

APRIL 2021

# NSC



**Steel delivers South Bank vision**

**Landmark car park for Hatfield**

**Steel on the ascent in Oldham**

**Low carbon sheds for Edinburgh**

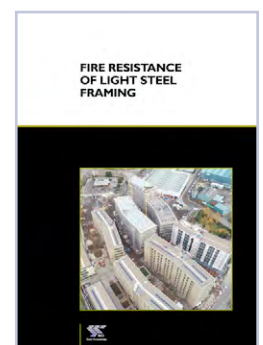
# NEW SCI Publication

## Fire Resistance of Light Steel Framing (P424)

This new design guidance provides information on how light steel framed buildings should be designed and detailed to provide fire resistance in accordance with the Building Regulations.

The guidance includes:

- Detailed design information on the application of the Building Regulation requirements to light steel framing, including requirements for fire testing.
- Construction practice and detailing of light steel frames and their interfaces with other materials for fire resistance.
- A set of typical generic construction details for light steel framing in terms of design for fire resistance is provided.
- Calculation methods which may be used to extend the tested fire performance of a light steel wall or floor construction to a wider range of design parameters.



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## All you need to know about Steel Construction

Everything construction professionals need to know to optimise the design and construction of steel-framed buildings and bridges can be easily accessed in one place at [www.SteelConstruction.info](http://www.SteelConstruction.info), the largest and most comprehensive database of steel design guidance and advice available anywhere.

This online encyclopedia is an invaluable first stop for steel construction information. Produced and maintained by industry experts, detailed guidance is provided on a wide range of key topics including sustainability and cost as well as design and construction.

This is supported by some 250 freely downloadable PDF documents and over 500 case studies of real projects.

The site also provides a single portal, one-stop-shop access to key resources including:

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- The Blue Book
- Eurocode design guides
- Advisory Desk Notes
- Steel section tables
- Steel design tools

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# Steel sheds support pandemic strategies



Nick Barrett - Editor

The Editor's Comment in NSC a year ago struck an optimistic note in suggesting that there seemed to be some good news ahead in the COVID-19 battle. It was early days, and as it turned out there was a long, hard way to go, but a fall in the rate of increase in new cases at that time was a welcome respite from what had so far been almost non-stop bad news relating to the pandemic.

The light at the end of tunnel turned out to be another tunnel however, and there were further lockdowns to come. But construction sites still managed to operate, and the industry has since been acknowledged as having played a courageous role, keeping sites working and essential services functioning.

BCSA called for clients, main contractors, specialists, sub-contractors and sub-subcontractors to play their part through mutual respect for each other's situations and acknowledge that human life is more important than construction programmes. Contractors managed to ensure that sites remained open, and health and safety precautions to prevent the spread of the virus seem to have been widely observed.

A year on, the prospects are looking bright again with vaccines being deployed and economic forecasts sounding positive notes. Steelwork contractors report that after a four-month period of uncertainty last Spring-early Summer, demand started to revive. Some sectors have grown strongly since then, in particular sheds as we detail in our article this month.

Steel is uniquely suited to creating sheds, now called the Industrial and Logistics market by the property industry. This market had to grow rapidly in response to an urgent need for storage and distribution facilities to support expansion in online shopping as non-essential shops were forced to close, and worried shoppers stayed away even from the supermarkets which were allowed to open.

The sheds sector continues to grow but other sectors either already know or are learning that steel is the best suited material for them. As we see throughout this issue of NSC, steel is the material of first choice for the widest range of buildings and other structures across the UK, including multi-storey commercial buildings, such as the 18-storey Bankside Yards tower being built on London's South Bank where 14 metre spans were desired, and a steel frame's lighter self-weight also helped swing the designers away from concrete alternatives.

New types of facilities are being built while we wait for lockdown relaxation to allow their use, as we see at Oldham where an Olympic standard climbing centre is being built to cater for the growing craze for this sport. A more established Olympics event, swimming, is being catered for along with a wide range of other sports at a leisure centre at Barnstaple. Steel allowed excavation of the swimming pool to be carried out after the frame was erected, saving costs.

