

# NISC



**Media hub for Soho**

**Steel extends tower**

**Sector Focus: Commercial Buildings**



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Neptune, the Roman god of freshwater and the sea is the counterpart of the Greek god Poseidon. In the Greek tradition, Neptune was the brother of Jupiter and Pluto; the brothers presided over the realms of Heaven, the earthly world, and the Underworld.

# The Stuff Of Legend

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**Cover Image**

Ilona Rose House Development, London  
 Main client: Soho Estates  
 Architect: MATT Architecture  
 Main contractor: Sir Robert McAlpine  
 Structural engineer: Tier Consult  
 Steelwork contractor: William Hare  
 Steel tonnage: 2,900t  
 Photo: Ben Burns, William Hare



The images used in this month's project features were all taken before the new coronavirus social distancing restrictions came into force. As such, some may show operatives in close proximity to each other.



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# Steel has post-pandemic attractions



**Nick Barrett - Editor**

Construction is making every effort as an industry to put the adverse impact of the pandemic-enforced lockdown behind it and to get back to as near normal as is safe. Industry bodies like the Construction Leadership Council (CLC) have produced plans outlining paths to recovery and messages about safe working practices are being spread by all trade and professional groups and larger employers.

Balfour Beatty has reported that 80% of its sites were back at work by the end of April and the focus of the recovery over the next few months is clearly going to be restarting operations safely while achieving acceptable productivity levels. Beyond that there will be a heightened focus on improving productivity and strengthening the supply chain, all issues which have been identified long before the pandemic started.

Longer term, after a year or so, the CLC in its Roadmap to Recovery asks the industry to reinvent itself to deliver better value and improve collaboration and partnership. The constructional steelwork sector stands ready to make a full contribution to achieving all of these goals and has in fact been stressing the need for improvements in these and related areas for some years.

Clients of steelwork contractors are generally highly pleased by their performance and take for granted their turning up on site when required to start speedy steel erection programmes with offsite fabricated sections arriving only as and when required. There are great health and safety advantages from using steel at any time, but they will be valued particularly in a world that is adjusting to a new normal.

The benefits of steel being a material that is manufactured offsite in controlled factory conditions is likely to become even more important to developers and designers. Few operatives are needed on site during a typically short steel erection programme so social distancing is not as much of an issue as when other materials are chosen for frames. Selecting a steel-framed building solution is generally a beneficial health and safety choice, as the steel sector's track record consistently shows.

In this month's issue we have a special focus on commercial buildings, a sector that some commentators suggest will be under more pressure than others in future. Some are even predicting the end of the office. Short term it looks like there might well be more working from home, and social distancing requirements will mean not everybody can be in some offices at the same time.

Medium to long term however it must be premature to call this the end for offices, which have been the centre of commercial activity worldwide for hundreds of years. We can expect adjustments will be made to developer's requirements and to designs, but whatever the pattern of demand the world settles down to, steel will remain the cost-effective and safest way of providing the spaces a post-pandemic world needs.



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# City of London's green tower gets the go-ahead

The City of London Corporation's Planning and Transportation Committee has approved plans for what will be the first building in London to incorporate urban greening on a large scale.

The high-rise building at 50 Fenchurch Street will incorporate extensive vertical urban greening that is designed to mitigate air and noise pollution, combat the heat island effect, improve biodiversity, and help rainwater run-off management.

Bespoke metal planters will provide support for climbing plants on the south, north and east elevations to create an expansive green *façade*. At level 10, urban greening will be provided on the roof terrace through unique sculptural elements with vertical planting and the double-height winter garden.

The building will deliver 60,000m<sup>2</sup> of office space across 35 floors and 800m<sup>2</sup> of retail space. A new Livery Hall and offices for the Clothworkers' Company and The Clothworkers' Foundation will also be built at 50 Fenchurch Street.

The scheme will also relocate the historical 12th Century Lamb's Chapel Crypt to a new location forming part of the free public exhibition at lower ground floor level.

Alastair Moss, Chair of the City of London Corporation's Planning and Transportation Committee, said: "We are proud to support world-class development – creating more great spaces for the people who work, visit and live in the Square Mile.

"The new 50 Fenchurch Street building will be of the highest quality design and has a number of innovative



features, including extensive urban greening all the way into the higher floors and a new public space. It provides a significant increase in flexible office floorspace, meeting one of the primary objectives of the City's

Local Plan and London Plan policies.

"We hope this new building will provide an example of sustainable development fit for future generations, as the City continues its pattern of sustainable growth."

## Steelwork rises for Gloucester redevelopment



Working on behalf of main contractor Kier, Mifflin Construction is fabricating, supplying and erecting 400t of steelwork for the first phase of Gloucester's Quayside regeneration plan.

The project, which is due to be finished early next year, stands on the footprint of the former Quayside House and alongside the old Gloucester Prison site.

The new building will include two three-storey GP surgeries capable of serving more than 17,500 patients, a pharmacy, office space and ground floor parking.

Gloucestershire NHS Clinical

Commissioning Group plans to replace the Gloucester City Health Centre at Rikemel and Gloucester Health Access Centre in Eastgate Street.

Phase two of the project includes a £7.5M multi-storey car park to provide 500 public parking spaces including charging points for electric vehicles.

Cllr Ray Theodoulou, Deputy Leader and Cabinet Member for Finance and Change, said: "This is a great scheme that will significantly benefit Gloucester and Gloucestershire, bringing investment and job opportunities into the city for its growing population."

## Approval granted for Lowestoft crossing

Suffolk County Council's ambition to build a third crossing in Lowestoft has received a significant boost after its planning application was approved by the Secretary of State for the Department of Transport, Grant Shapps MP.

The confirmation came following a year-long Development Consent Order process, which effectively sought planning permission from the Department of Transport to build the bridge over Lake Lothing.

Councillor Matthew Hicks, Leader of Suffolk County Council, said: "We now have the seal of planning approval to build a third crossing for Lowestoft, which is very good news.

"The crossing can make a significant difference as we continue

to invest in the area. I'm confident that people will see positive changes, from their daily commute to the wider regeneration of the area."

Councillor Hicks added: "This is a significant step forward, and we will continue to make good progress behind the scenes in these unprecedented and challenging times.

"The tender period for construction contractors comes to an end later in May and we are concluding our final business case to access the funding from the government."

Now that the Council has received permission, a report is intended to be taken to its Cabinet meeting in July 2020, so it can consider the detail of the planning details, the outcome of

the construction tendering process, the final project cost estimate and the timetable for the project.

Subject to a successful outcome

to the tendering process, the July Cabinet report will name the bridge and authorise its senior managers to choose a construction contractor.



# Temporary steel bridges reimaged for social distancing

In response to the challenge of ensuring safe social distancing at large-scale outdoor events, structural engineers Elliott Wood and reForm Architects have developed a [concept design](#) for a reconfigurable elevated steel walkway to reduce crowd densities.

Originally conceived to enhance the visitor experience at major horticultural events, the Tree Line has been reimaged as a temporary structure that can be quickly [erected](#) and demounted and can be reconfigured for use across multiple sites and different types of event.

When implemented as part of a movement strategy, it will enable one-way circulation, reduce crowd density at ground level and support the

implementation of social distancing measures.

The Tree Line is said to offer exciting new viewpoints for visitors and creative opportunities for event organisers. Inspired by the stem and leaves of a plant, the structure includes a meandering walkway with separate viewing platforms and access ramps at each end. The [design](#) is based on a [transportable](#) length, fully prefabricated offsite so that it can be erected quickly on site.

Gary Elliott, Co-Founder and CEO of Elliott Wood said: "In the short term these structures provide the events industry with a tool for reducing crowd density, longer term they add a new dimension to the visitor experience"



Nik Randall, Managing Director, reForm Architects added: "The beauty of the Tree Line is that it addresses the challenges currently faced by many events and takes that opportunity to enhance the visitor experience."

## UK's biggest road project opens ahead of schedule

The A14 Cambridge to Huntingdon scheme, said to be Britain's biggest road-building project has opened for traffic eight months ahead of schedule.

The £1.5bn scheme will transform journeys on the A14 in Cambridgeshire, shaving up to 20 minutes off journeys and strengthening links between the Midlands and the East of England, while improving access to and from the UK's largest container port at Felixstowe.

A number of [bridges](#) are included in the completed scheme, the biggest of which is the 750m-long [River Great Ouse Viaduct](#).

Working on behalf of main contractor Costain Skanska Balfour Beatty JV, Cleveland Bridge [erected](#) 6,000t of steel for the viaduct comprising 76 [main girders](#) and 800 [cross members](#).

Willie McCormick, Construction Director for the A14 Cambridge to Huntingdon Improvement Scheme on

behalf of Highways England, said: "This viaduct over the River Great Ouse, south of Huntingdon, is by far the biggest bridge on our 21-mile project. It's taken over 18 months to build, and it carries drivers over the river and floodplain."

Highways England Chief Executive Jim O'Sullivan said: "This upgrade is a key addition to our national infrastructure, better linking the North of England and

the Midlands to the East of England and to the Haven ports. It also brings economic benefits to the wider region and local towns and communities.

"Being able to open it more than six months early and on budget shows what the UK construction industry can achieve with an integrated client team, common goals and targets, and a shared vision of success."



## Go ahead given for West Midlands rail hub

The government has given the green light for the construction of a new rail freight hub on land adjacent to the M6 motorway in Staffordshire.

Known as the West Midlands Strategic Rail Freight Interchange it will link to the motorway and the West Coast Mainline.

The hub is set to be built near the village of Gailey and will allow for the transfer of goods between lorries and trains and requires the creation of a freight terminal, container storage, heavy goods vehicle parking, rail-served [warehouses](#) and ancillary buildings.

[Construction](#) is expected to start in 2021 and is currently expected to be phased over 15 years.

Preliminary works will include new roads, [bridges](#) and drainage infrastructure, extensive earthworks, landscaping and utilities works.



## NEWS IN BRIEF

**Severfield** has announced the first order for its new Severstor product line of steel-framed modules that house critical systems technology and can be supplied to a wide range of main contractors and end users. The initial order is for the supply of four modular substations to house switchgear with delivery due before the end of this year.

**Willmott Dixon** has been contracted to build the University of Lincoln's £7M agri-food research and development (R&D) facility at Peppermint Park – part of the South Lincolnshire Food Enterprise Zone (FEZ) in Holbeach. The completed building will facilitate pioneering research, skills provision and knowledge exchange for agri-food businesses across Lincolnshire and beyond.

Developer **Patrizia** has been given consent to demolish its Market Street building in Aberdeen and replace it with a new glass and granite clad [commercial scheme](#). The 'lantern-shaped' building would be only five-storeys tall at the Market Street end but gradually increase to 11 storeys – or 56.9m tall – at its south-western corner, opposite the junction of Carmelite Street and Hadden Street.

An [underground car park](#) in the heart of London's West End is set to be converted into a £150M subterranean [healthcare](#) and [entertainment](#) complex. Westminster Council has approved plans for the four-level mega-basement beneath Cavendish Square during a 'virtual' planning meeting thought to be a first for such a major project.

**BAM Construction** has been appointed to build new [teaching facilities](#) for Chorlton High School South in Manchester following a competitive tender process led by the Department for Education, under its capital framework for schools in England. The company has been appointed to develop a plot on Mauldeth Road West which is partly occupied by Greater Manchester Police dog unit and horse paddocks.

Developer **Drum Property Group** has received planning approval for its masterplan for a mixed-use transformation of Candleriggs Quarter in Glasgow's Merchant City. The £300M redevelopment plan includes [homes](#), [offices](#), [hotels](#), restaurants and a new public square delivered on the 3.6-acre city centre site.

## PRESIDENT'S COLUMN

The lockdown is starting to be relaxed and although things won't be back to normal any time soon, a lot of construction sites are open (with the exception of some in Scotland) and most steelwork contractors are working.

We all look forward to more restrictions being lifted over the summer, but I worry that The Chancellor, Rishi Sunak, has warned of a 'severe recession, the likes of which we haven't seen' and some commentators talk about 10% unemployment not just for the short term but for up to 5 years, it's important to me that we don't talk ourselves into recession.

We are seeing projects put back and a reduction in the number of enquiries. You may be interested to read that the 'Building Conference' reported a continued downward trend in both the number and value of contracts awarded in the first two weeks of May.

In the six weeks before the lockdown there was an average of 122 contracts awarded each week. In the first and second weeks of May, there were just 66 and 94 contracts awarded respectively and the value of the contracts awarded fell from an average of £2.08 billion per week to just £0.3 billion in the first week of May and £1.43 billion in the second week of May. These are grim stats but let's hope this is a more of a holding pattern and the work will flow through soon. This reduction in the pipeline of work is likely to hit the Construction industry at the worst possible time. The Job Retention Scheme is scheduled to end at the end of October just when the industry will need it.

We all have a part to play in an economic bounce-back, it's time to show our metal, that's resilience, customer and project focus and the brilliant can-do attitude of our sector. A demonstration of our flexibility and versatility which won't go unrecognised and perhaps optimistically, I hope will act as a catalyst for the kick-start.

To make matters worse the government is looking to introduce reverse charge VAT in March 2021. This unfair change to the tax system will have a massive negative economic impact on the industry and will increase the burden on business and reduce cashflow - not just in the short-term but as a perpetual effect. BCSA has been lobbying hard against this and is keeping the pressure on by writing to Mr Sunak directly, to urge this initiative gets taken off the table.

Any construction company, but particularly those who purchase high value materials and act as sub-contractors in delivering construction services, will in effect become a perpetual creditor to HMRC. They would be caught in the middle of regular input VAT being charged to them, then the reverse charge applying to the sub-contracted construction services they provide. You must then grasp the implication that any cashflow shortfall must be funded from debt, or elsewhere in an already pressurised business.

BCSA has also written to Mr Nadhim Zahawi the Minister for Business and Industry warning about the fall in the construction pipeline and urging him to proceed as a matter of urgency with the infrastructure projects promised in the budget.

These are perhaps only two of the many priorities and changes that we are facing, add to them what the new norm is going to look like. Some of these are already having positive effects. Personally, I'm finding that using technology for instance, will reduce travel and the expense of it, and the travel time spent doing something else.

Being an eternal optimist, I'm looking forward to finding better ways of working, being efficient and effective and seeing that they impact positively on all our businesses.

**Tim Outteridge**  
BCSA President



## STRUMIS launches updated steel fabrication management system

STRUMIS has released what is claimed to be its most comprehensive and feature-rich version of the steel fabrication management information system.

Known as STRUMIS V10.4, the company said this latest version demonstrates its commitment to customers' needs and expectations and also the wider global steel construction sector.

STRUMIS also said that steelwork contractors, suppliers, processing plants, as well as main contractors, will all benefit even further and increase their already significant cost and time saving benefits along with total traceability across their projects.

Steve Watson, Sales Manager for STRUMIS UK & Europe said: "In my 30 years, both using and working for STRUMIS, I can't remember a version upgrade containing so many new and exciting features, V10.4 is the most genuinely exciting release I have seen,



I've also been lucky enough to spend a little time testing V10.4 in the past few weeks and it is seriously impressive."

Chris Eaton, Product Manager for STRUMIS added: "We always aim to stay ahead of the curve with regard to new industry requirements and develop STRUMIS in-line with end user requirements along with regional and global industry demands such as BIM legislation and CE Marking to ensure our STRUMIS customers have the very best tools-to-hand in order to remain competitive. V10.4 is a result of a great deal of hard work and dedication by our expert STRUMIS developers and testers."

## Gatwick logistics park expansion gets green light



Developer St. Modwen has secured detailed planning permission for a 6,000m<sup>2</sup> unit at its St. Modwen Park Gatwick logistics park, which is 5.5 miles from Gatwick Airport.

Believed to be the largest planned unit in the Gatwick area for more than a decade, St. Modwen has revised its initial outline consent with detailed plans to create a significantly taller building with an internal height of 12.5m.

The company said the additional 4.5m height will cater to market demand, enabling more space for

warehouse racking and the potential for additional mezzanine floor space.

The new unit will have 24-hour access, seven dock level loading doors and a 50m deep secure service yard, which St Modwen said will be ideal for an airport-related UK logistics business.

Strategically located adjacent to Junction 10 of the M23, serving both Gatwick and Crawley, the logistics park also has easy access to the M25 and the South Coast.

David McGougan, Senior Development Manager at St. Modwen, said: "Our confidence in the park is clear and securing planning for a further warehouse in the area evidences this."

William Merrett, Senior Associate Director at BNP Paribas Real Estate, agents for St. Modwen Park Gatwick, added: "With Gatwick Airport just over a 10-minute drive away, this new unit will provide a prime location for a leading industrial and logistics business. We have confidence in the scheme and look forward to welcoming an occupier keen to either relocate or expand into the popular area."

## Major development for Rotherham submitted

Muse Developments has submitted an outline planning application to Rotherham Metropolitan Borough Council for the Forge Island mixed-use destination, which it said will bring both a new offer and increased vibrancy to the heart of the town centre.

Plans for the scheme include a cinema, food and drink outlets, a hotel, and a car park, with the new leisure facilities set within a public space, as well as a new pedestrian bridge connecting to the wider town centre.

Dan Needham, Development Director at Muse Developments, said: "We're at the next stage on the journey to deliver an innovative and striking scheme in the heart of Rotherham that will benefit the town



and the community for years to come.

