

OXFORD DREAMS ARE REALITY FOR FUSION

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A 50% weight saving and improved construction efficiency using Fusion's light steel framing system that lead to a 5% overall saving on the overall project costs of this 8 block student residential scheme.

The Perfect Solution

Site logistics and construction efficiency are important requirement for main contractors, and Fusion's light steel framing system proved to be the perfect solution for a difficult site next to the main railway line in Oxford. At the pre-contract stage, the main contractor, Longcross, carried out a crucial Value Engineering exercise and saved an estimated £1.1m million out of a contract value of £20 million by using light steel framing in preference to concrete for the eight student residence blocks.

The project on Castle Mill consists of six 5 storey and two 4 storey buildings in a line on former railway sidings. The original design called for Insulated Concrete Formwork (ICF), but the project was over budget, and the contractor sought to reduce foundation and ground remediation costs by using Fusion's light steel framing system. From receiving the order in April 2012, Fusion was on site only 3 months later and completed all eight blocks in only four months, a saving of an estimated three months on the ICF system.

The project provides 312 single studio flats and two person flats for Oxford University and hand over is staged between June and September 2013. The difficult site logistics meant that two buildings had to be constructed at a time using one 100 Tonne crawler crane with restricted slew over the railway line. This crane was the maximum size possible for the narrow access road to the site.

BREEAM 'Excellent'

The project achieved BREEAM 'Excellent' at the design stage, partly due to its high level of thermal insulation with a wall U value less than 0.15 W/m²K, and also to the use of onsite Combined Heat and Power Systems combined with under floor heating. The heating pipes were accommodated in a Screed-board floating floor system, placed on Fusion's light steel floor cassettes.

The build-up of the external walls consisted of Fusion's unique bonded insulated wall panels with cement particle board, mineral wool and render on the upper floors, and brickwork for the lower 2.1m. This system, combined with high performance windows, proved to provide excellent attenuation of noise from the railway lines only 10 m away, which was an important requirement of the University client. In addition, the project was designed to achieve 3 dB better airborne sound insulation than required by the Building Regulations Part E.



Aerial view of the completed project next to Oxford station



View of the Fusion framing system used in a 5 storey block



Fusion framing system during construction



Construction Details

Rapid Construction

The construction of the 8 blocks required extensive planning from a logistical viewpoint. A pair of buildings was serviced by a 100 Tonne crawler crane that had to make its way along a 2.9 m wide access road to the site. A period of 2 weeks was allowed to install the light steel framing for each building, and this required a total of only 120 deliveries of floor cassettes and wall panels compared to over 600 required by the previous proposals. The overall construction period for the light steel structure for all 8 blocks was only 16 weeks from July to October 2012.

An important part of the project was the remediation work to the ground of the former railway sidings and the re use of the slag mixed with cement as the sub base to the 300 mm deep concrete raft (the slag cement additive is itself a by-product of steel production). The safe bearing pressure after this remediation was 250 kN/m², which meant that the use of a concrete raft to support the light steel structure was viable. This saved the cost of over 500 piles that would have been required to support the concrete system and was crucial in the contractor's decision to use light steel framing.

Application Benefits

- Rapid construction system, 10 days for each block.
- Excellent acoustic insulation.
- Light weight, saving 50% on foundation cost.
- £1.1 million saving using light steel framing in a £20 million project.
- BREEAM 'Excellent' rating.

Insulated Frame

Fusion's light steel framing system consists of 90mm deep C sections in thicknesses of 1.2 and 1.5mm. External walls are manufactured with bonded EPS insulation to create a highly energy efficient and reliable building envelope. The floor joist are 254mm deep C sections that spanned up to 4m as pre-fabricated cassettes and the floor boarding and site applied screed Screedboard (a dry floating floor system with the appearance and feel of concrete) with embedded water pipes for under-floor heating.

A mock up structure was built to demonstrate to the client the excellent acoustic insulation of the light steel framing and insulated render cladding to external noise from the nearby railway lines. This was achieved by 170 mm of external mineral wool that was attached through cement particle board to Fusion's pre insulated light steel framing system.

Other indicators of construction efficiency were the reduction of an estimated 2000 deliveries of concrete to less than 200 deliveries of light steel framing, plasterboard and insulation materials, and a 70% reduction in overall construction waste (check). No waste was generated in the light steel framing package. All steel off-cuts in the factory were recycled.

Project Team

Client:	Oxford University Estate Services
Contractor:	Longcross Construction
Architect:	Frankham
Structural Engineer:	Frankham
Light Steel Framing:	Fusion Building Systems

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Fusion Oxford Case Study

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