Proof of the resumed growth of the speculative shed development mentioned in our sheds article can be seen in our project report from Edinburgh where the uninterrupted clear spans in three steel-framed industrial blocks will provide great flexibility for a range of tenants, while achieving a more favourable carbon footprint than alternative framing materials. We look forward to telling readers more about steel's outstanding sustainability benefits as the recovery from the pandemic continues.



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# City of London approves third office tower in 2021

The City of London Corporation has approved a new 38-storey development at 2 Finsbury Avenue, making it the third tall building to receive planning permission in the Square Mile in 2021.

Highlighting the confidence developers have for new [commercial developments](#) in the City, the news follows hot on the heels of the planning consents given for 55 and 70 Gracechurch Street earlier this year.

The 2 Finsbury Avenue office-led development, by British Land and GIC, aims to become an innovative, inclusive and sustainable place to work, visit and learn.

The scheme, which is designed by Danish firm 3XN, incorporates new ways of working with [flexible and adaptable](#) workspace suitable for a range of occupiers - from incubators and start-ups to medium-sized businesses. An innovative 'Open Learning Hub' will be provided as a way for local communities to access the City's knowledge and expertise through formal learning programmes, informal networks and talks from institutional providers.

The scheme is targeting a [BREEAM](#) 'Outstanding' rating through high [sustainability](#) standards including the adoption of [Circular Economy](#) and Whole Life Carbon principles.

Chair of the Planning and Transportation Committee at the City of London Corporation, Alastair Moss, said: "The high-quality design for 2 Finsbury Avenue is yet another step in the radical transformation of Broadgate as a thriving and vibrant destination in the City.

"It will re-enliven the Liverpool Street area through better pedestrian connectivity, improved urban greening and the enhancement and activation of the public realm."

Head of Development at British Land, Nigel Webb, said: "We're delighted with the City of London Corporation's decision to grant planning permission for 2 Finsbury Avenue.

"As businesses look beyond COVID-19, it is clear that high quality workspace in great locations will continue to play a crucial role in their success, by promoting and supporting innovation, collaboration, training and culture."



# Landmark Swansea bridge lifted into position

An eye-catching [steel footbridge](#) has been installed as part of the Copr Bay Phase One Regeneration and Arena Scheme in Swansea.

With a 50m-span, the bridge structure is 12m-wide and 7.5m-high and has a structural skin of 15mm-thick

plate. Featuring a distinctive gold paint finish, the side panel plates are perforated with numerous laser profiled cut-outs and pressed into complex shapes.

[Fabricated](#), supplied and installed by S H Structures, on behalf of main

contractor Buckingham Group, the 140t bridge was [delivered to site](#) in sections, consisting of four deck pieces, six roof sections and 11 side panels.

The bridge deck was assembled on temporary works positioned in an area adjacent to the site. The curved plates,

which form the sides, arch and roof were then [welded](#), before the complete structure was given its final [topcoat](#) of gold paint.

The completed structure was lifted onto [self-propelled mobile transporters](#) (SPMTs) and then manoeuvred into position during a Saturday night road closure.

Swansea Council Leader Rob Stewart said: "This is another big milestone in the transformation of our city.

"With its bold design and striking façade that will complement the new state-of-the-art [arena](#), the bridge will become a stunning new landmark for the city and an emblem nationally and internationally of a modern welcoming city.

Friedrich Ludewig, Design Director for ACME said: "The new bridge is a true piece of international innovation for Swansea.

"ACME worked with Brussels-based structural engineers Ney & Partners to design this bridge made from [steel plate](#).

"The iconic [arch](#) stabilises the super-slim bridge deck and creates a new urban space floating over the road, enclosed by patterned steel offering glimpses across the road, the arena and the new coastal park."



# Severfield acquires Yorkshire-based DAM Structures

Severfield has acquired DAM Structures, paying £12M for the business with another £7M payable next year.