"Forge Island will be a destination that will bring a family-friendly offer to the town, where people will be able to relax during their free time. Our collaboration with Rotherham Council is built on a shared vision, shared values, and with the goal to deliver a truly transformational scheme, and we're all moving in the same direction to bring that vision to life."

Following consent and exchange of agreements with the main anchor occupiers, it is anticipated that construction will begin in autumn 2021.

# Tekla partner with Farrat on new plug-in tool

Trimble Solutions, in partnership with Farrat, has launched a new Tekla plug-in tool, which it said will help to facilitate the efficient design and detailing of thermal break plates in steel-framed buildings.

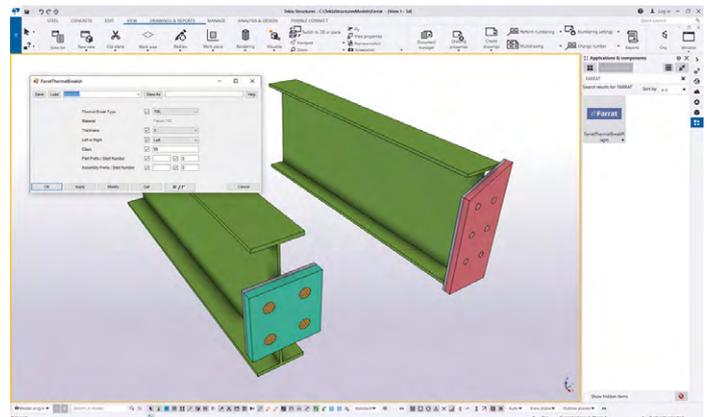
The tool, available for Tekla Structures, enables Farrat's structural thermal break plates to be incorporated directly into a Tekla user's BIM model, as well as automatically integrate with all structural attributes, scheduling, and production dimensions.

The structural thermal breaks, fabricated by Farrat at its Altrincham manufacturing facility, are designed to insulate the connections between structural components, such as steel beams, reducing

both energy loss through the building and the risk of interstitial condensation.

According to Trimble, prior to the launch of the plug-in tool, customers would have had to manually model a generic steel plate with no specific attributes and simply label it as a thermal break plate.

Steven Insley, National Sales Manager at Trimble Solutions said: "We were delighted to have the opportunity to work with Farrat on this new plug-in tool. A significant number of their steel fabrication customers use Tekla Structures as their primary design and detailing tool and, with Farrat's structural thermal breaks regularly incorporated in the main frame model, it



made sense for us to collaborate and work on combining the two."

The new plug-in tool is now available to download from Tekla Warehouse.

## New brewery planned for Scottish capital



Innis & Gunn has formally submitted a planning application for its new brewery at Heriot-Watt University's Research Park west of Edinburgh.

The project is said to be the first major

brewery in the Scottish capital for 150 years and will host a world-centre for brewing studies and applied learning in partnership with the university.

Innis & Gunn said it will be the UK's

first major tie-up between a full-scale brewery and a university. The project will create up to 30 new jobs and the firm's 45 office-based staff will relocate there from its head office in Randolph Crescent.

The brewery will include a high-speed canning and bottling line and will consolidate all outsourced production under one roof. Modern equipment and technology are intended to reduce the firm's carbon footprint by up to 30%.

Founder and Master Brewer Dougal Gunn Sharp said: "I am excited that we have submitted our planning application. This means that the project now enters

a statutory phase during which our application will be considered by the local authorities in Edinburgh.

"In normal times, we would expect this process to take three or four months. However, because of the COVID-19 situation we are not able to say how long this stage might take.

"This natural pause in the project comes at a helpful time. Right now, our priorities remain the welfare of our staff and ensuring the continuing supply of Innis & Gunn beers to our key customers in the UK and overseas, where we have seen surging demand since the start of this crisis."

## Plans revealed for Widnes leisure centre

Wates Construction has submitted plans on behalf of Halton Council for a new 4,600m<sup>2</sup> leisure complex in Widnes.

The facility will feature a 25m-long swimming pool and 100-station gym, a sports hall, squash court and soft play area, and is expected to be completed by October 2022.

The centre, designed by architects Ellis Williams, will replace Widnes' ageing Kingsway Leisure Centre.

The £20M project has been in the council's development pipeline since 2018, when it commissioned Wates to undertake a feasibility study for a new leisure centre. The scheme has since been procured via the Major Works UK part of the Scape National Construction framework.

Dave Saville, Business Unit Director for Wates Construction in the North West, said: "This leisure centre represents a major place-making opportunity for Widnes.

"Alongside Halton Council and our architects, we've thoughtfully designed this project to meet the health and wellbeing needs of as many people as possible and provide a community hub that can be enjoyed for generations to come."

Cllr Phil Harris, the Council's Portfolio Holder for Sport and Leisure, added: "The proposals are for a centre that is fit for purpose in terms of accessibility and sustainability."



"It will be open to all, with a design that is also dementia-friendly, and make a significant contribution to the health and wellbeing of our residents. We are also exploring virtual reality-related exercise in the spinning studio."

## Diary

In the current circumstances, SCI have postponed all forthcoming face-to-face courses. A programme of online courses is being arranged and will be publicised on the SCI website <https://portal.steel-sci.com/trainingcalendar.html>. The regular programme of lunchtime webinars for members will be maintained. Further details of all the SCI online events are on the SCI's website.

For SCI events contact Jane Burrell, tel: 01344 636500 email: [education@steel-sci.com](mailto:education@steel-sci.com) web: <https://portal.steel-sci.com/trainingcalendar.html>



**Tuesday 16 June 2020**

**Curved Steel**

**SCI/BCSA Members only**

There is no guidance in design standards when steel is curved on plan or in elevation, so other references must be used. This webinar will cover how steel is curved, what steel properties are changed by the curving process and how design expressions may be modified to account for the form of the member and the modified properties.



**Tuesday 23 June 2020**

**Straight to the Point: Steel design using the Blue Book**

This half day course is designed for technicians who want a practical demonstration of how to use the Eurocode Blue Book immediately to select steel members.



**Tue 7 & Thu 9 July 2020**  
**Second-order effects and Frame Stability**

Delivered in 2 sessions (2



hours per session) between 1000-1200. This course will demonstrate that second-order effects are always present, and how they are managed in design.

**Tuesday 14 July 2020**  
**Connection Stiffness**

**SCI/BCSA Members only**  
Common UK practice has been to use intuition and experience to assess the stiffness of a connection – nominally pinned or nominally rigid. The webinar



will look at the principles, the calculations and some software to draw comparisons.

**Tue 21 & Thu 23 July 2020**  
**Nominally Pinned Connections**

Delivered in 2 sessions (2 hours per session) between 1000-1200. These two sessions will cover the design of nominally pinned connections, based around the rules in the Green Book.

# Steelwork completed for Birmingham Symphony Hall extension

Working on behalf of Galliford Try, H Young Structures has completed the steelwork programme for the refurbishment of the Birmingham Symphony Hall.

Adjoining the city's large Centenary Square redevelopment programme, Symphony Hall is undergoing a major refurbishment to extend the existing foyers. This will create a new large space and a dedicated entrance from the new public realm at Centenary Square.

According to the project architect Page \ Park, the transformed foyers will also provide improved bar, catering and hospitality spaces, to help increase the financial resilience of the Symphony Hall as well as creating areas for its learning

and participation programme.

The new steel-framed [design](#) of the extension has incorporated a series of gentle curves in order to contrast with the original structure's angular geometry.

Nick Reed, Chief Executive Officer for Symphony Hall said: "This project will finally give us the foyers and public spaces to match the world-class [auditorium](#). Boasting a much-improved audience experience and a dedicated entrance, this permeable space will be energised with new artistic adventures, creating a sustainable future for Symphony Hall, and developing an audience that looks like the city it serves: young, diverse and creative."



## Contractor named for Sky expansion

Leading media company Sky has appointed ISG to build a new innovation centre at its campus in Osterley, West London.

As the latest phase in the redevelopment of Sky's campus, the new structure has

been described as an architecturally striking building that will contain wellness, [sustainability](#) and environmental performance credentials.

Occupying the site of two former buildings, that have already been

demolished, the new three-storey hybrid steel and cross laminated timber frame structure has been specifically designed to maximise natural light within the circa 23,400m<sup>2</sup> majority open-plan accommodation.

The raking aluminium and glass ziggurat [façade](#) supports a roof structure with a lightwell that will ensure light floods the full height [atrium](#), while large photovoltaic panels (PV) will generate emission-free electricity.

Targeting a [BREEAM](#) 'Excellent' rating, Sky said its new innovation centre will be delivered with a significant focus on driving down [embodied carbon](#), reducing [waste](#) through prefabrication and efficient [design](#), and ensuring materials are [responsibly sourced](#).

Steven McGee, Managing Director of ISG's London Construction Business, commented: "Sky is globally recognised as a company at the forefront of innovation, and this latest investment in spaces to inspire and nurture the creativity of its teams demonstrates the company's commitment to delivering the best possible outcome for its people and its customers. People are at the heart of the design for the new innovation centre, which is targeting a WELL Gold certification, as is consideration for the planet.

"The focus around eliminating single-use plastics and reducing carbon are key areas which could have significant positive implications on behaviours and practices across the wider industry, and we see this as a major legacy of the project."



## Redevelopment plans announced by Margate FC

Isthmian Premier League side Margate FC has announced some ambitious plans to redevelop its Hartsdown Park ground with new stands and a 120-bed hotel.

Submitted to Thanet District Council, the application has been developed in conjunction with IHG Hotels and the brand Holiday Inn Express. The club said it reflects the increased demand for hotel rooms in Thanet and will provide not only a first-class facility for football teams but also a sporting hub for the community.

The application comprises two main elements; the east stand and the north stand. The former will include the [hotel](#) together with restaurant and bar

facilities. The building will also have space for Margate FC club offices and a club shop together with the [stadium](#) control room. The stand will be all-seater and have a capacity of 650.

The north stand will be a terrace with a capacity of 1,300 and behind it, there will also be space for first team home and away changing facilities, together with ancillary spaces associated with the first team.

Speaking about the planning developments, Club Chairman, Terry Painter said: "This is an exciting step forward in the evolution of our plans to secure a long-term, sustainable and exciting future for Margate Football Club. Lots of hard work has taken place



to get us to this stage and I'm sure supporters and members of the local community will see these plans and be equally as excited as us."

"We hope our supporters can play their part in this by sending a letter of support or an email to the planning

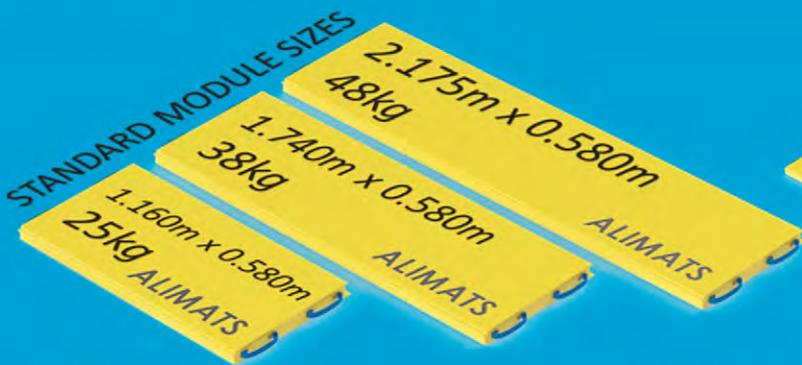
department at Thanet District Council indicating both their support and the need for this facility to allow Hartsdown Park to develop and grow. We will ensure we keep our supporters, partners and the local community fully up-to-date as we head to planning committee."

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# Aiming for zero carbon steelmaking

ArcelorMittal says it is at the forefront of an initiative to ensure the steelmaking sector achieves the Paris Agreement's environmental aspirations.

In 2015 the Paris Agreement became a landmark environmental accord with aspirations to address climate change and its negative impacts. The deal aims to substantially reduce global greenhouse gas emissions to limit the global temperature increase in this century to 2°C above pre-industrial levels, while pursuing means to limit the increase to 1.5°C. The agreement includes commitments from all major emitting countries to cut their climate-altering pollution and to strengthen those commitments over time.

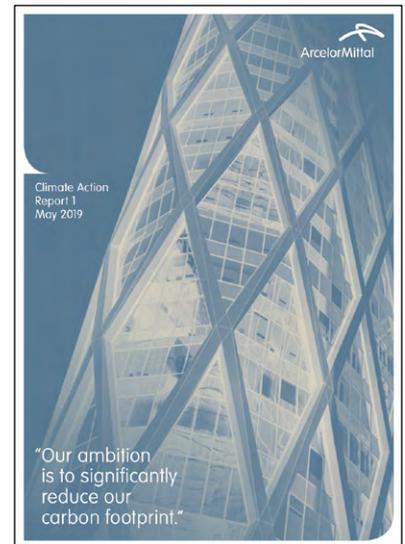
Following this, in May 2019, the UK Parliament became the first national government to declare an environmental and climate emergency, committing the UK to be carbon net zero by 2050.

Steelmaking accounts for 7 – 9 % of global CO<sub>2</sub> emissions and with demand for steel forecast to continue growing for several decades to come, the carbon challenge is significant. In the UK, the built environment contributes around 40% of the UK's total carbon footprint.

ArcelorMittal published its first Climate Action Report in May 2019 in which it outlined a strategic roadmap to significantly reduce CO<sub>2</sub> emissions by 2050 and, in Europe, to achieve carbon neutrality by this date, in line with the objectives of the Paris Agreement.

This report, the first of its kind for a steel company, includes a suite of breakthrough technologies, and has enabled ArcelorMittal to make an intermediate target of 30% reduction by 2030. The company's advancements in reducing the carbon burden of steelmaking include, in terms of circular carbon, converting waste wood into biocoal and reforming waste carbon gases. Both technologies will reduce the amount of coal and coke needed in the blast furnace and lower associated CO<sub>2</sub> emissions.

Additionally, ArcelorMittal is building a demonstration plant to both capture carbon offgases and convert them into ethanol which can then be used as biofuel. It is also developing clean power technologies for iron ore reduction using hydrogen and



electrolysis, both of which could deliver significant carbon reductions if powered with clean electricity. Significantly these technologies show that steelmaking can be zero carbon in the future.

ArcelorMittal says addressing the carbon burden in steelmaking is a long game with commercialisation not anticipated within 5 years for those most advanced technologies. However, the climate emergency is here and now, and the construction industry's design supply chain has been quick to react declaring its own climate emergency with the formation of [constructiondeclares.com](http://constructiondeclares.com).

In the UK, there are over 1000 signatories to [constructiondeclares.com](http://constructiondeclares.com) from civil and structural engineers, building services engineers, project managers and architects, all making a commitment to take positive action in response to climate breakdown and biodiversity collapse. A result of this is designers and material specifiers are seeking



Plenty of guidance is available on how to reduce operational and embodied carbon in the built environment. For details of ArcelorMittal's webinar on 9th July, e-mail: [steligence@arcelormittal.com](mailto:steligence@arcelormittal.com)

# 103 Colmore Row

When complete, 103 Colmore Row, at 26 storeys will be Birmingham's tallest office building.

Replacing the previous concrete-framed building with a steel frame including ArcelorMittal's Histar® 460 columns and clear span cellular beams enabled the integration of structure and services. Optimised floor zones reduce building height and so reduce embodied impacts associated with the building envelope, and minimise operational impacts associated with heating/cooling.

Other benefits include:

- The light footprint of the steel frame enabled reduced foundations and associated embodied impacts and allowed the reuse of existing foundations drawing a second life out of the sub-structure.
- Clear spans allow flexible use, promote building longevity and support circularity.
- Faster speed of construction was achieved through offsite fabrication.
- Lower local environmental impacts due to reduced site traffic during construction through material reduction.



103 Colmore Row will be Birmingham's tallest office block

solutions and products with lower embodied carbon now.

Alongside [constructiondeclares.com](https://www.constructiondeclares.com) other organisations such as RIBA, LETI (London Energy Transformation Initiative) and HSBC have issued guidance to designers on how to reduce operational and embodied carbon in the built environment. Key to this advice is a range of carbon targets for various building types expressed in kgCO<sub>2</sub>e/m<sup>2</sup> which reduce in line with the Paris Agreement.

For LETI there are additional targets which increase and develop circular thinking and circular systems. This approach gives targets for newbuild design in 2020 which includes 30% reused content and 50% end of life reusable content. While these targets are generally ambitious for the construction sector, steel construction is uniquely placed to answer both additional targets. HSBC lists general embodied carbon figures for a range of current steel manufacturing routes combined with additional carbon reducing techniques. ArcelorMittal says that clearly now with a range of published targets as guidance,

designers will be working towards them as part of their immediate Climate Action commitment.

The company has a clear intent to offer open and transparent data on its products and processes to support the design community in their aim to address the Climate Emergency. In offering this support ArcelorMittal has been recognised in the 2019 CDP Climate Change Assessment with an A- Leadership Level rating for its corporate transparency and action on climate change. This puts it among the top 11% within the industry and compares very favourably with a global average Leadership Level rating of C.

