1,000	5	4	0	0	0	5,554	-	5,554	4,148	74%	£227	£118
14	Barbours Place	W11	Cost Plan	2013	2112	£1	11	142	0	0	0	141,813	-	141,813	187,420	76%	£194	£228
15	21-23 Queens Road	SE1	Contract	2013	2066	£1,000	8	10	0	0	0	9,084	-	9,084	14,200	64%	£222	£140

Requirement for data, data and more data

Capital cost increases vs Traditional



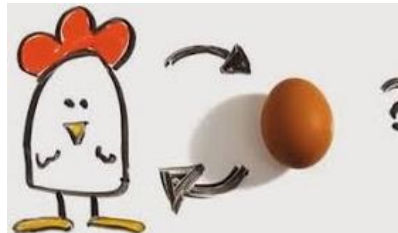
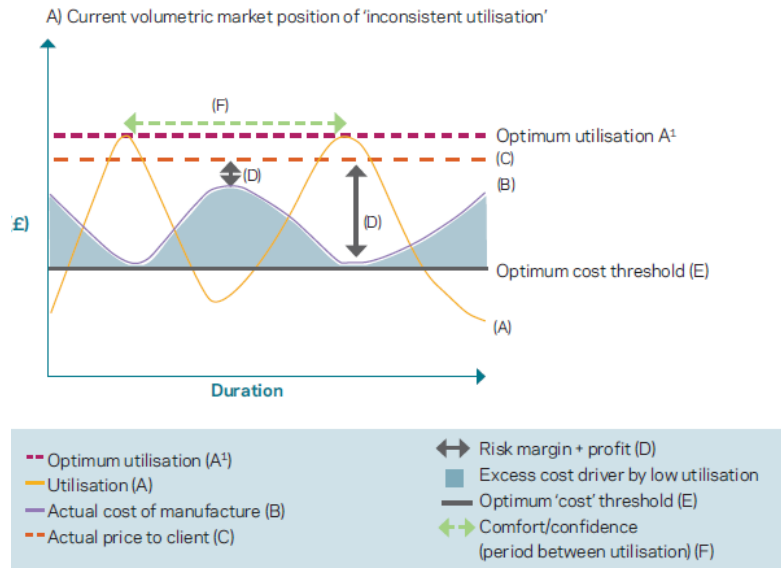
Barriers to Implementation

- **Cost**

“Some areas of the market have seen savings over traditional **BUT** for mass market, BTR, prime etc costs remain higher”

Why?

- Large Initial Investment > High Overheads > Needs High Utilisation to keep unit costs low
ISSUE: Control of Supply - unlike car factory – manufacturer far removed from ultimate client



- Other Factors Driving Cost Increases

- Supply limited market driven by..
- Lack of **Competition**

- **Change in mentality / realistic Expectations**

“Adopt manufacturing mind-set not a construction mind-set for offsite”



“ How much am I paying for the seatbelts please?”

“ I'd like my car in red with cream leather seats”



What elements do clients actually want to change?

- Façade
 - Kitchen
 - Finishes
 - Lighting / Specialist MEP
- ALL ABOUT PRODUCT

Therefore agree lump sum for modules:

- Structure
- Install
- Delivery
- Profit
- Overhead

NO FURTHER INTEROGATION

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