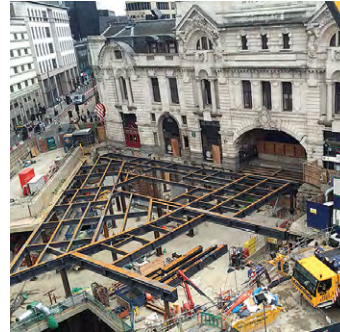
DAM Structures is a Yorkshire-based steelwork contractor that designs, manufactures and erects structures for the early-stage construction and rail electrification sectors.

The company's manufacturing capabilities include both temporary and permanent works, ranging from plunge columns, plated beams, box sections, tower crane grillages, small and large diameter propping works, façade retention towers, portal-framed structures, mezzanine floors, heavy duty stairs and minor bridges.

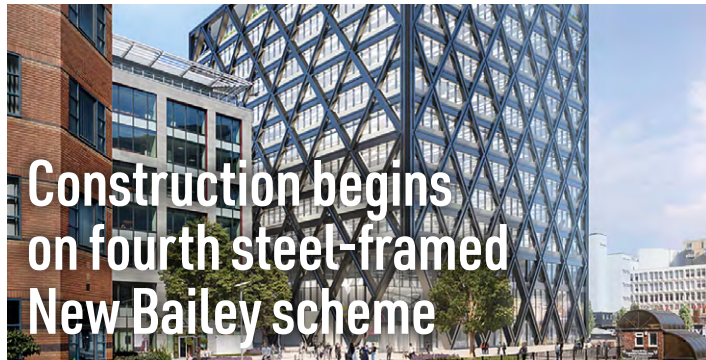
It operates from its bespoke premises in Carnaby and can currently process up to 300t of structural steelwork per week for distribution across the UK. DAM Structures currently has 76 employees.

Commenting on the acquisition, Severfield Chief Executive Alan Dunsmore said: "This is a very exciting, highly complementary acquisition which will help the Group continue to deliver on its strategic growth objectives.

"DAM Structures will provide us with access to existing and new customers earlier in the construction process as well as access to new market sectors with strong growth potential including the growing rail electrification sector.



DAM Structures has an established client base and proven track record of delivering quality services and will fit in well with the Severfield culture and team."



## Construction begins on fourth steel-framed New Bailey scheme

Bowmer + Kirkland has started work on what is said to be the most sustainable development to date on The English Cities Fund's New Bailey development in Salford.

Four New Bailey – which will reach 10 storeys and provide 16,200m<sup>2</sup> of prime, Grade A office space – was pre-let on a 20-year lease in October 2020 to telecommunications giant BT, which

represented the largest single pre-let in the region for the year.

The building has been designed by Make architects, and will feature an exposed lattice steel frame, influenced by the bridges along the nearby River Irwell.

Phil Mayall, Regional Director at The English Cities Fund, said: "Getting the spade in the ground on our latest development at New Bailey and keeping momentum on the wider scheme, despite the ongoing pandemic, is something we're incredibly proud of."

One New Bailey, Two New Bailey and Three New Bailey are also steel-framed buildings erected by Billington Structures, Severfield and EvadX respectively.

# Steel creates new residential scheme for Glasgow

Working on behalf of Springfield Properties, Hescott Engineering is fabricating, supplying and erecting 600t of structural steelwork for a residential scheme in Dalmarnock, Glasgow.

Being built on the site of a former goods yard, which has lain vacant for decades,

the scheme consists of three blocks that will contain flats ranging from one to five bedroom units.

Andrew Kubski, Director of Development and Asset Management at West of Scotland Housing Association, commented: "We are excited that

construction has started on our 114 homes in Dalmarnock that will transform the streetscape of this section of Dalmarnock Road and also see the creation of our first ever mid-market rent homes."

Councillor Kenny McLean, City Convener for Neighbourhoods, Housing and Public Realm at Glasgow City Council, said: "It's great to see work beginning on these new homes and all the more pleasing to see the large number of homes involved.