For day-to-day carbon considerations ArcelorMittal publishes Environmental Product Declarations (EPD to BS EN 15804) which are key to building an accurate carbon model. Its Histar® rolled sections EPD shows Global Warming Potential (GWP) of 524 kgCO<sub>2</sub>e/t (A1 – A3) with an associated +87.3 kgCO<sub>2</sub>e/t for Module D and our Heavy Plates EPD shows a GWP of 2,600 kgCO<sub>2</sub>e/t (A1 – A3) with an associated

-1,800 kgCO<sub>2</sub>e/t for Module D. The A1 – A3 boundaries represents the embodied carbon for the Product Stage (Raw material supply, Transport, Manufacturing) of the EPD with Module D representing the benefits beyond the system boundaries (Reuse-Recovery-Recycling potential). Module D highlights steel's well established and high recovery and recycling rates at the end of the building's useful life.

EPD GWP figures can be put into context with the 2020 LETI embodied target of 600 kgCO<sub>2</sub>e/m<sup>2</sup> for offices with some basic estimations. Using Histar® rolled sections and estimated quantities from the recent BCSA costing update with BCIS Steelwork indices for building works material frame make-up gives the table below.

As well as stating Climate Emergency targets for designers LETI also promotes an increasing move towards circular design. The 2020 target suggest the inclusion of 30% reused content at build stage and 50% reusable content at end of life. Steel construction is highly circular with potential for matching reused and reusable aspirations through design for deconstruction and bolted connections. SCI P427 "Structural Steel Reuse" and P428 "Guidance on Demountable Composite Construction Systems for UK Practice" will help designers to consider future targets for reuse and reusability.

|   | Steelwork design based on (kg/m <sup>2</sup> ) | A1 – A3 Histar®** kgCO <sub>2</sub> e/m <sup>2</sup> | Module D Histar®** kgCO <sub>2</sub> e/m <sup>2</sup> |
|---|--|--|---|
| Steel Framed to Low Rise Building       | 55   | 63   | -26   |
| Steel Framed to High Rise Building      | 90   | 103  | -43   |
| Complex Steel Frame                     | 110  | 126  | -53   |
| Large Span Single Storey, Low Eaves **  | 35   | 40   | -17   |
| Large Span Single Storey, High Eaves ** | 45   | 52   | -22   |

\* based on BCIS Steelwork Indices 3/52 for Building Works: 70% sections, 15% SHS, 15% plate

\*\* LETI gives no target values for single span buildings

ArcelorMittal is a headline sponsor of Steel for Life



# Adaptable steel for future buildings

The immediate future for commercial buildings looks challenging as the economy emerges from the pandemic-enforced lockdown. Nick Barrett says that the adaptability, circular economy and health and safety benefits of steel could heighten its attractions as the framing material of choice for this important sector.

The outlook was reasonably bright for commercial developers on the eve of the world heading into the hugely disruptive COVID-19 pandemic.

Although there were a few voices reminding us that good times don't last forever, and that a correction of some sort was due after years of growth in capital values and yields, the glass looked at least half full.

The amount of new office space under construction in London had hit an all time high earlier this year, with construction started on over five million square feet of office space in the six months to 31 March, according to the Deloitte Crane Survey, as developers took heart from a possible end to Brexit uncertainty. This was 41% higher than the long term average and was 29% up on a year previously. Confidence in the post Brexit London office market was proving to be higher than many had expected.

Since then, the change has been dramatic, with offices having been stripped almost bare of staff under lockdown. Cancellations of projects already underway were thought to be unlikely, but developers were hanging fire on a large number of schemes.

Architects' confidence has fallen to an all time low according to a RIBA Future Trends Survey in May. Architect workloads were 33% down on the same period a year ago. Some 39% of projects had been put on hold since March and 14% of architects had been placed on furlough.

Architects' confidence levels and workloads are traditionally bellwethers, but this time the storm arrived with the forecast, thanks to an immediate shut down of many sites. Since then the Construction Products Association and other respectable forecasters have only added to the gloomy outlook.

The big unknown now is what the speed and strength of the post crisis turnaround will be. Forecasters are almost unanimous that there will be no rapid return to previous peaks. The other major unknown is what impact living with the threat of future pandemics and the new vogue for working from home will have on commercial buildings of the future.

## Offices exert a strong attraction

The jury is out on what the long term future of the commercial office will be, with various possible trends pulling demand in different directions. Prophets of doom see everybody working at home, and insist that today's hollowed out offices will be a permanent feature. Others think that the perceived benefits to employers of having staff work from home could be shortlived, outweighed by the inherent attractions and advantages of office life.

Financial services has been a major end user of commercial developments since the 1980's, especially in London, but if even large funding deals for corporate mergers of some £30 Billion can be managed successfully by homeworkers, as has happened in recent weeks, and equities, bond, foreign exchange and financial derivatives markets can be operated by workers at home during the recent times of market turmoil, then who needs offices?

Office optimists say that relationships forged from face-to-face meetings over many years are however what gave people confidence enough in each other to become parties to these major deals and trades without direct contact. The employees involved had hard to acquire financial nous built up over years from face-to-face relationships, and would have benefitted from face-to-face training.

Younger people in particular are drawn to cities and office environments, to make themselves known to superiors and to meet other like-minded people, forging relationships that support careers and can last working lifetimes. Working in a



small bedroom in a shared flat might have only a short-lived novelty factor. Some commentators however are saying that younger people seem to be enjoying the commute-free lifestyle that lockdown has given them.

Those with more experience might fear the 'out of sight out of mind' syndrome, and worry about being overlooked by head office while languishing in the backwoods of a suburb or village.

The pull of the office is strong. Some companies are reportedly going to ask staff to spend two or three days in offices and other days working at home. In the short and medium term companies can be expected to ask some staff to stay away from the inner city offices where they are used to congregating, some using satellite premises instead and coming to the main offices only for meetings, training or occasional days. Demand for these satellite spaces may rise.

Many industries, especially financial services, have demands imposed by regulators on being able to demonstrate operational resiliency, so they have always maintained satellite offices for emergency use; these business continuity spaces might

*A new focus on healthy workspaces and the environment generally is a likely outcome of the pandemic and steel scores well on all relevant measures.*



*There is still a demand for high-quality office space as the City of London's ever-increasing high-rise cluster demonstrates*

not be needed in future if resiliency can be achieved by home working capabilities proven during this pandemic.

Other trends could boost office demand. Those companies that intend to revert to full time office working for all or most staff as soon as possible face challenges that might mean they need more office space than before, at least as long as social distancing requirements stay in force. The trend towards 'densification', where more and more people are shoe-horned into less and less space, is likely to have been reversed by the pandemic.

Hot desking might be a thing of the past. Even with staggered shifts the norm, there could be long waits to use lifts - so more lifts might be needed in future buildings. Many of the staff leisure facilities that have been provided by employers in sectors like technology - ping pong tables and gyms for example - could be redundant in a social distancing age.

All the fears and worries could of course evaporate if a vaccine or a range of effective treatments are developed soon, but working from home during lockdown has reportedly given employers pause for thought about how they use their office spaces, and how

much of it they need. Developers will respond to that, no doubt with caution at first while there is still a serious recession to contend with, but later by asking designers to come up with solutions appropriate to the new working world.

#### **Steel ideal for a social distancing world**

Steel comes into its own against this sort of background as it has proven [adaptability](#) and future-proofing characteristics, which can be seen in the completed [steel-framed](#) commercial projects in the following pages. This built in adaptability can significantly extend the life of a building as uses change, an obvious [circular economy](#) plus.

Social distancing products are becoming available daily, all of which can easily be installed in modern steel-framed buildings. Open-plan spaces may be broken up with easily installed perspex screens. Major [services are often integrated](#) within the depth of the floor zone, creating space where additional ventilation can be provided to buildings, as has been suggested might be demanded in future.

New services might have to be designed into new buildings or retrofitted; equipment is already being installed in buildings

including thermal imaging screens to detect anyone with an increased temperature.

The long spans that steel-framed buildings are renowned for are easily adapted to suit alternative, cellular layouts. Buildings that have used integrated beam construction in particular have total flexibility of layout as the flat soffit means all internal walls can be relocated or taken away, or additional walls added.

And if, as we can still hope, a vaccine is found for COVID-19 or it mutates into something more benign, a steel-framed building can easily be converted back to what it was before, or adapted further to changing uses.

A new focus on healthy workspaces and the environment generally is a likely outcome of the pandemic and steel scores well on all relevant measures. Constructional steelwork is [fabricated](#) in factory conditions where social distancing and other measures are easily supervised, and a steel-framed building demands far fewer people on site than alternatives. [Sustainability](#), or circular economy, benefits include steel's low [embodied carbon](#), and a [100% recyclability](#) that no other construction material can match.

# Commercial success stories

A steel-framed solution is the tried and tested method for creating high-rise and cost-effective commercial schemes throughout the UK.

London has traditionally seen the most activity in the construction of high-rise commercial projects. Over the last couple of years one of the most prestigious jobs to complete is 100 Bishopsgate, a 40-storey tower that incorporates a distinctive structural design.

This stand-out City of London tower transforms from a parallelogram at its base to a rectangle at the top, accommodating just over 83,900m<sup>2</sup> of open-plan floor space within its main tower and a contiguous six-storey podium.

William Hare erected 15,000t of steelwork for this project, a total which included a number of inclined columns that form the structure's sloping parallelogram façades that stretch from ground floor up to level 24.

The project team strove to achieve a high-level of excellence during the construction programme and this was recognised when Multiplex won a Silver Considerate Constructors Scheme 2016 National Site Award.

In addition, the Project was awarded the City of London Corporation's Chairman's Cup for most Considerate Contractor in the City of London. The 100 Bishopsgate

job was said to have shown the highest levels of consideration towards the public, its workforce and the environment through adhering to the Scheme's five-point Code of Considerate Practice.

Also in the square mile and only a stone's throw away, 52 Lime Street (also dubbed the Scalpel) has also recently completed.

A total of 10,500t of steel was erected by William Hare for this eye-catching scheme. Setting it apart from its neighbours, the Scalpel features an inclined northern façade, which has a diagonal fold line running from top to bottom giving the building its distinctive look and name.

Unlike many commercial buildings, the Scalpel's main core is offset and positioned along the south elevation, which provides shade from solar gain. In this way, the structure's available floor space has been maximised and internal spans of up to 20m have been achieved.

Commenting on the decision to use a steel framing solution Skanska Project Director Ian Perry says: "Using steelwork is an efficient option for this type of construction project as buildability and speed of construction are vital on a city centre job."

▶17

Completed last year, 100 Bishopsgate is already a landmark City structure

## Manchester's booming commercial sector

Second only to London, the Manchester commercial sector has been experiencing strong levels of demand. To satisfy this requirement, a number of city centre steel-framed office schemes have either been completed or are due to be finished in the coming months.

Two examples are the Landmark in St Peter's Square and the twin Embankment development in Salford.

Billington Structures erected 1,800t of steel to complete the 14-storey Landmark building, which offers 16,700m<sup>2</sup> of BREEAM 'Excellent' office space.

Column-free space is a prime requirement in commercial buildings, and the Landmark satisfies this by only having one internal column, and having clear spans

of up to 17.6m.

Positioned on a podium that once supported Exchange Station, which closed down in 1969, 100 and 101 Embankment are twin nine-storey and 10-storey commercial buildings serving the regenerated area where the cities of Manchester and Salford meet.

Commenting on the scheme, Salford City Mayor, Paul Dennett said: "These buildings are a physical demonstration of the commercial development and investment in Salford.

"This iconic pair of buildings will provide a new corporate centre bringing more jobs and revenue to the local economy."

Elland Steel Structures erected the steel for both buildings.



Landmark St Peter's Square offers high-quality office space in the centre of Manchester



*Steel was the only viable choice to form the distinctive scalpel design at 52 Lime Street*

►16 Elsewhere in the capital, steel construction is also playing a leading role in numerous commercial projects. One of the latest additions to the fast-growing King's Cross redevelopment is **Four Pancras Square**. On this scheme, steelwork has come to the fore as an architectural highlight.

According to Eric Parry Architects, the 11-storey office block needed a strong identity that resonated with the site's industrial heritage. This was encapsulated in the company's design, which features an expressive exposed **weathering steel** exoskeleton frame.

The **steel exoskeleton** forms the exterior of the entire building, supporting all of the internal floor slabs along each of the four elevations. The external steelwork and the floors are connected at key strategic locations that allow differential movements between the two to occur.

The main feature of the steelwork, which was all erected by Severfield, is a storey-high **Vierendeel truss** that encircles the building at first floor level.

"The main function of the steel truss is to create a 27m-long column-free façade along the building's main entrance elevation, that not only overlooks the public realm but forms an important architectural 'open letterbox' between the building and the outdoor area," explains BAM Design Associate Mike Hayes.

Overlooking the River Thames and situated between the London Eye and Waterloo Station, two commercial schemes, known as **One & Two Southbank Place** completed last year.

Forming part of a much larger south bank development, the steel-framed structures are 11-storeys and 17-storeys respectively, and required 6,300t of steelwork, which was erected by Severfield.

The design of both buildings has included the use of **cellular beams** throughout for efficient **service integration**. However, unlike Building One, which has some internal columns, Building Two has none, with clear uninterrupted spans reaching an impressive maximum length of 17m.

With such long spans, the connections are very big, as the finished main member is up to 30t in weight in some places. Consequently, Severfield had to use a number of **plated sections** to achieve the desired spans.

## Home Counties on the up

Demand for commercial space in the towns surrounding London is on the rise as many companies are relocating away from the capital.

The imminent arrival of the Crossrail scheme has driven the market in Slough and Reading, two towns that will benefit from the faster direct rail link to central London.

Adjacent to Reading station, **Thames Tower** is a 1970s-office block that has been given a new lease of life with enlarged floorplates and four extra steel-framed floors above level 11.

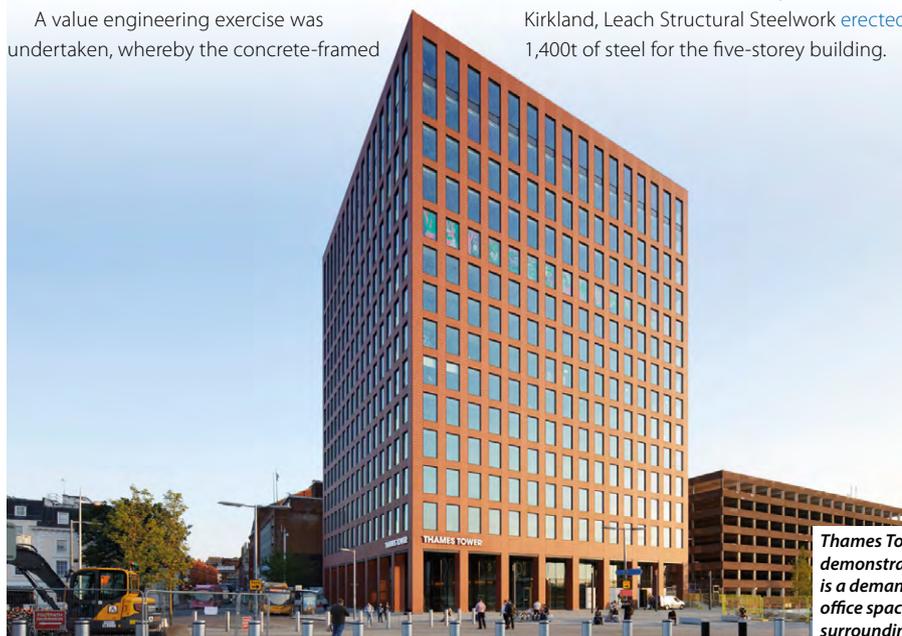
A value engineering exercise was undertaken, whereby the concrete-framed

structure was strengthened with steelwork to allow the new floors to be added, without any enhancements necessary to the existing foundations.

Working on behalf of Bowmer + Kirkland, Shipley Structures erected the project's steelwork.

Also, located conveniently close to a railway station, the steel-framed **Porter Building** in Slough has achieved WELL Building Standard certification, making the 11,100m<sup>2</sup> development one of the UK's healthiest office blocks.

The project was a partnership between developers Landid and Brockton. Working on behalf of Bowmer & Kirkland, Leach Structural Steelwork **erected** more than 1,400t of steel for the five-storey building.



*Thames Tower demonstrates there is a demand for more office space in the towns surrounding the capital*

## High-rise in Glasgow

The commercial property sector in Glasgow has also seen a number of high-profile projects come to fruition during the last few years.

One of the most prominent city centre projects is HFD Property Group's **122 Waterloo Street**, a nine-storey commercial development, which was pre-let to Morgan Stanley.

The building provides 13,900m<sup>2</sup> of space over the basement, ground and eight open-plan upper floors.

Requiring BHC to erect 1,900t of steel, the building forms the first phase of the Bothwell Exchange development that also includes a second commercial structure that is currently under construction.

According to HFD Property, the 122 Waterloo Street achieved an A rated EPC and a **BREEAM** 'Excellent' rating, making it one of the most energy efficient and sustainable buildings delivered into the Glasgow office market.



*122 Waterloo Street is the first part of a larger Glasgow scheme*

## FACT FILE

Mini-Gherkin two  
 Main client:  
 Constructionarium  
 Steelwork contractor:  
 Caunton Engineering  
 Steel tonnage: 13t

Offering students and professionals an innovative and hands-on construction experience in the built environment, Constructionarium is a not-for-profit organisation with a number of sites throughout the country.

The initiative to build the Constructionarium was originally pioneered in a joint venture between Imperial College London, Expedition Engineering and John Doyle Construction.

Since 2003, more than 12,000 delegates have attended Constructionarium to work in teams over six days to build one of their carefully designed projects. Each project is a scaled down replica of an iconic structure from around the world, mirroring the challenges of life on site and enabling students to apply the knowledge they have gained in a practical, safe and relevant environment.

