Meeting the student deadline

Completing student accommodation in time for the start of the academic year meant steel was essential to enable fast-track construction

Text by Pamela Buxton / Picture by Daniel Hopkinson

Driving student housing to the tightest time scale means the use of steel is often vital to achieve the outcome. Ducie Court, a substantial first-floor develop-

ment of student accommodation in Manchester designed by Howard de Paris, was no exception.

The result of a building designed with a mid-term lease for a group with red brick cladding to give it a robust character. The first phase has been completed in time for the autumn term and is now fully-occupied.

Worthington Properties - who were initially approached by the then owner to convert the existing building on the site - a Victorian school turned homeless hostel – into student accommodation, to react to a new traditional arrangement of buildings around a court and the need for a strong sense of identity.

"Worthington’s were very keen that it be a building of quality and permanence," he says, adding the programme was "incredibly tight".

This time pressure made steel (supplied by BD Structures) a natural choice, especially given that the building rises to nine storeys and is extensively glazed.

"Speed was a big issue with Worthington Properties de-

veloper, says Peter Ward, partner at engineer Fair-

hurst. "A timber frame was not an option, and concrete was too expensive."

"A lead in time of just five to

six weeks is very quick for the size of the project," says BD Structures managing director Chris Heys. "Fairhurst provided very good information to us and helped us deliver so quick."

The structure is a relatively straightforward main steel frame without concrete shear walls, fully-diagonally braced and with a composite metal deck floor. There was more complexity in concealing the steel frame and the brick sides. Agreements were pre-cut in the steel and diff-

erently assembled to enable the distribution of services throughout the building.

"Most of our schemes are built in steel," says Russell Worthington, development director of developer Worthington Properties. "Concrete is far too slow. Steel frame is all to do with speed."
In association with The British Constructional Steelwork Association and Tata Steel.

Grater London

Rogers Stirk Harbour's Leadenhall, the latest addition to London's high-rise landscape, is being largely prefabricated off-site.

Leadenhall, also the Cheesegrater, is going up fast in the City of London at a rate of approximately seven floors per month. At 225m tall when completed in 2014, it is the second-tallest building in the City after the Walkie Talkie. Designed by Rogers Stirk Harbour + Partners, the office tower will not break any height records, but it is remarkable for the unprecedented scale of its use of a “tube” structural perimeter envelope with an external support core.

Leadenhall comprises a tapering, polygonal-trussed diagrid structure containing the office floors along with a northern support core, which houses all service and goods lifts, services, and an underground car park. Office floors are connected to the northern core via a self-supporting core.

The main structure is set out on a grid of 4.8m, creating clear and flexible space that would be impossible with a conventional internal core—only six internal columns are required. Designed to optimise the internal use of the building without the need for further structural columns.

The main structure is divided into eight structural levels, each containing seven floors, apart from the first which has only five floors.

The main structure’s steel diagrid is divided into eight structural levels, each containing seven floors, apart from the first which has only five floors.

The diagrid is composed of a self-supporting core and a structural external framework in a very strong way, “says Young. “The challenge has been dealing with the big loads within such a slender structure."

The architect worked very closely with engineer Arup and steelwork contractor Watson Steel Structures to design and deliver the optimal solution. "We wanted to express the structural diagrid as a design and deliver the optimal solution. With very few nodes on the core construction, it is very much an assembly process. Within one month we assembled the 60-800 tonne required for the structural diagrid."

For fire protection, the whole structure is sprayed prior to site assembly with a marine-standard, epoxy intumescent coating in layers of 3-12mm, giving 90 minutes fire protection. When complete, the structure will contain 500 tonnes of paint.

The 16,000-tonne steel superstructure is expected to complete by February. For Watson Steel Structures, the challenge has been meeting the stringent fire regulations and ensuring that the steel could be assembled on site within the six-month programme.

"We have a very close collaboration between Watson Steel Structures, Laing O'Rourke, Arup, Rogers Stirk Harbour + Partners and ourselves, working very much as a joined-up team," says Peter Emerson, managing director of Watson Steel Structures.

The expressed triangulated mega-frame is divided into eight of what the design team terms mega-levels of 28m high, each containing seven floors, apart from the first which has only five floors.

Designed by architect Andy Young, the development of the external mega-frame allowed the creation of a non-standard plan, which creates a generous public space at the base.

"To do the strip building of this type to have a tiny urban gesture," says project architect Andy Young, adding that this ground-level amenity is a contrast to most tall buildings where the gestures are more about the skyline than the streetscape.

"We are making the diagrid terminates at ground level, which means there is a central column and that is an opportunity to accommodate the focal point at the entrance," says Peter Emerson of Watson Steel Structures.