"We are pleased to support the project partners in this development, and we can all look forward to these new high-quality and energy-efficient homes enhancing the quality of life in the area."

As well as steelwork, Hescott is also installing precast stairs, metal decking and edge protection.

The project is expected to be complete in early 2022.



## NEWS IN BRIEF

**BAM Construction** has been appointed to deliver a leisure centre, promenade and associated works by Folkestone & Hythe District Council. Construction will begin on the Princes Parade site in Hythe during the first quarter of 2022, with preparatory works beginning this month.

**Deeside Regeneration** Limited has received detailed planning consent for its new 4,200m<sup>2</sup> speculative industrial scheme located adjacent to Junction 35 of the M4 Motorway, on Pencoed Technology Park. It is supported by the European Regional Development Fund through the Welsh Government. In line with the Welsh Government's sustainable buildings standards it aims to achieve a BREEAM 'Excellent' rating.

**Willmott Dixon** has been appointed by Stevenage Borough Council to build a new £8M bus interchange as part of the town's 20-year £1bn regeneration programme. The project will see the company deliver a significant upgrade on Stevenage's existing bus station by creating a facility with a host of modern features that will make it an important regional transport hub.

Work is set to begin on a Biomedical Cluster in Dundee after the project was officially signed off by the Tay Cities Region Joint Committee. The project will help the post-COVID-19 recovery through the development of new medicines, innovative medical technologies and the provision of high-quality new jobs, according to the University of Dundee academics leading it.

Construction has started on the £7M state-of-the-art replacement for Cedarbank School in Livingston. The new stand-alone, modern purpose-built facility will bring up to 130 Cedarbank pupils together, from three locations, under one roof when it opens in 2022.

## PRESIDENT'S COLUMN

I've been informed by my social media that I've been in this industry for 25 years. During that time, a lot of technological advances have been brought into the industry, all with the aim of making our lives a lot easier. In many ways they have, a lot of the **design**



and detailing programs on the market are superb bits of kit. One of the things that hasn't improved however, is the quality and timeliness of coordinated information that we all have to suffer. During that time, every new technological advance was going to be the cure to poor information flow: the post, the fax, the email, extranets and BIM platforms. Certainly, the information flow has exponentially increased, but alas the quality of that information leaves a lot to be desired. What it means in the final reckoning is a lot of additional pressure put on our designers and detailers, with shortened lead in's that can only make the probability of errors creeping in more likely, both in the technical and production phases. We all know the number of variations that are caused by this wasteful process, nobody likes doing them, nobody likes to pay for them.

Why is it still happening? In my opinion it's the procurement process adopted in the UK. Main Contractors just refuse to appoint all the necessary design teams at the appropriate time, such that coordinated information can be accurately modelled. If they didn't feel they needed to squeeze every pound out of the contract and just appointed the right guys on the right job much faster, I think that a lot of the problems we all face would be vastly reduced. I have found BIM to be a great idea, just like Esperanto, but it's not working at the top end of the industry, that being client to steelwork contractor. Where it is more successful is between steelwork contractors and our sub-trades, such as **metal deck**, precast and **edge protection** contractors. Passing our models back through the chain to, say, architects for checking, also seems to work well.

Whilst sat in a **sustainability** meeting talking with a diverse set of academic thinkers, consulting engineers and steelwork contractors, much of the talk was on "minimum weight" design, the **re-use of steel** and the **recycling of steel**. The recycling argument of steel is a "no-brainer"; we should push that message hard. "Minimum weight" design was tried very unsuccessfully 25 years ago. In its worst form its "gravity only" design for the final condition only. Practical designers know only too well the many design and detailing challenges that are caused by inappropriate **member design**. I also think that with the advent of 3D steel design software, the days of inefficient design by consulting engineers are well gone. If anything, we spend more time in value engineering sessions trying to make changes to the structural system to pay for all the secondary steel left out of the primary design. Re-use in theory can be useful if done correctly and intelligently. There is talk of suggested minimum percentages of re-used steel on future contracts, but it is just not practical yet.