This higher education stratagem is also aimed at addressing the current shortfall in practical construction and design expertise among graduates, and attract prospective students by offering an onsite degree.

One of these scaled-down mini structures is London's Swiss Re building, also dubbed the Gherkin, which Caunton Engineering, in conjunction with Expedition Engineering, fabricated and supplied in 2007 for the Constructionarium at the National Construction College at Bircham Newton in Norfolk (see NSC July 2008).

"The original mini-Gherkin was a great success, and we've now been contracted to fabricate and supply a second one for the Constructionarium's new site in Southall," explains Caunton Engineering Technical Director Robert Weeden.

"Our aim for the mini Gherkin II was to reduce the fabrication time and increase repetition, thereby making it safer and quicker for site operatives to erect."

The second mini-Gherkin is similar in design to its predecessor. It is just under 12m-high, has a base diameter of 4.4m and a diameter of 4.9m around its middle. The steelwork supports a Tata Steel Durbar steel floor plate to create three upper levels.

The most important difference between the two Gherkins is the new structure has been designed without a positive fixing to the ground slab. Instead, it has a ring beam, a design change made by Caunton's technical team to allow the new structure to be fully mobile.

"With a ring beam replacing holding down bolts, the Gherkin will not just be available at the Constructionarium's new site, but it can easily be moved from site to site, such as the premises of interested companies," adds Mr Weeden. "This was an important criteria for our client."

The ring beam is fabricated from



The second Gherkin can be demounted more easily than its predecessor

## Small wonder

Following on from the success of its first mini-Swiss Re (Gherkin) building, Caunton Engineering has fabricated a second similar structure to be located at the Constructionarium's new site in Southall, west London.



The structure consists of five pre-assembled sections



Each section is lifted into place by a crane using a bespoke lifting frame

305 × 305 × 97 UC members, while its interconnecting internal beams are 203 × 203 × 46UCs. The total weight of the ring beam, including these internal beams is 2.2t, without the internal beams the weight is 1.7t.

Both of the mini-Gherkins have a similar weight, but the new structure's design incorporates angle sections instead of SHS members. This is said to have led to a more economic design and one that will allow cladding systems to be more easily fixed to the erected structure.

The angle members that are used round the outside of the building are all 1,050mm-long, while the sections used for the internal stair tower are between 1,120mm-long and 1,620mm-long.

“Also, increasing the economic design of this structure, we slightly changed the geometry, which enabled more repetition. We also made sure the connecting nodes were all similar within each ring, which makes the erection sequence easier and quicker,” says Mr Weeden.

The steelwork for both the original and this second Gherkin structure was designed, modelled, detailed and fabricated by Caunton's apprentices in the company's accredited Academy, which the company says further emphasises the educational benefits of this enterprising scheme.

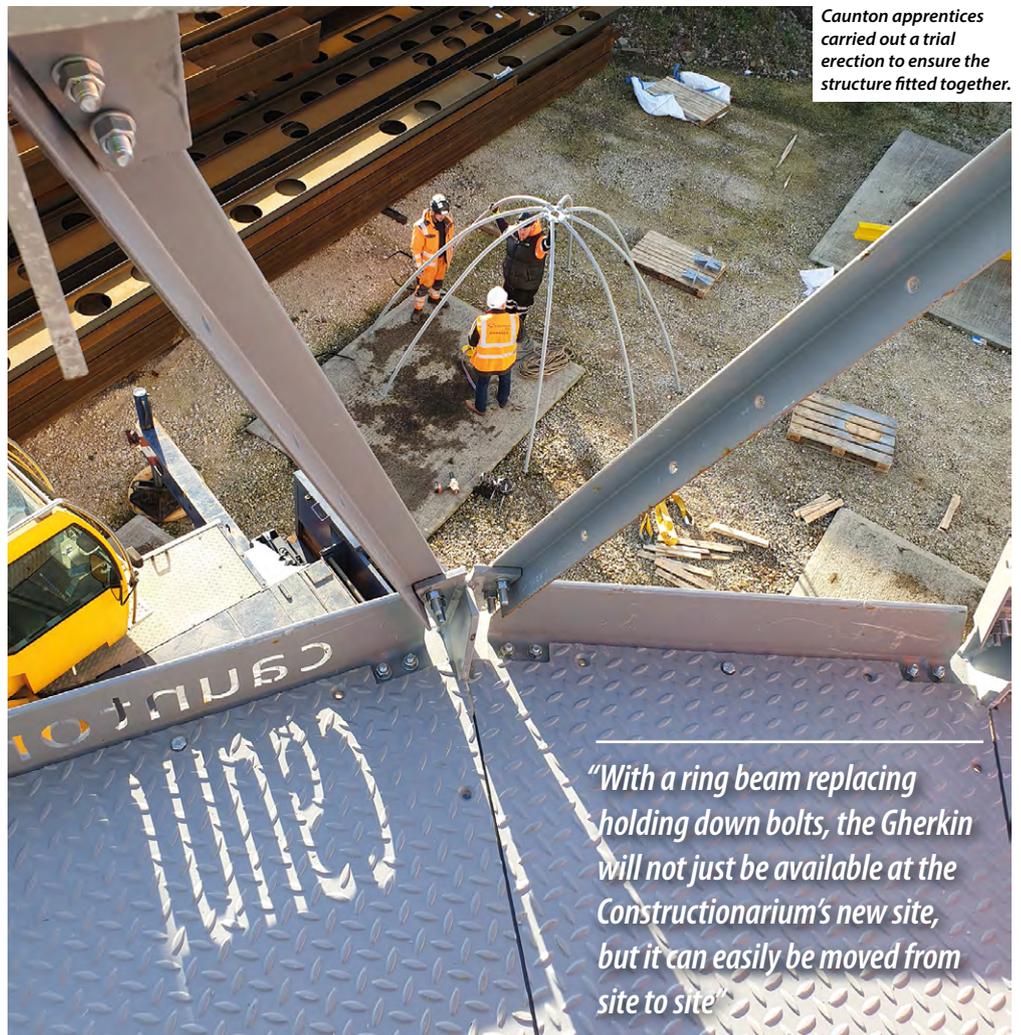
The Gherkin consists of approximately 600 steel members and is assembled into five sections, including the base section that has the ring beam. After this lowest section is in place, the next four sections, which are assembled on the ground, are subsequently lifted into place, using a crane with a bespoke lifting frame, which was also designed by Caunton Engineering.

Making sure the entire structure fitted together correctly, Caunton's apprentices

undertook a trial erection in the company's car park prior to the steelwork being delivered to the client.

Highlighting the expertise and the high level of the apprentice's work, the entire structure was easily erected in less than one day, with each section fitting exactly.

Summing up, Emeritus Professor David Nethercot, Imperial College says: “We have found that Constructionarium positively influences students towards careers in engineering and is seen as an exemplar of best practice for other departments within the engineering faculty.”



Caunton apprentices carried out a trial erection to ensure the structure fitted together.

“With a ring beam replacing holding down bolts, the Gherkin will not just be available at the Constructionarium's new site, but it can easily be moved from site to site”



# Creative highlights

A large mixed-use scheme, with office space geared towards the creative industries, will transform a swathe of land on the edge of London's Soho district, offering a host of amenities including new public realms. Martin Cooper reports.

Located at 111-119 Charing Cross Road, the plot previously occupied by the famous Foyle's bookshop, Ilona Rose House is a new 27,800m<sup>2</sup> mixed-use development that will include ground floor shops and restaurants, office space on the upper eight floors including garden terraces, and a four-level basement that will house Warner Brother's European post-production studios, including a double-height 60-seat editing theatre.

Surrounding the building, a large portion of the site is dedicated to new public realm space with a new café and restaurant-lined mews linking Manette Street to Greek Street. The mews will also provide an entrance to the extensive subterranean creative office and post production space.

Aiming to achieve a BREEAM 'Excellent' rating, the scheme also includes redevelopment of 14 Greek Street, a Grade II listed building, which will be protected and carefully restored. Next door, at 12-13

Greek Street, the façade of the building is being retained while eight affordable housing flats are constructed behind it.

The main building consists of a steel-frame superstructure, which is erected around a centrally-positioned concrete core.

Cellular steel beams, used to accommodate services within their depth, have been used throughout. The beams are typically 725mm-deep with 500mm-diameter holes at 750mm centres.

From ground floor upwards, the steel beams support metal decking to form a composite flooring solution. Externally, the structure features bespoke precast concrete façade panels, clipped on to a traditional curtain wall system.

Work onsite began last year and following the demolition of the previous building, an extensive groundworks programme was undertaken, which included a deep excavation to enlarge the existing basement to the required four levels.

Once the concrete slab for the deepest basement level four was installed, William Hare was able to begin its steelwork programme as the majority of the steel columns are founded at this level.

The subterranean portion of the building is a hybrid design, with steel columns and beams and the floors formed with concrete. Basement level three has an in situ concrete deck with no steel beams, but levels two and one have steel beams with a concrete slab cast around them.

This method of construction was chosen as the basement will house office space

A 'spotlight' atrium is formed with curved members.





The cantilevering truss, which forms the main elevation, takes shape

#### FACT FILE

**Ilona Rose House Development, London**

**Main client:** Soho Estates

**Architect:** MATT Architecture

**Main contractor:** Sir Robert McAlpine

**Structural engineer:** Tier Consult

**Steelwork contractor:** William Hare

**Steel tonnage:** 2,900t



Model showing the main elevation

*“Using structural steelwork was the obvious choice for this project as a lightweight frame was required.”*

and a similar long span arrangement to the above ground levels was needed.

In the building’s south west corner, a ‘spotlight’ shaped atrium, dramatically cut into the basement, will provide daylight deep into the lower floors which are designed specifically with the film and creative industries in mind.

The circular void atrium is up to 5.8m-diameter and has been formed with a series of 700mm × 700mm × 40mm curved box sections set into the relevant floor slabs.

“The basement had a number of temporary props, which could only be removed once the floors had been installed. We had to erect the columns, which are typically two-storeys high, around the props and then wait until the concrete slabs had been installed before we could erect further columns,” says William Hare Senior Project Manager Richard Mosek.

Above ground, the retail areas and offices are said to exploit the stepped massing of the building to create over 1,100m<sup>2</sup> of planted external terraces for the benefit of occupants. This means from level three upwards, the building’s footprint gradually decreases.

“The bulk and the massing of the building is biased toward Charing Cross Road, where the general height of the surrounding buildings is greater. The building then cascades down towards Greek Street on its western perimeter,” explains Tier Consult Engineer Jim Fraser.

“The need to reduce the mass on the western side and introducing terraces led to the use of a series of transfer structures

to support the changing perimeter column lines.”

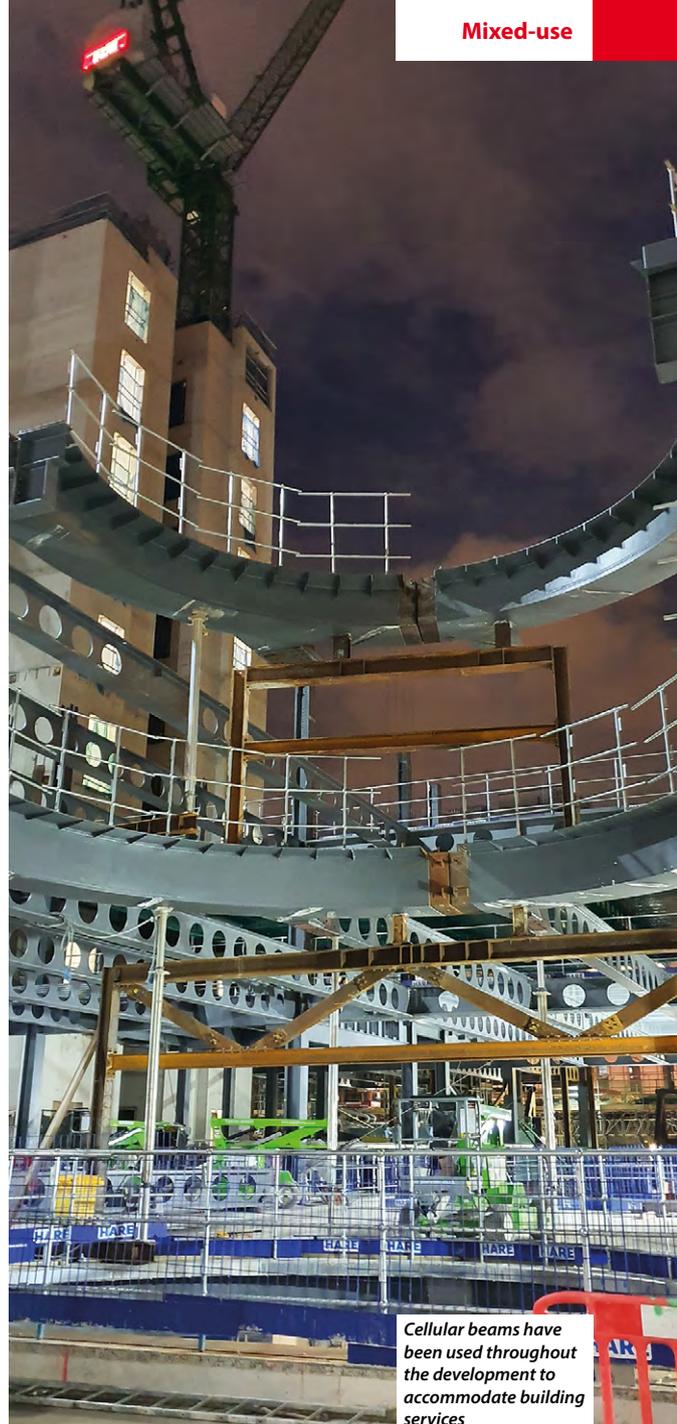
Radiating out from the central core, the upper levels feature minimal internal columns and open-plan areas are created with numerous long span beams. The project has 23 beams that span up to 19m or more, with the longest being 19.6m.

According to William Hare Senior Site Manager Ben Burns, the biggest challenge for the steelwork programme is the main Charing Cross Road east elevation. On this side of the building there is a 34m-long × 4.4m-deep cantilevered truss, weighing in excess of 66t, positioned at first-floor level.

“It had to be broken down into sections, no heavier than 16t each, so as not to exceed the lifting capacity of the onsite tower crane. To assemble the sections, we had to use 35t of temporary support steel and do three weeks of continuous 24-hour onsite welding. This included a total of 64 full penetration butt welds with thicknesses of up to 100mm, which is the equivalent of one 5,400m-long weld.”

The cantilevering truss will create a feature overhang above the ground floor retail area. This architectural highlight extends around the corner and along a portion of the Manette Street façade. There are no corner columns positioned at ground floor as they would have been obtrusive to the architectural design and so the truss was introduced as the best option.

With no columns beneath, the truss is effectively hung from the underside of four plate girders positioned at the underside of level two. The girders’ back spans are ▶▶



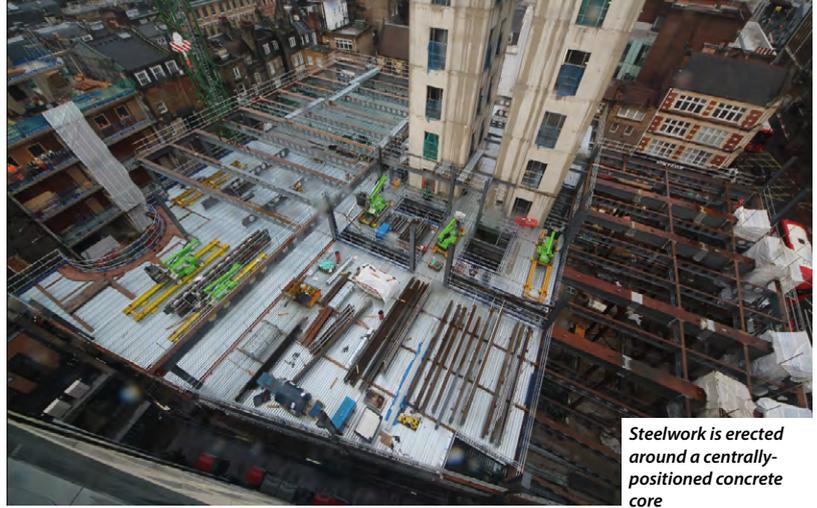
Cellular beams have been used throughout the development to accommodate building services



Cut-out model showing the rear of the development and the atrium



A fabricated plate girder is lifted into place



Steelwork is erected around a centrally-positioned concrete core

►21 restrained by the primary beam line on the east side of the core.

The girders are between 15m-long and 18m-long, and weigh in the region of 40t each. They are tapered and have a depth that varies from 730mm to a maximum of 1.5m depth.

As these sections would have also exceeded the lifting capacity of the onsite tower crane, each girder had to be delivered to site in three pieces.

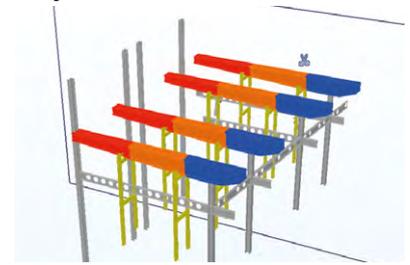
Summing up, Sir Robert McAlpine Project Director Allan Cameron says: “From the outset, William Hare has worked hand-in-hand with Tier Consult to provide the most efficient solution with a key consideration given to buildability.

