

An innovative building concept using composite floors and light steel framing was demonstrated in this Thames-side residential building, in which there was a requirement for light weight and creation of open plan space.

Quality Apartments using New *Metframe* Flooring System

Light Steel Framing



Tunnel Wharf is one of the largest buildings constructed using *Metframe*. A lightweight structure was required to minimise the loads on Brunel's railway tunnel beneath.

Structural engineer turned developer, Bryn Bird, wished to demonstrate his concept of a lightweight composite flooring system, developed with colleague Bernard Sanders, and turned to Metsec to realise his ideas. Tunnel Wharf in Rotherhithe, East London is the site of Bird's mixed commercial and residential development, which was made technically more demanding by the adjacent tidal Thames and Brunel's 1840's railway tunnel beneath.

The 8-storey building comprises 11 apartments and a penthouse in which the Bird family will live. The ground floor is for offices and possibly a restaurant, and below is a half basement car park. The high quality apartments range from 100 to 220 m² floor area in 2, 3 and 4 bed configurations.

There was a requirement for a lightweight structure to reduce the loads on the foundations, yet the super-structure was supported on a concrete transfer slab. The walls comprised pre-fabricated load-bearing panels from the

Metframe system, with intermediate hot rolled steel beams and columns.

The innovative flooring system, *Conform*, used standard Metsec joists with a concrete topping supported by thin steel 'pans'. The advantage of this system proved to be a lightweight structure, but with floors having sufficient mass to achieve excellent acoustic insulation and robustness to impact. Spans of 6.5 m were achieved with a single temporary prop, or 5 m when unpropped. This gave the apartments a light, airy feel and, internally, the individual rooms could be easily fitted-out.

The complex curved walls and raking façades stretched the innovative design concept to the limit for this £3 million riverside development, but the end result is a lightweight building with open, adaptable space. It is one of the largest buildings constructed using *Metframe* and extends the use of light steel framing into medium-rise apartments.



Pre-fabricated wall panels

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Technical details

Light Steel Framing

Application benefits

- Robust structural system
- Fast construction for this inner city site
- Innovative flooring system
- Open adaptable space
- Good acoustic insulation
- Light weight relative to reinforced concrete

Project data

Contractor/Developer
Tunnel Wharf Developments

Architect
CZWG Architects

Structural Engineer
Alan Conisbee

Services Engineer
Max Fordham

Constructor
Ellmer Construction

Light Steel Framing
Metsec Framing

Construction details

The *Metframe* system consists of 150 mm C section wall studs pre-fabricated into storey high panels. The steel thickness varies from 1.6 mm at the upper floors to 3.2 mm at the heavily loaded ground floors. The 'Conform' flooring system comprises 185 mm C section joists supporting a 120 mm deep steel 'pan' placed on the bottom flange of the joists. This 'pan' acted as permanent formwork to the thin concrete topping above it. The overall slab depth was 220 mm. Reinforcing bars were placed parallel to the joists to provide the necessary additional load resistance and fire resistance. Spans of up to 7.2 m were achieved in a prototype construction built before the project started. This project is the first example of this innovative flooring system.

Metframe uses the steel detailing package, *Strucad*, to draw, detail and fabricate the super-structure, which also included many hot rolled steel components. The raking façade on one side of the building proved to be demanding, as did the 2-storey penthouse with its curved infill panels.

External steelwork supported 4 or 5-storeys of brickwork on the south and east façades, allowing the ground floor to be fitted-out for commercial use. Elsewhere, zinc cladding was fixed to timber and was supported directly by the wall panels by screwing through the *Celotex* insulation. Steel stairs were also supplied by Metsec, which facilitated early fit-out.

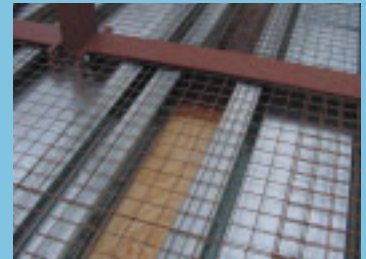
The floor and wall structures achieved excellent acoustic insulation, higher than the standard of the Building Regulations. A raised floor permitted service pipes and cables to be located on the floor slab, minimising holes through the slab.

The cost breakdown for this project is consistent with the complex nature of the site and the high quality of the building.

Cost analysis

COMPONENT	COST (£ 000)	% OF TOTAL
Frame, floors, stairs	422	14
Cladding & roofing	563	19
Services (M & E)	503	17
Internal fit-out	801	26
Foundations/podium	427	14
Site preliminaries	288	10
Total	£3,000	100%

Total floor area 1,000m² approx.



Detail of *Conform* flooring system



Metframe panels during construction

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Publication P328

Silwood Park, Ascot
Berkshire SL5 7QN
United Kingdom

Tel: (01344) 623345
Fax: (01344) 622944