The steelwork industry is one of the most competitive industries you could be involved with. The vast majority of contracts are for bespoke buildings with the steelwork packages being priced at production style wafer thin margins. Working in the steelwork industry can be very frustrating, but it certainly is not dull.

**Mark Denham**  
BCSA President

## Work starts on £22M Edinburgh robotics research centre

Robertson Construction has begun work on the National Robotarium at Heriot-Watt University in Edinburgh.

The steel-framed facility, which will be the largest and most advanced of its type in the UK, will be a centre of excellence for pioneering research for robotics and artificial intelligence.

The National Robotarium will create innovative solutions to global challenges using cutting-edge research, product design and industry collaboration. Bringing together academics and global companies, the facility will provide a catalyst for entrepreneurship and is expected to deliver sustainable economic benefit to Edinburgh, the UK and beyond.

David Cairns, Managing Director, Robertson Construction Central East said: "The National Robotarium building is designed to be as innovative as the research taking place within its walls. The commitment to **sustainability** and the wellbeing of its staff and students mean the facility will be equipped



with state-of-the-art technology for **energy efficiency** and production and will boast considerable green space."

Funded as part of the Edinburgh and South East Scotland City Region Deal, the National Robotarium is a collaboration between Heriot-Watt University and the University of Edinburgh. The 3,700m<sup>2</sup> building will house three distinct research and development areas, providing bespoke facilities for Robotics & Autonomous Systems (RAS), Human & Robotics Interaction (HRI) and High Precision Manufacturing.

BHC are the steelwork contractor for the project.



Steelwork contractor Cleveland Bridge has been awarded a refurbishment contract to undertake renovations of Bristol's Redcliffe Bridge.

The iconic bridge is part of the floating harbour in Bristol, linking Redcliffe Way to the city centre. It

was constructed in 1942, and in 1996 underwent a major electrical and control system refit bringing the installation up to the current industry standards.

Cleveland Bridge has been named as principal contractor for the latest refurbishment work, delivering the project throughout 2021.

The scope of work includes refurbishment of the internal steelwork and bridge parapet, waterproofing of the bridge deck, and mechanical and electrical modifications including the removal of the existing gates and machinery and replacing them with rising arm barriers.

Cleveland Bridge Managing Director Chris Droogan said: "Alongside our proud reputation for building **bridges** in the UK and around the world, we are also gaining a strong track record for rehabilitation projects, which is extending the life of important pieces of transport infrastructure such as the iconic Redcliffe Bridge."

## Twin Slough commercial scheme given planning consent

AshbyCapital and U+I have received planning consent for No 1 and No 3 The Future Works, a 24,100m<sup>2</sup> commercial quarter in the heart of Slough and adjacent to the Crossrail station.

Located either side of the existing No. 2 building and completing the office campus, No 1 The Future Works will offer 15,700m<sup>2</sup> of office and retail space across 12 storeys with roof terraces throughout the building, while No 3 The Future Works comprises 8,500m<sup>2</sup> of office space including a large communal roof terrace.

AshbyCapital and U+I aim to deliver two of the most sustainable and technologically advanced

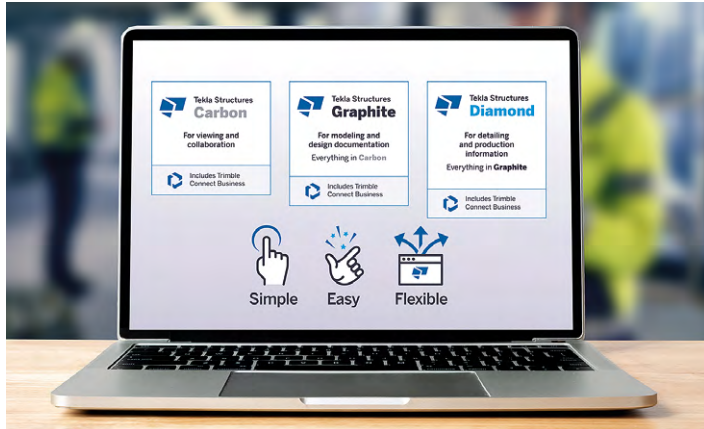


buildings within the Thames Valley, targeting net-zero **carbon emissions**, including an ambitious reduction in **embodied carbon**, and a **BREEAM** 'Excellent' rating for the office floorspace.