“With a fully coordinated and integrated 3D model in place prior to any site works commencing, all key interfaces have been

resolved with risk reduced of any onsite clashes.

“On the large truss, they designed both welded and bolted connections to enable erection during the winter ‘windy’ period with minimal fuss and overcame what was a high-risk element of the build.”

Ilona Rose House development is due to complete in 2021.



Each girder was supplied in three sections, red, orange and blue, and welded together onsite, while supported on temporary props - yellow

## Fabricated plate girders

### David Brown of the SCI comments on the fabricated plate girders used at the Ilona Rose Development

The four plate girders described in the main article are not ordinary I-shaped beams, but are fabricated box sections, as can be seen in the photographs. In terms of structural resistance, a fabricated box section has some significant advantages. Firstly, a box section with a rectangular cross-section of this geometry will not suffer from lateral torsional buckling, so the moment resistance will be the resistance of the cross section. Very tall, very narrow rectangular cross sections may experience lateral torsional buckling – but not the form of the cross section used at the Ilona Rose development.

Double webs obviously increase the shear resistance of the member. Normally, shear resistance is not critical for beams, but with high loads close to supports, shear will be much more important.

A further beneficial contribution to the resistance is that the classification of the all-important compression flange changes from the consideration of an outstand element to classification based on an internal element – between the two webs. Outstand flanges are of course still possible, but the outstands of the

fabricated sections at the Ilona Rose development can be seen to be very small.

From Table 5.2 (sheet 2) of BS EN 1993-1-1, the Class 3 limitation on an outstand flange is a  $c/t$  ratio of  $14\epsilon$ . The Class 3 limit for an internal element from sheet 1 of the same table is  $42\epsilon$ . Based on the outstand classification one might have expected  $28\epsilon$  for internal elements, so the 50% increase is valuable – the compression flange of a box member with a double web is more effective than that of an I section. The classification of the compression flange is unlikely to be a concern in this instance – the flanges are so thick that they will be Class 1. The significant thickness

means that the design strength – taken from BS EN 10025 – will be significantly lower than the nominal grade. A 100 mm thick flange in S355 will have a design strength of  $315 \text{ N/mm}^2$ , for example, which affects the resistance of the cross section and the value of  $\epsilon$  when classifying the element.

Fabricated box sections do have some disadvantages. The section must be completed by welding from the outside only and connections to the webs may be more involved since access to the inside is not possible. Fin plates may be appropriate, or end plates offset from the web and welded to the flanges, as can be seen in the photograph.





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# Old and new

A 1960s office block in central London is being given a new lease of life with the addition of 13 new steel-framed floors.

Located a short distance from Old Street underground station, just north of the City of London, a high-rise development with a difference is taking shape in Islington.

A 16-storey office block, built in the 1960s, is being reinvented by Mace, who are stripping back the original concrete frame and adding 13 new steel-framed floors to enlarge the structure into a 29-storey edifice.

The works also include enlarging the two podiums that sit adjacent to the building,

removing and replacing the existing two cores as well as some substantial strengthening works to the existing columns to allow them to support extra loadings.

When viewing this construction project, the obvious question is why not demolish the old building and start afresh?

The answer is simple, according to AKT II Associate, Michael Hynd. “The primary driver was minimising the embodied carbon of the scheme and being as environmentally-friendly as possible through reusing the

inherent capacity in the existing structure.

“It is more sustainable to refurbish and enhance the building as opposed to undertaking a large demolition programme, which was something the local authority and the client was keen to avoid.”

For this reason, main contractor Mace decided on a cut-and-carve approach, whereby as much of the original structure is being retained, some existing floor plates enlarged and the top of the building extended with new floors.

The end product of this work will result in Hylo being converted into what CIT describes as a design-led work and lifestyle office development comprising 29 floors with 25,800m<sup>2</sup> of office and retail space.

Steve Riddell, Managing Director Developments, CIT says: “As the line between corporate and creative becomes more integrated, our aim is to provide a workplace solution that offers flexible spaces that embrace collaboration and connectivity at the same time. We are excited for Hylo to become the defining destination in the Old Street district.”

The choice of structural steelwork for the new upper floors was made due to the material’s lightweight attributes compared to other framing solutions.

“The original building had residual capacity within the floor slabs, which were believed to have been designed to accommodate printing works on some floors,” says Mr Hynd.

“It’s fair to say the large diameter under-ream piles had some free capacity which we’ve used up with the new steel floors, however, no other framing solution would have allowed us to re-use the existing foundations, while achieving the desired spans and floor zones in the extension floors.”

Paul Fairhurst, Mace’s Project Director at Hylo agrees and says: “We chose steel to transform the Hylo structure because it is a lighter material than concrete. This meant that the original and new foundations did not have to be as deep. We therefore had the knock-on benefit of cost efficiency and savings to foundation design and installation.

“Secondly, steel is typically quicker to erect and install than a traditional reinforced concrete structure.”

Prior to Bourne Steel erecting the steelwork and installing the metal deck flooring for 13 new levels of the structure, a lot of work had to be undertaken to the existing frame. An extensive surveying programme was completed in order to determine the condition of the concrete. The results proved to be very welcome as the frame was in good order.

However, the two cores were too small for the needs of the enlarged building and so they were replaced with two new ones that extended to the full new height of the building

## FACT FILE

Hylo, Bunhill Row, London

Main client: CIT

Architect:

Horden Cherry Lee

Main contractor: Mace

Structural engineer:

AKT II

Steelwork contractor:

Bourne Steel

Steel tonnage: 870t

Thirteen new steel floors are extending the structure up to 29 levels



and consequently offered the **stability** that was needed for the new upper steel-framed levels.

Interestingly, the areas beneath the new **cores** were some of the few parts of the scheme, which did require the installation of new piled foundations.

Throughout the structure, the concrete columns were strengthened with concrete jackets, installed on every floor. The only exception were some areas where the internal architectural vision required a slimmer solution and in these places steel strengthening collars were installed.

From level 16, new steel columns were installed on top of the existing concrete members. However, the existing **grid pattern** is based around a column spacing of 6.1m × 7.6m. This was deemed to be slightly restrictive for the new floorplates and so some column positions have been omitted, with the upper floors having just one row of internal columns and spans of up to 12m.

All of the steelwork erected by Bourne is standard S355 grade, and the beams are all custom-made **plate girders**, with depths ranging from 525mm to 665mm. Modular pieces for the perimeter, weighing up to 7t, were also introduced to reduce the number of pieces to be lifted.

Commenting on the steelwork programme, Bourne Steel Project Manager Theodoros Pitrakkos says: "The floorplates are generally repetitive up to level 25, but level 26 has a step-back creating a terrace."

"Considerable planning was required to devise a construction programme that allowed the works to be continuous. To achieve this, the floorplate was split into three main areas and the steelwork was built three floors at a time. Primary activities involved **welding** fittings to cast-in plates in the core walls for beam connections, steelwork **erection**, metal decking installation and on-site **painting**. These activities continuously rotated throughout the floorplate to meet programme."

With the steel frame starting at Level 16, Bourne's main challenge was dealing



*"We chose steel to transform the Hylo structure because it is a lighter material than concrete."*

**Site constraints meant steelwork had to be erected immediately from the delivery vehicles**

with high winds during construction, while maintaining the programme and the tight **erection tolerances**. Because the site is a confined high-rise plot, there was limited storage space and so the steel was generally erected directly from the delivery trailer by **tower crane** in conjunction with MEWPS.

Summing up, Bourne Steel's engineering team say: "Due to the nature of the project and the high standards that were required from MACE, AKT II and importantly the architects HCLA. It was even more imperative to have a close relationship during the **design** and build process, to ensure it met all expectations.

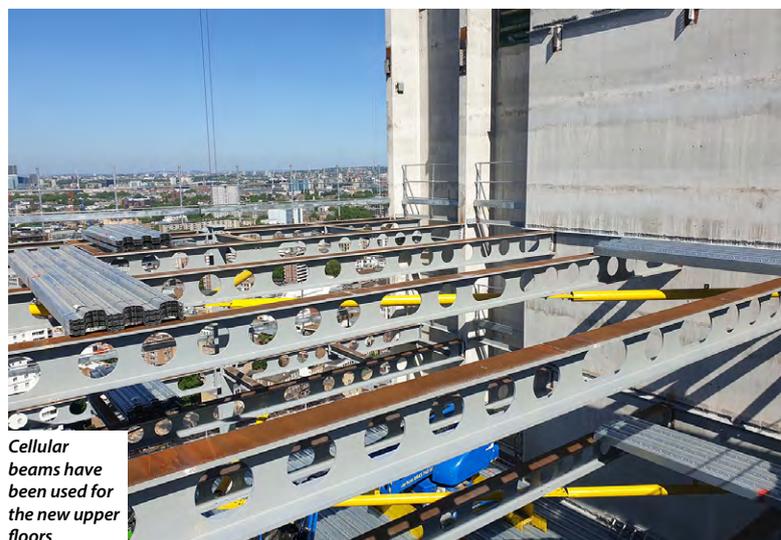
"As all steelwork in its final state was **visually exposed**, as a team we

reviewed all end connections and **column splices** throughout to insure they were architecturally-pleasing, but at the same time ensuring they met the design requirements."

Hylo is due to complete in spring 2021. According to CIT, the tenants will enjoy the latest building amenities and specification with unparalleled views across London, while the landscaped roof terraces, breakout spaces and dining areas will create a relaxed environment away from traditional desks. In addition, they will benefit from generous locker and shower facilities, as well as cycle storage for over 400 bikes. An expansive ground floor reception incorporating a modern lounge and cafe will make Hylo a social hot spot all day.



**Hylo will be a tall landmark structure overlooking the northern perimeter of the City of London**



**Cellular beams have been used for the new upper floors**

# In-plane stability of portal frames

David Brown of the Steel Construction Institute offers a reminder of the guidance covering in-plane stability of this very common form of construction. Judging by recent questions received by the SCI, the topic is not as clearly understood as it should be!

## The problem(s) identified

In March and April of 2020, to offer some light relief during COVID-19 lockdown, the SCI ran a number of free webinars covering the analysis, member verification and detailing of portal frames. The webinars were significantly over-subscribed, and were repeated four times. Two topics gave rise to the most questions – [in-plane stability](#) and restraints to the inside flange. Many delegates wanted to know what in-plane effective length should be used when verifying members – particularly the column. Others wanted to apply Annex E of BS 5950 to determine an in-plane effective length. There was no problem with out-of-plane lengths – no-one questioned that out-of-plane, members should be verified between restrained positions.

Perhaps the problem is highlighted if designers are using general [elastic analysis](#) software to determine the [design](#) forces and moments around the frame and then to verify the members within it. Such software expects to complete both in-plane checks and out-of-plane checks, which naturally demands an in-plane buckling length. [Portal frames](#) are a special case, with particular rules discussed in this article.

## What does BS 5950 say?

Before opening the Eurocode, it is valuable to look at the particular rules for portal frames given in BS 5950. The UK would claim to have developed most of the rules for portal frame

design, backed up by many decades of successful application, so one might expect definitive guidance in our previous standard.

Portal frames are one example of a continuous frame, and may be designed elastically or plastically, so we need to look carefully at the relevant clauses.

Within the "Continuous structures" section, clause 5.2.3.1 discusses [plastic analysis](#). The second paragraph should be sufficient to clarify the in-plane verifications needed:

*The in-plane stability of the members in a continuous frame designed using plastic analysis should be established by checking the in-plane stability of the frame itself, see 5.5.4.*

Designers should note that according to this clause in-plane checks of individual members are not required.

Portal frames are addressed in section 5.5. Clause 5.5.2 covers elastic design:

*If elastic global analysis is used for a portal frame, the cross-section capacity should be checked... and the out-of-plane buckling resistance should be checked....*

*For portal frames with no in-plane bracing... the in-plane stability of the frame should be verified by checking the cross-section capacity and the out-of-plane buckling resistance of the members (amplified if necessary)*

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Plastic design is covered in clause 5.5.3:

*Plastic global analysis may be used for a portal frame provided that the conditions in 5.2.3 are satisfied (which is a reference back to the clause previously quoted).*

Checking the in-plane buckling of individual members in a portal frame is inappropriate – the frame buckles as a single entity, and therefore the standard demands that stability is verified by checking “the in-plane stability of the frame itself”.

**Multi-span frames**

One potential exception to the preceding general rule is an internal column in a multi-span frame (Figure 1). In the so-called gravity combination, the bending moment in the internal column may be very small. The in-plane buckling of this member should be checked. P292 recommends an effective length factor of 1.0 for truly pinned bases, 0.85 for nominally pinned bases and 0.7 for nominally fixed bases.

Internal columns probably have no restraint at any level below the haunch. If the internal column is orientated in the orthodox direction (major axis in the plane of the frame) then the minor axis resistance will of course be critical, not the in-plane buckling. If the internal column was turned 90°, such that its weak axis was in the plane of the frame (Figure 2), or if the internal column was a fabricated section with a larger inertia out of the plane of the frame, then in-plane buckling could be critical, but it seems most unlikely.

**In-plane buckling of the frame**

According to BS 5950, in-plane stability of portal frames can be verified by three methods:

1. The sway-check method – commonly known as the  $h/1000$  check, with a limited scope (and a snap-through check for multi-span frames);
2. The amplified moments method, requiring the determination of  $\lambda_{cr}$  and an amplifier if necessary. No amplifier is required if  $\lambda_{cr} > 10$ ;
3. [Second-order analysis](#).

In each method, the impact of [second-order effects](#) is

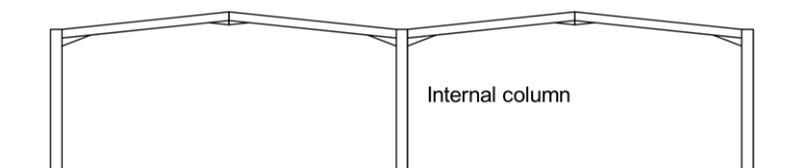


Figure 1; Multi-span portal with internal column

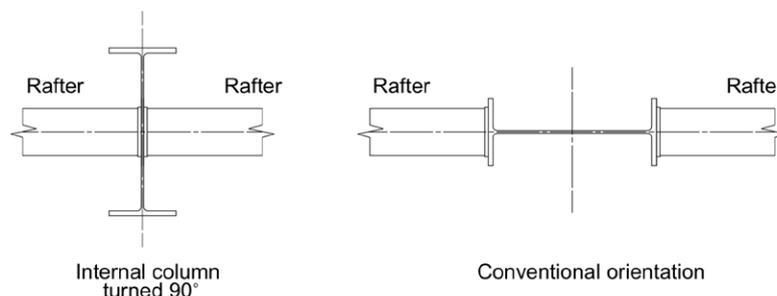


Figure 2; Orientation of internal column

considered. Satisfying the sway-check method means that second-order effects are small enough to be ignored. The amplified moments method allows for second-order effects with an amplifier unless the effects are small enough to be ignored. Second-order analysis will always allow for those effects.

**Member checks in BS 5950**

Having completed the in-plane buckling checks of the frame in its entirety and allowing for second-order effects if necessary, the cross section has to be checked and then out-of-plane checks completed. BS 5950 has a range of clauses covering different conditions – next to plastic hinges, with intermediate restraints to the tension flange only, tapered sections etc.

**Why not Annex E?**

The introduction to the Annex seems to offer opportunities for use, describing “the effective length  $L_e$  for in-plane buckling of a column or other compression member in a [continuous structure with moment resisting joints](#) should be determined using the methods given in this annex.” That sounds appropriate for portals, but as one reads further, it becomes abundantly clear

►28

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►27 that this annex is limited to columns in rectilinear multi-storey frames. The annex describes columns in multi-storey beam-and-column framed buildings with .... concrete or composite floor and roof slabs. Hardly the description of a portal frame!

**Eurocode rules**

One would not expect the fundamental physics to change simply because the Eurocode was introduced. On that basis alone, one should be confident that the same rules apply to orthodox portal frames – that in-plane, the stability of the entire frame as one unit is critical, followed by checks of the cross section and only out-of-plane buckling checks.

The key clause is 5.2.2(7)a in BS EN 1993-1-1:

*If second order effects in individual members and relevant member imperfections are totally accounted for in the global analysis of the structure, no individual stability check for the members according to 6.3 is necessary.*

In-plane second order effects are allowed for by determining  $\alpha_{cr}$  (directly equivalent to  $\lambda_{cr}$  in BS 5950), and using an amplifier in the global analysis if necessary. Frame imperfections are allowed for by always including the equivalent horizontal forces (EHF) in every combination. The only in-plane effects that are not included in the global analysis are the individual member imperfections, such as an initial lack of straightness. To consider the impact of in-plane member imperfections, colleagues at the SCI spent (very) many hours analysing a wide range of frames with and without in-plane member imperfections. Imperfections were modelled in both directions, in each member, to produce the most onerous effect. The study concluded that the value of  $\alpha_{cr}$  changed less than 0.3%. Two conclusions can be made. Firstly that the effect of in-plane member imperfections on the stability of the frame is small enough to be ignored – or presented another way, we can say that all relevant in-plane effects have been allowed for in the global analysis. We therefore do not need an in-plane stability check of individual members. The second conclusion is that as expected, BS 5950 was correct – “The in-plane stability of the members in a continuous frame .... should be established by checking the in-plane stability of the frame itself”

The global analysis has not verified the out-of-plane resistance – members still must be verified between restraints, using section 6.3 of the Eurocode, aided perhaps by the guidance

in Annex BB, which is simply the guidance from BS 5950 ‘translated’ into Eurocode nomenclature.