Leadenhall will provide 750,000m² of office space over 42 floors.

PROJECT TEAM

Client  British Land
Architect  Rogers Stirk Harbour + Partners
Engineer  Arup
Contractor  Laing O'Rourke
Steelwork contractor  Watson Steel Structures

The north core is clearly delineated by its distinctive yellow colour.

Cheesegrater, is going up fast in the City of London at a rate of approximately seven floors per month. At 225m tall when completed in 2014, it is the second-tallest building in the City after the Walkie Talkie. Designed by Rogers Stirk Harbour + Partners, the office tower will not break any height records, but it is remarkable for the unprecedented scale of its use of a “tube” structural perimeter envelope with an external support core.

Leadenhall, also the Cheesegrater, is going up fast in the City of London at a rate of approximately seven floors per month. At 225m tall when completed in 2014, it is the second-tallest building in the City after the Walkie Talkie. Designed by Rogers Stirk Harbour + Partners, the office tower will not break any height records, but it is remarkable for the unprecedented scale of its use of a “tube” structural perimeter envelope with an external support core.

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A repository of knowledge

A new website offers a wealth of information about steel design and application

The idea is to bring it all together in one place

Content on SteelConstruction.info, which has been in development for two years, is organised by sectors and topics.

The site has a link to the winners of the Structural Steel Design Awards. There are also product and service directories, and advice on health and safety.

The site aims to keep users up-to-date on the latest research on steel design, with content on hot topics such as structural steel cut, lifecycle assessment and embodied carbon, and thermal mass (see boxes).

The British Constructional Steelwork Association (BCSA) Steel and the Steel Construction Institute (both part of the British Constructional Steelwork Association (BCSA)) have brought together all the key steel design and construction information under one roof.

In association with The British Constructional Steelwork Association and Tata Steel, the steel website has been launched with the aim of making it the one-stop shop for anything about steel construction.

The hope is to attract around 50,000 unique visitors per month to the new website, which is at www.steelconstruction.info.

Technical information available on the site explains how thermal mass works, as well as examining the relative thermal merits of steel and concrete structures.

Thermal mass Technical information is available on how thermal mass works. The site explains how the correct amount of thermal mass - can be achieved just by using a steel frame. This includes research considering the relative thermal merits of steel and concrete structures, including the optimum thickness of concrete for thermal mass in both new and existing buildings.

The site also provides technical advice on how to achieve the best acoustic performance in steel-framed buildings. Each building type on the website features five or six case studies, including details on the design and structural form. Case studies also include building companies such as Foggo Associates’ Coventry Plaza, and the St. George’s Building designed by Grimshaw Architects, both in London, as well as CSIO’s distinctive curved Maggie’s Centre in Edinburgh.

Technical advice on how to achieve the best acoustic performance in steel-framed buildings is also included on the new website. The site sets out the acoustic regulations for various building uses such as residential, schools, hospitals and commercial buildings, and talks in detail at different types of wall, ceiling and floor. There are also links to other technical resources, further reading, and CPDs.

ONLINE CPD

The site currently offers 12 online CPD courses as well as information on how to access face-to-face in-house technical seminars. Those who opt to do the online CPD must read the online module on the subject, take an online multiple choice test, which they must pass by 80%. They can then print off a CPD certificate.

“This is a much quicker way of doing CPD and you don’t have to travel, so hopefully it will become a popular part of the website,” says Beenham.

The website sets out all CPD topics available. The subscription costs £140 per year, inclusive of VAT. Subtopics include sustainable, acoustic, design for fire, and weathering steel, as well as particular topics on Eurocode compliance and steel framed hospitals. There are also links to other technical resources, further reading, and CPDs.

A new online encyclopedia for anyone designing with steel has been launched on the steel sector.

The steel website, www.steelconstruction.info, has been developed over the last two years by the British Constructional Steelwork Association (BCSA). Steel and the Steel Construction Institute, and brings together all the key steel design and construction information under one roof.

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The site has a link to the winners of the Structural Steel Design Awards. There are also product and service directories, and advice on health and safety.

The site aims to keep users up-to-date on the latest research on steel design, with content on hot topics such as structural steel cut, lifecycle assessment and embodied carbon, and thermal mass (see boxes).

The site includes an acoustic analysis of typical light steel walls.

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Each article in the Steel Insight series contains indicative prices for steelwork and focused guidance on a key market sector.

Research also shows the continuing tough state of the market, with the total value of all new orders further reduced by 9.5% in 2011. Overall, these new constructional steel multi-storey buildings is only 71% of the size of the market at its peak of 2008.

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