As well as prioritising **sustainability**, wellness and technology lie at the heart of the new development, which is designed to be WELL 'Ready' and is targeting a WiredScore Platinum rating for connectivity and digital infrastructure. Best-in-class amenities include multiple roof terraces offering Wi-Fi connectivity, on-site gym facilities, bicycle parking and changing facilities.



# Trimble releases Tekla 2021 Structural BIM solutions



Trimble has introduced the latest versions of its Tekla software solutions for Building Information Modelling (BIM), structural engineering and steel fabrication management – Tekla Structures 2021, Tekla Structural Designer 2021, Tekla Tedds 2021 and Tekla Power Fab 2021.

Tekla Structures 2021 is said to have three new subscription options, which can reduce the upfront investment and provide flexibility. The three options are:

- Carbon: for viewing models and collaborating with project stakeholders
- Graphite: for creating constructible, intelligent BIM and structural

documentation

- Diamond: for design, detailing and fabrication

Tekla Structural Designer 2021 features a new carbon calculator. This provides the ability to understand a structure's embodied carbon impact during design.

Meanwhile, the 2021 version of the steel fabrication management software, Tekla PowerFab, is said to deliver visual dashboard reporting, with enhanced options for filtering and organising data, as well as continued improvements for automated machine instruction on the shop floor.

## Steelwork underway at St. Modwen Park Basingstoke

St. Modwen Logistics has announced that Adstone Construction has started steelwork erection on three units, totalling more than 17,100m<sup>2</sup>, at its new development in Basingstoke.

St. Modwen Park Basingstoke is a 11.3-acre site and will be developed in several phases with the first phase set to complete later this year.

Three units of 3,400m<sup>2</sup>, 4,700m<sup>2</sup> and 9,000m<sup>2</sup> will provide sought-after urban logistics and industrial space for the area. The scheme is scheduled for completion in late July.

Strategically-located between Junction 6 and 7 of the M3 and within 2 miles of Basingstoke town centre, St. Modwen Park Basingstoke is well-placed to capitalise on the town's existing diverse economy, providing fast access to London and Southampton.

St. Modwen Logistics' plans could create a further 250 new jobs for the region, with the scheme designed to help meet the growing demand for high-quality logistics space in the area.

David McGougan, Senior Development Manager at St. Modwen

Logistics, commented: "St. Modwen Park Basingstoke will deliver much-needed urban warehouse space for the

region at an industry-leading standard and we look forward to welcoming new occupiers to the scheme this year."

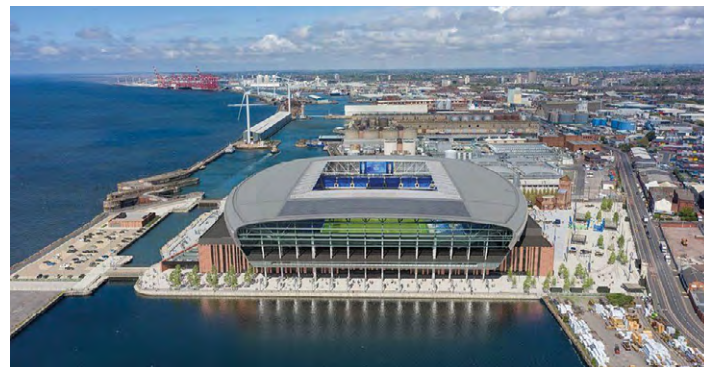


## Green light for Everton Bramley Dock stadium

Everton Football Club's planning applications for a new stadium at Bramley-Moore Dock and a community-led legacy project at Goodison Park have been approved by Liverpool City Council.