**Member verification in section 6.3 of BS EN 1993-1-1**

If (and only if) the interaction factors in expressions 6.61 and 6.62 are taken from Annex B of the Eurocode (very strongly recommended by SCI), it can be concluded that expression 6.61 deals with in-plane effects and expression 6.62 deals with out-of-plane effects. Since we have concluded that no in-plane member checks are needed (other than the possible internal columns mentioned earlier), we can dispense with expression 6.61 altogether.

As there is no minor axis moment in a portal frame, expression 6.62 reduces to a rather simpler form:

$$\frac{N_{Ed}}{N_{b,z,Rd}} + k_{zy} \frac{M_{y,Ed}}{M_{b,Rd}}$$

The numerators are the design force and major axis moment. The denominators are the minor axis flexural resistance and the lateral torsional buckling resistance, which with some judicious interpolation can generally be obtained from look-up tables if required. In all cases, the lateral torsional buckling resistance depends on the shape of the bending moment diagram over the length being considered, reflected in the value of the factor  $C_1$ . Resources are readily available to determine the  $C_1$  factor for different shapes of bending moment diagram. The interaction factor  $k_{zy}$  is painful to compute, but in portal frames is generally around 0.97 – there is not much loss in manual calculations if  $k_{zy}$  is assumed to be 1.0.

**Conclusions**

Portal frames are special in many ways, despite their frequent use in the UK. They are slender, have significant axial forces in the members, generally are sensitive to second-order effects, experience reversing bending moments and demand very careful restraints to otherwise unrestrained flanges. The objective of this article was to confirm one special design feature – that in-plane buckling is an concern for the frame as a whole, not for individual members.

- 1 King, C, M. In-plane stability of portal frames to BS 5950-1-2000 (P292) SCI, 2001



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## BS EN PUBLICATIONS

### BS EN ISO 21904-1:2020

Health and safety in welding and allied processes. Equipment for capture and separation of welding fume. General requirements  
*supersedes BS EN ISO 15012-4:2016*

### BS EN ISO 23386:2020

Building information modelling and other digital processes used in construction. Methodology to describe, author and maintain properties in interconnected data dictionaries  
*no current standard is superseded*

## BS IMPLEMENTATIONS

### BS ISO 4992-1:2020

Steel castings. Ultrasonic testing. Steel castings for general purposes  
*supersedes BS ISO 4992-1:2006*

### BS ISO 4992-2:2020

Steel castings. Ultrasonic testing. Steel castings for highly stressed components  
*supersedes BS ISO 4992-2:2006*

### BS ISO 21455:2020

Mobile elevating work platforms. Operator's controls. Actuation, displacement, location and method of operation  
*no current standard is superseded*

## BRITISH STANDARDS REVIEWED AND CONFIRMED

### BS EN ISO 15609-4:2009

Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Laser beam welding

### BS EN 1011-1:2009

Welding. Recommendations for welding of metallic materials. General guidance for arc welding

## BRITISH STANDARDS WITHDRAWN

### BS EN ISO 15012-4:2016

Health and safety in welding and allied processes. Equipment for capture and separation of welding fume. General requirements  
*Superseded by BS EN ISO 21904-1:2020*

### BS ISO 4992-1:2006

Steel castings. Ultrasonic examination. Steel castings for general purposes  
*Superseded by BS ISO 4992-1:2020*

### BS ISO 4992-2:2006

Steel castings. Ultrasonic examination. Steel castings for highly stressed components  
*Superseded by BS ISO 4992-2:2020*

## BRITISH STANDARDS UNDER REVIEW

### BS EN 14399-1:2015

High-strength structural bolting assemblies for preloading. General requirements

### BS EN 14399-2:2015

High-strength structural bolting assemblies for preloading. Suitability for preloading

### BS EN 14399-3:2015

High-strength structural bolting assemblies for preloading. System HR. Hexagon bolt and nut assemblies

### BS EN 14399-4:2015

High-strength structural bolting assemblies for preloading. System HV. Hexagon bolt and nut assemblies

### BS EN 14399-5:2015

High-strength structural bolting assemblies for preloading. Plain washers

### BS EN 14399-6:2015

High-strength structural bolting assemblies for preloading. Plain chamfered washers

### BS EN 10034:1993

Structural steel I and H sections. Tolerances on shape and dimensions

## NEW WORK STARTED

### EN ISO 9606

Qualification test of welders. Fusion welding  
*will supersede BS EN ISO 9606-1:2017*

### ISO 21928-2

Sustainability in buildings and civil engineering works. Sustainability indicators. Framework for the development of indicators for civil engineering works  
*will supersede None*

## AD 443: The use of fully threaded bolts

SCI has been surprised to hear of the use of [fully threaded bolts](#) being questioned, as these have been in common use – and have been the standard bolt used – for very many years.

The potential advantage of partially threaded bolts is that they obviously have a slightly higher shear resistance if the shear plane is in the unthreaded length. The disadvantages of calculating precise unthreaded lengths, which must be neither too long nor too short, and relating each bolt length to specific connections, far outweigh the increased resistance. On site, multitudinous bags of different bolt lengths give ample opportunity to install the wrong bolts. In contrast, a standard M20 x 60 mm fully threaded bolt may be used in the vast majority of site connections.

The use of fully threaded bolts was recommended in the first “Green Book” of 2002<sup>1</sup> and the Eurocode version of 2014<sup>2</sup>.

Concerns with fully threaded bolts may relate to the supposed increased in bearing deformation, if the threads engage with the steel rather than the unthreaded shank. Investigations of the behaviour of fully threaded bolts were reported by Graham Owens in 1992<sup>3</sup>. Although fully threaded bolts in bearing show a lower initial stiffness, the bearing strength actually increases slightly, due to the constraint offered when the threads dig into the plate material. The deformation in bearing of a fully threaded bolt is slightly more than that of a plain shank, but the increase is not relevant when bolts are already in 2 mm oversize holes.

If designers are concerned about deformation in a joint, the issue does not concern whether fully threaded or unthreaded bolts are specified – the difference in performance is insignificant. If deformation in the joint must be avoided, [preloaded assemblies](#) must be specified.

It should be noted that shear and tension resistances quoted (in the [Blue Book](#), for example) always use the cross section in the threaded length as the basis of the resistance calculations – and are therefore safe.

Contact: **SCI Advisory**  
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Email: **advisory@steel-sci.com**

1. *Joints in steel construction. Simple connections* (P212), SCI and BCSA, 2002
2. *Joints in steel construction. Simple joints to Eurocode 3* (P358), SCI and BCSA, 2014
3. Owens, G. W., *The use of fully threaded bolts for connections in structural steelwork for buildings*. *The Structural Engineer*, Volume 70, September 1992

# TALL STORAGE

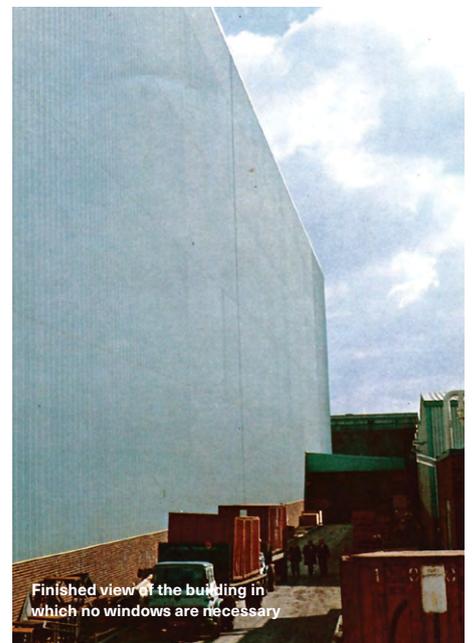
View down aisle from upper maintenance platform

The high cost and scarcity of land have led to the development of Highbay storage systems. R. Dunning, CEng, AMIStructE, Senior Structural Engineer, Storage and Materials Handling Division, Dexion Ltd, here describes a new warehouse for the Fold Motor Co in which over 20,000 tons of goods can be stored

FROM

**Building  
with Steel**

May 1970



Finished view of the building in which no windows are necessary

Dexion Ltd became established as the foremost producers of slotted angles in the world. This product is still as useful as ever and millions of feet are made every year for home and export. However, all products have their limitations and there are some storage jobs for which lightweight angles are not really suitable. Dexion Ltd, recognising that their business was not so much as slotted angle manufacturers but more as storage specialists have long now offered several highly developed storage systems on the market. Most recent of these is the Highbay system.

Basically the problem is that the cost of land is ever increasing and in some areas the shortage is desperate. In addition it is vitally important for stores to be as efficient as possible as obviously all time spent fetching goods is non-productive and should be reduced to a minimum. Similarly the more a system can be automated the faster and more efficiently it can operate.

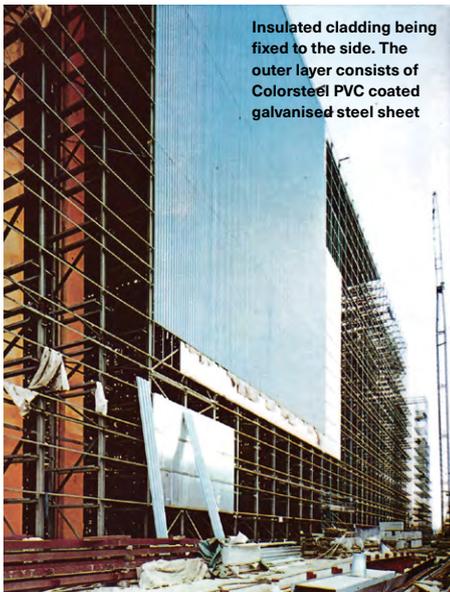
The only way to save on land is to build

high – as high as other limiting factors such as foundation conditions, wind pressures, efficient operation of cranes, town planning and costs will permit. The best way to save in operating time is to have powerful cranes to fetch the goods and working in a layout presenting no obstructions to movement.

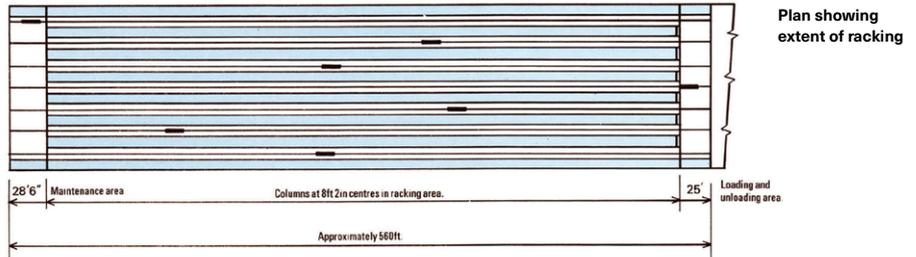
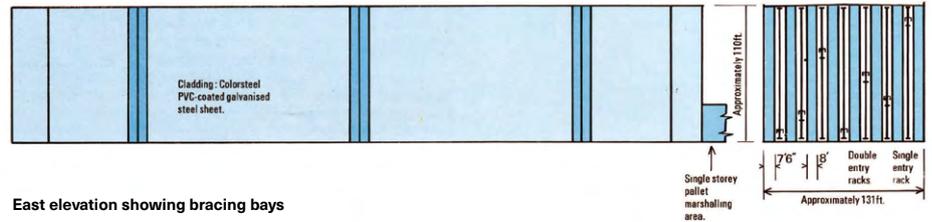
These features have been brought together in the Highbay system designed and built by Dexion. One of their contracts using these new techniques is for Fords of Dagenham. Highbay warehouse, also known as 'Pallet Silos' were first developed in the USA and are now spreading into Europe. Basically they consist a number of parallel pallet racks separated by narrow aisles in which the stacker cranes operate. There is no building in the traditional sense of the word as the roofing and cladding is simply attached to the tops of the columns and the outermost racks. Clearly the aisles should also be as narrow as possible and the stacker cranes are designed to operate within these narrow confines and at a high level.

The Highbay warehouse at Fords is 131 ft wide by 560 ft long while the height is 110 ft to roof level with a further 2 ft for the parapet. The racks occupy 507 ft of the length and are so arranged as to provide a crane maintenance area at the western end and a 106 ft pallet marshalling area at the east in a low single storey building. Altogether more than 3,000 tons of structural steel has been used, most of it being mild steel and the remainder high tensile. The ground is of a poor nature in consequence of which every one of more than 1,000 columns has an individual pile foundation.

There are eight parallel racks, six of which are double entry, while the two outer racks are single entry and also carry the steel sheet wall cladding. All the racks assist in carrying the roof. In addition to carrying pallets the side racks are 7 ft 6 in wide in order to resist wind loads. The internal racks are 8 ft wide and give support to the sides through the roof beam. This beam is a 7 in x 4 in RSJ and not only ties



Insulated cladding being fixed to the side. The outer layer consists of Colorsteel PVC coated galvanised steel sheet



The system of racks and aisles is shown in this picture taken during the early stages of construction



Goods delivery and collection area

the tops of the frames together but also acts as the support for the lightweight concrete roof slabs.

There are 17 levels of pallets each of which can weigh 1 or 2 tons. Five types of pallet are stored, three are large and weigh 1 or 2 tons, while two are small and weigh 1 ton. The small pallets are stored side by side in the same space as occupied by one large pallet but since they cannot span the distance between the cantilevered pallet bearers they can only be accommodated in spaces provided with support grillages which occur at three levels.

Cantilevered brackets are provided in order to keep the height of the building to a minimum by recessing them into the underside of the 8 in x 3 in channel pallet bearers. This system enables the crane forks to operate within deeper clear vertical spaces than would be the case with cross beams. The only interruptions come from lateral restraints which are connected to the spine bracing which resists longitudinal wind and

crane buffering loads. For efficient working, tolerances had to be very fine for structural steelwork and were  $\pm\frac{3}{8}$  in. in any horizontal or vertical plane for height, width and length of the building and local deviation not to exceed  $\pm\frac{1}{8}$  in. in 20 ft. This degree of accuracy led to the decision to employ bolted construction to avoid any possible difficulties from distortion caused by welding. High strength friction grip bolts were specified but as they were difficult to obtain in  $\frac{1}{2}$  in diameter size it was decided to use Huck Bolts for shop fabrication while the  $\frac{1}{2}$  in HSG bolts were employed on site with load indicating washers. The stacker cranes themselves are considerable structures as they have to pick up two tons and be capable of placing it at any height up to nearly 100 ft and to place it accurately.

The crane consists of two 160 ft high masts connected together at the top and bottom and running on a single flat bottomed rail. Overall height is 109 ft. The top is restrained by horizontal guide wheels running on either

side of a rail on one side of the aisle, while the bottom is restrained by horizontal wheels running against the rail. The lift platform moves between the masts while the pick-up forks can exit left or right. Total weight of each crane is about 30 tons and there is one to each of the seven aisles. They may be operated manually, by punched cards, or by computer. Maintenance is required at ground level for the motors and running gear and at a high level for the guide wheels for which a number of platforms, reached by stairs, are provided at 101 ft level.

As yet a young industry in the UK there is no doubt that Highbay storage is going to be more essential as land becomes even more costly and as storage itself becomes increasingly computerised. This is a highly specialised business where expertise in materials handling is vital to success. With its many years of experience in this specialized field Dexion should be well to the fore in this important business.



# Steelwork contractors for buildings

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland.

Details of BCSA membership and services can be obtained from

Lorraine MacKinder, Marketing and Membership Administrator,

The British Constructional Steelwork Association Limited, Unit 4 Hayfield Business Park, Field Lane, Auckley, Doncaster DN9 3FL

Tel: 020 7747 8121 Email: [lorraine.mackinder@steelconstruction.org](mailto:lorraine.mackinder@steelconstruction.org)

Applicants may be registered in one or more Buildings category to undertake the fabrication and the responsibility for any design and erection of:

**C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc

**D** High rise buildings (offices etc over 15 storeys)

**E** Large span portals (over 30m)

**F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)

**G** Medium rise buildings (from 5 to 15 storeys)

**H** Large span trusswork (over 20m)

**J** Tubular steelwork where tubular construction forms a major part of the structure

**K** Towers and masts

**L** Architectural steelwork for staircases, balconies, canopies etc

**M** Frames for machinery, supports for plant and conveyors

**N** Large grandstands and stadia (over 5000 persons)

**Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)

**R** Refurbishment

**S** Lighter fabrications including fire escapes, ladders and catwalks

**FPC** Factory Production Control certification to BS EN 1090-1

1 – Execution Class 1 2 – Execution Class 2

3 – Execution Class 3 4 – Execution Class 4

**BIM** BIM Level 2 assessed

**QM** Quality management certification to ISO 9001

**SCM** Steel Construction Sustainability Charter

(● = Gold, ● = Silver, ● = Member)

## Notes

(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.

