Powerwall
Space Frame Systems Ltd

ASSIST

HOUSING INNOVATION SHOWCASE 2012
affordable ^ sustainable ^ construction

POWERWALL SPACE FRAME SYSTEMS LTD / ASSIST ARCHITECTS

Volumetric Space Frame
Block 1
4 x 2 Bedroom Cottage Flats

The Powerwall units at Kingdom Housing Associations Showcase Project in Dunfermline were constructed and fitted out within the Powerwall factory in Wishaw to an extremely advanced stage of construction (over 90% complete) prior to being erected on site.

The Powerwall system is flexible and true to the architects design and in the case of this project a semi-detached two storey block of cottage flats for Kingdom Housing association.

A partnership project between

kingdom housing association

Fife Council

Fife Housing Alliance

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Powerwall had already developed a design concept for cost high performance, low carbon, and affordable homes and so our technology was easily transferable to this particular project.

The design team take the design and developed a modular solution which was essentially a series of structural steel sections (or Volumetric Space Frames) which provided the most effective and economical way to construct the complete structure. The manufacturing programme within the plant runs in parallel with the onsite foundations and infrastructure work.

This is one of the key cost benefit elements of using the Powerwall Space Frame System – the time saving across the whole job as well as the requirement for less complex foundations for the modular system.

Benefits

Powerwall Volumetric system provides a number of benefits to both clients (developers and contractors) and end users. A summary of the key points which we believe provide a unique position over both traditional methods of construction as well as other modern methods of construction are as follows:

- A fully flexible system that is true to the architectural design.
- The ability to provide a multi-storey solution "stackable in its own right" up to 20+ storeys un-supported – and beyond this with the inclusion of a core structure.
- The system has a higher degree of independence between the structural elements and the walls, ceilings and floors act as an infill. The internal walls are non load bearing, this is where it differs from the majority of other modular systems. This provides great flexibility to customise any architectural design for any building.
- 10 to 15% (average) improvements on Current performance Standards - Thermal, Acoustic, Air Tightness etc.
- 10 to 15% reduction on Construction Costs over traditional build.
- Faster Build Times – positive impact on the overall cost of a project funding scheme
- Less foundation costs and site intrusion through innovative (relative) lightweight technology
- Reduced life costs and cost of ownership – though the use of high quality build and materials
- Reduced Energy consumption for completed buildings – providing a low carbon solution in both manufacturing process as well as in operation.*Housing Innovation Showcase is a £3.3m project that will trial different new construction technologies with a view to using the best methods and systems in mainstream affordable housing programmes.

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DESIGN OUTPUTS	PLOT 1	PLOT 2	PLOT 3	PLOT 4
	GF FLAT	FF FLAT	FF FLAT	GF FLAT
CONSTRUCTION	Structural Steel Frame (Volumetric System)			
GROSS INDICATIVE FLOOR AREA M²	77.62m2	86.35m2	86.35m2	77.62m2
AVERAGE SUPERSTRUCTURE COSTS PER UNIT (INCLUDING RENEWABLES / EXCLUDING PRELIMS)	£63,875	£60,017	£56,917	£51,775
AVERAGE M² SUPERSTRUCTURE COSTS PER UNIT	£822.92	£695.04	£659.14	£667.03
CONSTRUCTION PERIOD (SUPERSTRUCTURE)	NUMBER OF WORKING DAYS OFF / PRE SITE :	42		
	NUMBER OF WORKING DAYS ON SITE :	49		

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DESIGN OUTPUTS	PLOT 1	PLOT 2	PLOT 3	PLOT 4
	GF FLAT	FF FLAT	FF FLAT	GF FLAT
SAP RATING (BASED ON 09 SAP)	85B	85B	85B	85B
C02 RATING (BASED ON 09 SAP)	86B	89B	89B	88B
U VALUES				
WINDOWS	0.80	0.80	0.80	0.80
DOORS	1.40	1.40	1.40	1.40
EXTERNAL WALLS	0.10	0.10	0.10	0.10
FLOORS	0.13	-	-	0.13
ROOF	-	0.13	0.13	-
RENEWABLES	Air Source Heat Pump	Solar Water Heating	Not Applicable	
ELECTRICITY GENERATED	Not Applicable			
AIR PERMEABILITY (Design Stage)	2.18	2.18	2.18	2.18
AIR PERMEABILITY (Actual)	3.19	3.59	3.28	3.07
VENTILATION SYSTEM	Conventional			
BOILER EFFICIENCY	-	91.1%	91.1%	91.1%
ENERGY USE				
SPACE HEATING (KWH/YEAR)	550.54	1908.40	2060.50	1719.94
WATER HEATING (KWH/YEAR)	1573.00	1881.00	2050.00	2170.00
LIGHTING (KWH/YEAR)	376.00	395.00	395.00	376.00
ANCILLARY (KWH/YEAR)	-	250.00	175.00	175.00
TOTAL (KWH/YEAR)	2499.54	4171.40	4680.50	4440.94
ENERGY COST				
SPACE HEATING (£/YEAR)	£70.08	£64.31	£63.88	£53.32
WATER HEATING (£/YEAR)	£200.27	£63.39	£63.54	£67.28
LIGHTING (£/YEAR)	£47.89	£50.26	£45.25	£43.11
ANCILLARY (£/YEAR	£113.00	£144.83	£126.06	£126.06
TOTAL ENERGY COST (£/YEAR) EXCLUDING SAVING FROM ENERGY GENERATED	£431.24	£322.79	£298.73	£289.77

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