Where an asterisk (\*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

| Company name                               | Tel                | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | BIM | SCM | Guide Contract Value (1) |
|--|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|-----|-----|--------------------------|
| A C Bacon Engineering Ltd                  | 01953 850611       |   |   | ● | ● | ● | ● |   |   |   | ● |   |   | ● |   |    | 2   |     |     | Up to £3,000,000         |
| Adey Steel Ltd                             | 01509 556677       | ● |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● | ✓  | 3   |     | ●   | Up to £4,000,000         |
| Adstone Construction Ltd                   | 01905 794561       |   |   | ● | ● | ● | ● |   |   |   | ● |   |   | ● |   | ✓  | 2   | ✓   | ●   | Up to £3,000,000         |
| Advanced Fabrications Poyle Ltd            | 01753 653617       |   |   |   | ● | ● | ● | ● |   | ● | ● |   |   | ● | ● | ✓  | 2   |     |     | Up to £800,000           |
| AJ Engineering & Construction Services Ltd | 01309 671919       |   |   | ● | ● |   | ● |   | ● | ● | ● |   |   | ● | ● | ✓  | 4   |     | ●   | Up to £3,000,000         |
| Angle Ring Company Ltd                     | 0121 557 7241      |   |   |   |   |   |   |   |   |   |   |   | ● |   |   | ✓  | 4   |     |     | Up to £1,400,000*        |
| Arminhall Engineering Ltd                  | 01799 524510       | ● |   |   | ● | ● |   | ● |   | ● | ● |   |   | ● | ● | ✓  | 2   |     |     | Up to £800,000           |
| Arromax Structures Ltd                     | 01623 747466       |   |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   |   | ● |    | 2   |     |     | Up to £800,000           |
| ASME Engineering Ltd                       | 020 8966 7150      |   |   | ● | ● | ● |   | ● |   | ● | ● |   |   | ● | ● | ✓  | 4   |     | ●   | Up to £4,000,000         |
| Atlasco Constructional Engineers Ltd       | 01782 564711       |   |   | ● | ● | ● | ● |   |   | ● | ● |   |   | ● | ● | ✓  | 2   |     |     | Up to £1,400,000         |
| B D Structures Ltd                         | 01942 817770       |   |   | ● | ● | ● | ● |   |   | ● | ● |   |   | ● | ● | ✓  | 2   | ✓   | ●   | Up to £1,400,000         |
| Ballykine Structural Engineers Ltd         | 028 9756 2560      |   |   | ● | ● | ● | ● | ● |   |   | ● |   |   | ● | ● | ✓  | 4   |     |     | Up to £1,400,000         |
| Barnshaw Section Benders Ltd               | 0121 557 8261      |   |   |   |   |   |   |   |   |   |   |   | ● |   |   | ✓  | 4   |     |     | Up to £1,400,000         |
| BHC Ltd                                    | 01555 840006       | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● |   | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| Billington Structures Ltd                  | 01226 340666       |   | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| Border Steelwork Structures Ltd            | 01228 548744       |   |   | ● | ● | ● | ● |   |   | ● | ● |   |   |   | ● |    | 4   |     |     | Up to £3,000,000         |
| Bourne Group Ltd                           | 01202 746666       |   | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| Briton Fabricators Ltd                     | 0115 963 2901      | ● |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● | ✓  | 4   |     |     | Up to £6,000,000         |
| Cairnhill Structures Ltd                   | 01236 449393       | ● |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● | ✓  | 4   |     | ●   | Up to £4,000,000         |
| Caunton Engineering Ltd                    | 01773 531111       | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |   | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| Cementation Fabrications                   | 0300 105 0135      | ● |   | ● |   |   | ● | ● |   |   | ● |   | ● | ● | ● | ✓  | 3   |     | ●   | Up to £6,000,000         |
| Cleveland Bridge UK Ltd                    | 01325 381188       | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓  | 4   |     | ●   | Above £6,000,000         |
| CMF Ltd                                    | 020 8844 0940      |   |   | ● |   | ● | ● | ● |   | ● | ● |   |   |   | ● | ✓  | 4   |     |     | Up to £6,000,000         |
| Cook Fabrications Ltd                      | 01303 893011       |   |   | ● | ● |   | ● | ● |   | ● | ● |   |   | ● | ● |    | 2   |     |     | Up to £1,400,000         |
| Coventry Construction Ltd                  | 024 7646 4484      |   |   | ● | ● | ● | ● | ● | ● | ● | ● | ● |   | ● | ● | ✓  | 4   |     |     | Up to £1,400,000         |
| D H Structures Ltd                         | 01785 246269       |   |   | ● | ● |   | ● |   |   |   | ● |   |   |   |   |    | 2   |     |     | Up to £40,000            |
| D Hughes Welding & Fabrication Ltd         | 01248 421104       |   |   | ● | ● | ● | ● | ● | ● | ● | ● |   | ● | ● | ● | ✓  | 4   |     |     | Up to £800,000           |
| Duggan Steel                               | 00 353 29 70072    | ● | ● | ● | ● | ● | ● | ● | ● |   | ● |   |   |   | ● | ✓  | 4   |     |     | Up to £6,000,000         |
| ECS Engineering Services Ltd               | 01773 860001       | ● |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● | ✓  | 4   |     | ●   | Up to £3,000,000         |
| Elland Steel Structures Ltd                | 01422 380262       |   | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |   | ● | ● | ✓  | 4   | ✓   | ●   | Up to £6,000,000         |
| EvadX Ltd                                  | 01745 336413       |   |   | ● | ● | ● | ● | ● |   | ● | ● | ● |   |   | ● | ✓  | 3   |     | ●   | Up to £3,000,000         |
| Four Bay Structures Ltd                    | 01603 758141       |   |   | ● | ● | ● | ● | ● |   | ● | ● |   |   | ● | ● |    | 2   |     |     | Up to £1,400,000         |
| Four-Tees Engineers Ltd                    | 01489 885899       | ● |   | ● |   | ● | ● | ● | ● | ● | ● |   | ● | ● | ● | ✓  | 3   |     | ●   | Up to £2,000,000         |
| Fox Bros Engineering Ltd                   | 00 353 53 942 1677 |   |   | ● | ● | ● | ● | ● |   | ● | ● |   |   | ● |   |    | 2   |     |     | Up to £2,000,000         |
| Gorge Fabrications Ltd                     | 0121 522 5770      |   |   | ● | ● | ● | ● | ● |   | ● |   |   |   | ● | ● | ✓  | 2   |     |     | Up to £1,400,000         |
| G.R. Carr (Essex) Ltd                      | 01286 535501       | ● |   | ● | ● |   | ● |   |   |   | ● |   |   | ● | ● | ✓  | 4   |     |     | Up to £800,000           |

| Company name                       | Tel                | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | BIM | SCM | Guide Contract Value (1) |
|------------------------------------|--------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|-----|-----|-----|--------------------------|
| H Young Structures Ltd             | 01953 601881       |   |   | ● | ● | ● | ● | ● |   |   |   |   |   | ● | ● | ✓  | 4   | ✓   | ●   | Up to £3,000,000         |
| Had Fab Ltd                        | 01875 611711       |   |   |   | ● |   |   |   | ● | ● | ● |   |   |   | ● | ✓  | 4   |     |     | Up to £3,000,000         |
| Hambleton Steel Ltd                | 01748 810598       |   | ● | ● | ● | ● | ● | ● |   |   | ● | ● |   | ● |   | ✓  | 4   |     | ●   | Up to £6,000,000         |
| Hescott Engineering Company Ltd    | 01324 556610       |   |   | ● | ● | ● | ● |   |   | ● |   |   |   | ● | ● | ✓  | 2   |     |     | Up to £3,000,000         |
| Intersteels Ltd                    | 01322 337766       | ● |   |   | ● | ● | ● | ● |   | ● |   |   |   | ● | ● | ✓  | 3   |     |     | Up to £2,000,000         |
| J & A Plant Ltd                    | 01942 713511       |   |   |   | ● | ● |   |   |   |   |   |   |   |   | ● |    | 4   |     |     | Up to £40,000            |
| James Killelea & Co Ltd            | 01706 229411       |   | ● | ● | ● | ● | ● |   |   |   | ● | ● |   | ● |   |    | 4   |     |     | Up to £6,000,000*        |
| Kiernan Structural Steel Ltd       | 00 353 43 334 1445 | ● |   | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| Kloekner Metals UK Westok          | 0113 205 5270      |   |   |   |   |   |   |   |   |   |   |   | ● |   |   | ✓  | 4   |     |     | Up to £6,000,000         |
| LA Metalworks Ltd                  | 01707 256290       |   |   |   | ● | ● |   |   |   | ● | ● |   |   | ● | ● | ✓  | 2   |     |     | Up to £2,000,000         |
| Leach Structural Steelwork Ltd     | 01995 640133       |   |   | ● | ● | ● | ● | ● |   |   | ● |   |   |   |   | ✓  | 2   |     | ●   | Up to £6,000,000         |
| Legge Steel (Fabrications) Ltd     | 01592 205320       |   |   | ● | ● |   | ● |   | ● | ● | ● |   |   | ● | ● |    | 3   |     |     | Up to £800,000           |
| M Hasson & Sons Ltd                | 028 2957 1281      |   |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● | ✓  | 4   |     | ●   | Up to £2,000,000         |
| M J Patch Structures Ltd           | 01275 333431       |   |   |   | ● |   |   |   |   | ● | ● |   |   |   | ● | ✓  | 3   |     |     | Up to £1,400,000         |
| M&S Engineering Ltd                | 01461 40111        |   |   |   | ● |   |   |   | ● | ● | ● |   |   | ● | ● |    | 3   |     |     | Up to £2,000,000         |
| Mackay Steelwork & Cladding Ltd    | 01862 843910       |   |   | ● | ● |   | ● |   |   | ● | ● |   |   | ● | ● | ✓  | 4   |     |     | Up to £1,400,000         |
| Maldon Marine Ltd                  | 01621 859000       |   |   |   | ● | ● |   |   | ● | ● | ● |   |   | ● | ✓ | 3  |     |     |     | Up to £1,400,000         |
| Mifflin Construction Ltd           | 01568 613311       |   |   | ● | ● | ● | ● |   |   |   | ● |   |   |   |   |    | 3   |     |     | Up to £3,000,000         |
| Murphy International Ltd           | 00 353 45 431384   | ● |   |   | ● |   | ● | ● | ● |   | ● |   |   |   | ● | ✓  | 4   |     |     | Up to £1,400,000         |
| Newbridge Engineering Ltd          | 01429 866722       | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● |   |   |   | ✓  | 4   |     | ●   | Up to £2,000,000         |
| North Lincs Structures             | 01724 855512       |   |   | ● | ● |   |   |   |   | ● | ● |   |   |   | ● |    | 2   |     |     | Up to £800,000           |
| Nusteel Structures Ltd             | 01303 268112       |   |   |   |   |   | ● | ● | ● | ● |   |   |   | ● |   | ✓  | 4   |     | ●   | Up to £6,000,000         |
| Painter Brothers Ltd               | 01432 374400       | ● |   |   | ● |   |   |   | ● | ● | ● |   |   |   | ● | ✓  | 3   |     |     | Up to £6,000,000*        |
| Peter Marshall (Steel Stairs) Ltd  | 0113 307 6730      |   |   |   |   |   |   |   |   | ● |   |   |   |   | ● | ✓  | 2   |     |     | Up to £1,400,000*        |
| PMS Fabrications Ltd               | 01228 599090       |   |   | ● | ● | ● | ● |   | ● | ● | ● |   |   | ● | ● |    | 3   |     |     | Up to £1,400,000         |
| Robinson Structures Ltd            | 01332 574711       |   |   | ● | ● | ● | ● |   |   |   | ● |   |   |   | ● | ✓  | 3   |     |     | Up to £2,000,000         |
| S H Structures Ltd                 | 01977 681931       | ● |   | ● | ● | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ✓  | 4   | ✓   | ●   | Up to £3,000,000         |
| SAH Engineering Ltd                | 01582 584220       |   |   | ● | ● | ● |   |   |   | ● | ● |   |   | ● | ● |    | 2   |     |     | Up to £800,000           |
| SDM Fabrication Ltd                | 01354 660895       | ● | ● | ● | ● | ● | ● |   |   |   | ● |   |   | ● | ● | ✓  | 4   |     |     | Up to £3,000,000         |
| Severfield plc                     | 01845 577896       | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| SGC Steel Fabrication              | 01704 531286       |   |   |   | ● |   |   |   |   | ● |   |   |   | ● | ● | ✓  | 2   |     |     | Up to £200,000           |
| Shaun Hodgson Engineering Ltd      | 01553 766499       | ● |   | ● | ● |   | ● |   |   | ● | ● |   |   | ● | ● | ✓  | 3   |     |     | Up to £1,400,000         |
| Shipley Structures Ltd             | 01400 251480       |   |   | ● | ● | ● | ● |   | ● | ● | ● |   |   | ● | ● |    | 2   |     |     | Up to £3,000,000         |
| Snashall Steel Fabrications Co Ltd | 01300 345588       |   |   | ● | ● | ● | ● | ● |   |   | ● |   |   |   | ● |    | 2   | ✓   |     | Up to £2,000,000         |
| South Durham Structures Ltd        | 01388 777350       |   |   | ● | ● | ● |   |   |   | ● |   |   |   |   | ● |    | 2   |     |     | Up to £1,400,000         |
| Southern Fabrications (Sussex) Ltd | 01243 649000       |   |   |   | ● | ● |   |   |   | ● | ● |   |   | ● | ● | ✓  | 2   |     |     | Up to £1,400,000         |
| Steel & Roofing Systems            | 00 353 56 444 1855 | ● |   | ● | ● | ● | ● |   |   |   | ● | ● |   | ● | ● | ✓  | 4   |     |     | Up to £3,000,000         |
| Structural Fabrications Ltd        | 01332 747400       | ● |   |   | ● | ● | ● | ● | ● | ● | ● |   |   | ● | ● | ✓  | 3   |     | ●   | Up to £1,400,000         |
| Taunton Fabrications Ltd           | 01823 324266       |   |   |   | ● |   |   |   |   | ● | ● |   |   |   | ● | ✓  | 2   |     | ●   | Up to £2,000,000         |
| Taziker Industrial Ltd             | 01204 468080       | ● |   | ● | ● |   | ● |   |   | ● | ● |   | ● | ● | ● | ✓  | 3   |     |     | Above £6,000,000         |
| Temple Mill Fabrications Ltd       | 01623 741720       |   |   | ● | ● | ● | ● |   |   | ● | ● |   |   | ● | ● | ✓  | 2   |     |     | Up to £400,000           |
| Traditional Structures Ltd         | 01922 414172       |   |   | ● | ● | ● | ● | ● | ● |   | ● |   |   | ● | ● | ✓  | 3   | ✓   | ●   | Up to £2,000,000         |
| TSI Structures Ltd                 | 01603 720031       |   |   | ● | ● | ● | ● | ● |   |   | ● |   |   | ● |   |    | 2   | ✓   |     | Up to £2,000,000         |
| W I G Engineering Ltd              | 01869 320515       |   |   |   | ● |   |   |   |   | ● |   |   |   |   | ● | ✓  | 2   |     |     | Up to £400,000           |
| Walter Watson Ltd                  | 028 4377 8711      |   |   | ● | ● | ● | ● | ● |   |   |   | ● |   |   |   | ✓  | 4   |     |     | Above £6,000,000         |
| Westbury Park Engineering Ltd      | 01373 825500       | ● |   | ● | ● | ● | ● | ● | ● | ● | ● |   |   |   | ● | ✓  | 4   |     | ●   | Up to £800,000           |
| William Haley Engineering Ltd      | 01278 760591       |   |   |   | ● | ● | ● |   |   |   |   |   |   |   |   | ✓  | 4   |     | ●   | Up to £6,000,000         |
| William Hare Ltd                   | 0161 609 0000      | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓  | 4   | ✓   | ●   | Above £6,000,000         |
| WT Fabrications (NE) Ltd           | 01642 691191       |   |   | ● | ● | ● | ● |   |   |   | ● |   |   | ● | ● | ✓  | 4   |     |     | Up to £40,000            |
| Company name                       | Tel                | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | FPC | BIM | SCM | Guide Contract Value (1) |



# Steelwork contractors for bridgeworks



The Register of Qualified Steelwork Contractors Scheme for Bridgeworks (RQSC) is open to any Steelwork Contractor who has a fabrication facility within the European Union.

Applicants may be registered in one or more category to undertake the fabrication and the responsibility for any design and erection of:

|  |   |
|--|---|
| <b>FB</b> Footbridges  | <b>FRF</b> Factory-based bridge refurbishment   |
| <b>CF</b> Complex footbridges  | <b>AS</b> Ancillary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)                        |
| <b>SG</b> Sign gantries  | <b>QM</b> Quality management certification to ISO 9001  |
| <b>PG</b> Bridges made principally from plate girders  | <b>FPC</b> Factory Production Control certification to BS EN 1090-1<br>1 – Execution Class 1 2 – Execution Class 2<br>3 – Execution Class 3 4 – Execution Class 4 |
| <b>TW</b> Bridges made principally from trusswork  | <b>BIM</b> BIM Level 2 compliant  |
| <b>BA</b> Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)                      | <b>SCM</b> Steel Construction Sustainability Charter<br>(● = Gold, ○ = Silver, ◐ = Member)  |
| <b>CM</b> Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span) |   |
| <b>MB</b> Moving bridges   |   |
| <b>SRF</b> Site-based bridge refurbishment   |   |

#### Notes

(1) Contracts which are primarily steelwork but which may include associated works. The steelwork contract value for which a company is pre-qualified under the Scheme is intended to give guidance on the size of steelwork contract that can be undertaken; where a project lasts longer than a year, the value is the proportion of the steelwork contract to be undertaken within a 12 month period.

Where an asterisk (\*) appears against any company's classification number, this indicates that the assets required for this classification level are those of the parent company.

| BCSA steelwork contractor member           | Tel                | FB | CF | SG | PG | TW | BA | CM | MB | SRF | FRF | AS | QM | FPC | BIM | NHSS<br>19A | 20 | SCM | Guide Contract Value <sup>(1)</sup> |
|--|--------------------|----|----|----|----|----|----|----|----|-----|-----|----|----|-----|-----|-------------|----|-----|-------------------------------------|
| AJ Engineering & Construction Services Ltd | 01309 671919       | ●  |    |    | ●  | ●  | ●  | ●  | ●  |     |     | ●  | ✓  | 4   |     |             |    | ○   | Up to £3,000,000                    |
| Billington Structures Ltd                  | 01226 340666       | ●  |    | ●  | ●  | ●  | ●  |    |    |     |     | ●  | ✓  | 4   | ✓   | ✓           | ✓  | ○   | Above £6,000,000                    |
| Bourne Group Ltd                           | 01202 746666       |    |    |    | ●  | ●  |    |    |    | ●   |     |    | ✓  | 4   | ✓   |             |    | ○   | Above £6,000,000                    |
| Briton Fabricators Ltd                     | 0115 963 2901      | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £6,000,000                    |
| Cairnhill Structures Ltd                   | 01236 449393       | ●  | ●  | ●  | ●  | ●  | ●  | ●  |    | ●   | ●   | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £4,000,000                    |
| Cementation Fabrications                   | 0300 105 0135      | ●  |    | ●  | ●  | ●  | ●  |    |    |     |     | ●  | ✓  | 3   |     |             | ✓  | ○   | Up to £6,000,000                    |
| Cleveland Bridge UK Ltd                    | 01325 381188       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     | ✓           | ✓  | ○   | Above £6,000,000                    |
| D Hughes Welding & Fabrication Ltd         | 01248 421104       | ●  |    | ●  |    | ●  |    |    |    |     |     | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £800,000                      |
| Donyal Engineering Ltd                     | 01207 270909       | ●  |    | ●  |    |    |    |    |    | ●   | ●   | ●  | ✓  | 3   |     |             | ✓  | ○   | Up to £1,400,000                    |
| ECS Engineering Services Ltd               | 01773 860001       | ●  |    |    | ●  | ●  | ●  |    | ●  |     |     | ●  | ✓  | 3   |     |             |    | ○   | Up to £3,000,000                    |
| Four-Tees Engineers Ltd                    | 01489 885899       | ●  |    |    | ●  | ●  | ●  |    | ●  | ●   | ●   | ●  | ✓  | 3   |     |             | ✓  | ○   | Up to £2,000,000                    |
| Kiernan Structural Steel Ltd               | 00 353 43 334 1445 | ●  |    |    |    | ●  |    |    |    |     |     | ●  | ✓  | 4   | ✓   |             | ✓  | ○   | Up to £6,000,000                    |
| M Hasson & Sons Ltd                        | 028 2957 1281      | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £2,000,000                    |
| Millar Callaghan Engineering Services Ltd  | 01294 217711       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £1,400,000                    |
| Murphy International Ltd                   | 00 353 45 431384   | ●  | ●  | ●  | ●  | ●  | ●  |    |    |     |     | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £1,400,000                    |
| Nusteel Structures Ltd                     | 01303 268112       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     | ✓           | ✓  | ○   | Up to £6,000,000                    |
| S H Structures Ltd                         | 01977 681931       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   | ✓   |             | ✓  | ○   | Up to £3,000,000                    |
| Severfield (UK) Ltd                        | 01204 699999       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   | ✓   | ✓           | ✓  | ○   | Above £6,000,000                    |
| Shaun Hodgson Engineering Ltd              |                    |    |    |    |    |    |    |    |    |     |     | ●  | ✓  | 3   |     |             |    |     | Up to £1,400,000                    |
| Structural Fabrications Ltd                | 01332 747400       | ●  |    | ●  | ●  | ●  | ●  |    |    | ●   | ●   | ●  | ✓  | 3   |     |             |    | ○   | Up to £1,400,000                    |
| Taziker Industrial Ltd                     | 01204 468080       | ●  |    | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 3   |     | ✓           | ✓  | ○   | Above £6,000,000                    |
| Underhill Engineering Ltd                  | 01752 752483       | ●  | ●  | ●  | ●  | ●  |    |    |    | ●   | ●   | ●  | ✓  | 4   | ✓   |             | ✓  | ○   | Up to £3,000,000                    |
| William Hare Ltd                           | 0161 609 0000      | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   | ✓   | ✓           | ✓  | ○   | Above £6,000,000                    |
| <b>Non-BCSA member</b>                     |                    |    |    |    |    |    |    |    |    |     |     |    |    |     |     |             |    |     |                                     |
| Allerton Steel Ltd                         | 01609 774471       | ●  |    | ●  | ●  | ●  | ●  | ●  |    |     | ●   | ●  |    | 4   | ✓   |             |    |     | Up to £4,000,000                    |
| Centregreat Engineering Ltd                | 029 2046 5683      | ●  |    | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     |             |    |     | Up to £2,000,000                    |
| Cimolai SpA                                | 01223 836299       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     | ✓           | ✓  |     | Above £6,000,000                    |
| CTS Bridges Ltd                            | 01484 606416       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £1,400,000                    |
| Ekspan Ltd                                 | 0114 261 1126      | ●  |    |    |    | ●  |    |    | ●  | ●   | ●   | ●  | ✓  | 2   |     |             |    |     | Up to £400,000                      |
| Francis & Lewis International Ltd          | 01452 722200       |    |    |    |    |    |    |    |    |     |     | ●  | ✓  | 4   |     |             | ✓  | ○   | Up to £2,000,000                    |
| Harrisons Engineering (Lancashire) Ltd     | 01254 823993       | ●  |    | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 3   |     | ✓           |    |     | Up to £1,400,000                    |
| Hollandia Infra BV                         | 00 31 180 540 540  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     |             |    |     | Above £6,000,000*                   |
| HS Carlsteel Engineering Ltd               | 020 8312 1879      |    |    |    |    |    |    |    |    | ●   | ●   | ●  | ✓  | 3   |     |             | ✓  |     | Up to £200,000                      |
| IHC Engineering (UK) Ltd                   | 01773 861734       |    |    |    |    |    |    |    |    |     |     | ●  | ✓  | 3   |     |             | ✓  |     | Up to £400,000                      |
| In-Spec Manufacturing Ltd                  | 01642 210716       |    |    |    |    |    |    |    |    | ●   | ●   | ●  | ✓  | 4   |     |             | ✓  |     | Up to £400,000                      |
| Kelly's Welders & Blacksmiths Ltd          | 01383 512 517      |    |    |    |    |    |    |    |    |     |     | ●  | ✓  | 2   |     |             | ✓  |     | Up to £200,000                      |
| Lanarkshire Welding Company Ltd            | 01698 264271       | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     | ✓           | ✓  | ○   | Up to £3,000,000                    |
| Total Steelwork & Fabrication Ltd          | 01925 234320       | ●  |    | ●  |    | ●  |    |    |    | ●   | ●   | ●  | ✓  | 3   |     |             | ✓  |     | Up to £3,000,000                    |
| Victor Buyck Steel Construction            | 00 32 9 376 2211   | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●  | ✓  | 4   |     | ✓           | ✓  | ○   | Above £6,000,000                    |



## Corporate Members

Corporate Members are clients, professional offices, educational establishments etc which support the development of national specifications, quality, fabrication and erection techniques, overall industry efficiency and good practice.

| Company name                 | Tel           | Company name                           | Tel           | Company name | Tel           |
|------------------------------|---------------|--|---------------|--------------|---------------|
| Gene Mathers                 | 0115 974 7831 | Inspire Insurance Services             | 02476 998924  | SUM Ltd      | 0113 242 7390 |
| Griffiths & Armour           | 0151 236 5656 | Sandberg LLP                           | 020 7565 7000 |              |               |
| Highways England Company Ltd | 08457 504030  | Structural & Weld Testing Services Ltd | 01795 420264  |              |               |



# Industry Members

Industry Members are those principal companies involved in the direct supply to all or some Steelwork Contractor Members of components, materials or products. Industry member companies must have a registered office within the United Kingdom or Republic of Ireland.

**QM** Quality management certification to ISO 9001  
**FPC** Factory Production Control certification to BS EN 1090-1  
 1 Execution class 1 2 Execution class 2  
 3 Execution class 3 4 Execution class 4  
**NHSS** National Highway Sector Scheme

**CE**  
 CE Marking compliant, where relevant:  
**M** manufacturer (products CE Marked)  
**D/I** distributor/importer (systems comply with the CPR)  
 N/A CPR not applicable

**SCM**  
 Steel Construction Sustainability Charter  
 ● = Gold,  
 ○ = Silver,  
 ● = Member

**SfL**  
 Steel  
 for Life  
 Sponsor

## Structural components

| Company name                       | Tel                     | QM | CE  | FPC | NHSS | SCM | SfL      |
|------------------------------------|-------------------------|----|-----|-----|------|-----|----------|
| Albion Sections Ltd                | 0121 553 1877           | ✓  | M   | 4   |      |     |          |
| BW Industries Ltd                  | 01262 400088            | ✓  | M   | 3   |      |     |          |
| Cellbeam Ltd                       | 01937 840600            | ✓  | M   | 4   | 20   |     |          |
| Composite Profiles UK Ltd          | 01202 659237            |    | D/I |     |      |     |          |
| Construction Metal Forming Ltd     | 01495 761080            | ✓  | M   | 3   |      |     |          |
| Daver Steels Ltd                   | 0114 261 1999           | ✓  | M   | 3   |      |     |          |
| Fabsec Ltd                         | 01937 840641            |    | N/A |     |      |     |          |
| Farrat Isolevel                    | 0161 924 1600           | ✓  | N/A |     |      |     |          |
| FLI Structures                     | 01452 722200            | ✓  | M   | 4   | 20   | ●   |          |
| Hadley Industries Plc              | 0121 555 1342           | ✓  | M   | 4   |      | ●   |          |
| Hi-Span Ltd                        | 01953 603081            | ✓  | M   | 4   |      | ●   |          |
| <b>Jamestown Manufacturing Ltd</b> | <b>00 353 45 434288</b> | ✓  | M   | 4   | 20   |     | Headline |
| Kingspan Structural Products       | 01944 712000            | ✓  | M   | 4   |      | ●   |          |
| Lionweld Group                     | 01642 233238            | ✓  | M   | 4   |      |     |          |
| MSW UK Ltd                         | 0115 946 2316           |    | D/I |     |      |     |          |
| Prodeck-Fixing Ltd                 | 01278 780586            | ✓  | D/I |     |      |     |          |
| Structural Metal Decks Ltd         | 01202 718898            | ✓  | M   | 2   |      |     |          |
| Stud-Deck Services Ltd             | 01335 390069            |    | D/I |     |      |     |          |
| <b>Tata Steel – ComFlor</b>        | <b>01244 892199</b>     |    | M   |     |      |     | Silver   |
| voestalpine Metsec plc             | 0121 601 6000           | ✓  | M   | 4   |      | ●   | Gold     |

## Computer software

| Company name               | Tel           | QM | CE  | FPC | NHSS | SCM | SfL    |
|----------------------------|---------------|----|-----|-----|------|-----|--------|
| Idea Statica UK Ltd        | 02035 799397  |    | N/A |     |      |     |        |
| StruMIS Ltd                | 01332 545800  |    | N/A |     |      |     |        |
| Trimble Solutions (UK) Ltd | 0113 887 9790 |    | N/A |     |      |     | Silver |

## Steel producers

| Company name              | Tel                 | QM | CE | FPC | NHSS | SCM | SfL    |
|---------------------------|---------------------|----|----|-----|------|-----|--------|
| British Steel Ltd         | 01724 404040        | ✓  | M  |     |      |     |        |
| <b>Tata Steel – Tubes</b> | <b>01536 402121</b> | ✓  | M  |     |      |     | Silver |

## Manufacturing equipment

| Company name                          | Tel                 | QM | CE  | FPC | NHSS | SCM | SfL    |
|---------------------------------------|---------------------|----|-----|-----|------|-----|--------|
| Behringer Ltd                         | 01296 668259        |    | N/A |     |      |     |        |
| <b>Cutmaster Machines (UK) Ltd</b>    | <b>07799 740191</b> |    | N/A |     |      |     | Bronze |
| <b>Ficep (UK) Ltd</b>                 | <b>01924 223530</b> |    | N/A |     |      |     | Gold   |
| <b>Kaltenbach Ltd</b>                 | <b>01234 213201</b> |    | N/A |     |      |     | Silver |
| Lincoln Electric (UK) Ltd             | 0114 287 2401       | ✓  | N/A |     |      |     |        |
| <b>Peddinghaus Corporation UK Ltd</b> | <b>01952 200377</b> |    | N/A |     |      |     | Gold   |
| Wightman Stewart (WJ) Ltd             | 01422 823801        |    | N/A |     |      |     |        |

## Protective systems

| Company name   | Tel                 | QM | CE  | FPC | NHSS | SCM | SfL    |
|--|---------------------|----|-----|-----|------|-----|--------|
| Forward Protective Coatings Ltd                          | 01623 748323        | ✓  | N/A |     |      |     |        |
| <b>Hempel UK Ltd</b>                                     | <b>01633 874024</b> | ✓  | N/A |     |      |     | Bronze |
| Highland Metals Ltd                                      | 01343 548855        | ✓  | N/A |     |      |     |        |
| International Paint Ltd                                  | 0191 469 6111       | ✓  | N/A |     |      |     |        |
| <b>Jack Tighe Ltd</b>                                    | <b>01302 880360</b> | ✓  | N/A |     | 19A  |     | Silver |
| <b>Joseph Ash Galvanizing</b>                            | <b>01246 854650</b> | ✓  | N/A |     |      |     | Bronze |
| <b>Jotun Paints (Europe) Ltd</b>                         | <b>01724 400000</b> | ✓  | N/A |     |      |     | Bronze |
| PPG Architectural Coatings UK & Ireland                  | 01924 354233        | ✓  | N/A |     |      |     |        |
| <b>Sherwin-Williams Protective &amp; Marine Coatings</b> | <b>01204 521771</b> | ✓  | N/A |     |      | ●   | Bronze |
| Vale Protective Coatings Ltd                             | 01949 869784        |    | N/A |     |      |     |        |
| <b>Wedge Group Galvanizing Ltd</b>                       | <b>01909 486384</b> | ✓  | N/A |     |      |     | Gold   |

## Safety systems

| Company name  | Tel          | QM | CE  | FPC | NHSS | SCM | SfL |
|---------------|--------------|----|-----|-----|------|-----|-----|
| easi-edge Ltd | 01777 870901 | ✓  | N/A |     |      | ●   |     |

## Steel stockholders

| Company name                                    | Tel                 | QM | CE  | FPC | NHSS | SCM | SfL      |
|---|---------------------|----|-----|-----|------|-----|----------|
| <b>AJN Steelstock Ltd</b>                       | <b>01638 555500</b> | ✓  | M   | 4   |      |     | Bronze   |
| <b>Arcelor Mittal Distribution - Scunthorpe</b> | <b>01724 810810</b> | ✓  | D/I | 4   | 3B   |     | Headline |
| <b>Barrett Steel Services Limited</b>           | <b>01274 682281</b> | ✓  | M   | 4   | 3B   |     | Headline |
| British Steel Distribution                      | 01642 405040        | ✓  | D/I | 4   |      |     |          |
| <b>Cleveland Steel &amp; Tubes Ltd</b>          | <b>01845 577789</b> | ✓  | M   | 3   |      |     | Gold     |
| Dent Steel Services (Yorkshire) Ltd             | 01274 607070        | ✓  | M   | 4   | 3B   |     |          |
| Dillinger Hutte U.K. Limited                    | 01724 231176        | ✓  | D/I | 4   |      |     |          |
| Duggan Profiles & Steel Service Centre Ltd      | 00 353 56772485     | ✓  | M   | 4   |      |     |          |
| Kloekner Metals UK                              | 0113 254 0711       | ✓  | D/I | 4   | 3B   |     |          |
| Murray Plate Group Ltd                          | 0161 866 0266       | ✓  | D/I | 4   | 3B   |     |          |
| <b>NationalTube Stockholders Ltd</b>            | <b>01845 577440</b> | ✓  | D/I |     | 3B   |     | Gold     |
| Rainham Steel Co Ltd                            | 01708 522311        | ✓  | D/I | 4   | 3B   |     |          |

## Structural fasteners

| Company name                     | Tel                 | QM | CE | FPC | NHSS | SCM | SfL    |
|----------------------------------|---------------------|----|----|-----|------|-----|--------|
| BAPP Group Ltd                   | 01226 383824        | ✓  | M  |     | 3    |     |        |
| Cooper & Turner Ltd              | 0114 256 0057       | ✓  | M  |     | 3    |     |        |
| Lindapter International          | 01274 521444        | ✓  | M  |     |      |     |        |
| <b>Tension Control Bolts Ltd</b> | <b>01978 661122</b> | ✓  | M  |     | 3    |     | Bronze |

## Welding equipment and consumables

| Company name     | Tel          | QM | CE  | FPC | NHSS | SCM | SfL |
|------------------|--------------|----|-----|-----|------|-----|-----|
| Air Products PLC | 01270 614167 |    | N/A |     |      |     |     |



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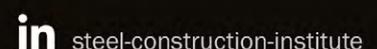
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