The decision to grant approval for a new 52,888-capacity waterfront stadium and the outline application for a re-imagined Goodison Park brings both projects a significant step closer.

Everton Chairman Bill Kenwright said: "Whilst today is just one more step in our long journey, it is a very important one. (Club Owner) Farhad Moshiri and I would like to thank the planning team



for their extraordinary hard work and commitment."

Following the City Council's approval, the plans have now automatically

been referred to the Secretary of State for Housing Communities and Local Government.

It is hoped that the new stadium will host its first football match in 2024. Under the plans, the ground could also host up to four pop concerts a year as well as weddings, funerals, Christmas parties and conferences.

The club's current Goodison Park home will be redeveloped into a mixed-use scheme including affordable housing, a health centre, retail units, leisure spaces and a youth enterprise zone for the local Walton community.

## Diary

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>



### Tue 20 April 2021 Fire Resistance of Light Steel Framing Webinar

SCI/BCSA Members only  
This 1 hour webinar gives an introduction to the design for fire resistance of light steel framing. The webinar will introduce how light steel framed buildings should be designed and detailed to provide fire resistance in accordance with the Building Regulations.



### Tue 11 May 2021 Connections to Cores Webinar

The webinar will follow the contents of SCI publication P416, The design of cast-in plates. Topics addressed will include: the behaviour of simple connections to cast-in plates; connections with coincident axial shear forces; the design model for the cast-in plate; contractual arrangements and design responsibilities; the effect of construction tolerances.

# British Steel investing £100M to improve manufacturing and environmental performance

British Steel has announced that it has returned to profit after being brought out of liquidation by Jingye Group 12 months ago, and it will invest up to £100M to improve its manufacturing operations and support clean growth.

Projects the money will help finance include a new billet caster, a scrap pre-heating facility, cranes and a new environmental emission control system.

Jingye Group CEO Li Huiming said: "We're committed to building a long-term future for British Steel and thanks to the hard work and diligence of our new colleagues, the business is now on a more sustainable footing.

"Their skill and dedication has enabled British Steel to maintain safe iron and steel production throughout the pandemic, ensuring customers' requirements were

– and continue to be – fulfilled. I'm extremely grateful for their efforts, and for the way they've embraced and driven change during a challenging period for everyone, both personally and professionally.

"British Steel's people and products are the reason Jingye is investing with such confidence."

During its first year as a new business, British Steel said it has achieved significant operational improvements, launched new products, introduced 24-7 operations at its Teesside and Skinningrove mills and resumed operational control of Immingham Bulk Terminal.

Mr Li said: "Moving into profitability was a significant milestone for the new business but we're only at the start of our journey and still have many challenges to overcome, such as the exceptionally high



raw material prices.

"However, British Steel is increasing production, reducing costs and growing into new markets, all of which is giving us a stronger platform upon which to build. We're optimistic for the future and I'd like to thank customers, suppliers and stakeholders for their continued support."

## Carbon neutral scheme revealed for Birmingham



Developer Woodbourne Group has unveiled plans for Birmingham's tallest building, which will form part of the wider Curzon Wharf carbon-neutral development.

The scheme would include three towers all located a short distance from the new Curzon Street HS2 railway station.

Of the three towers, the tallest will be 172m-high with 500 apartments, standing above Birmingham's current tallest structure, the BT Tower, which is 152m-tall.

The second 41-storey skyscraper of the project would have 732 flats for student accommodation, while the third tower would become a life sciences hub, with laboratories and research and development space.

According to Associated Architects, the £360M development will rejuvenate an under-utilised site and become the

catalyst for future growth in the area and beyond.

"The net-zero carbon agenda is very much at the heart of our ethos and Curzon Wharf marks the next logical step for the practice as well as underlining its pedigree in designing low-energy buildings," the company said.

Associated Architects are working with engineering consultancy Cundall, to take a whole building approach to achieve deep energy efficiency. The scheme will deliver an optimised thermal envelope in line with Passivhaus principles – super-insulated walls, floor and roof, minimisation of thermal bridging, triple glazing, maximisation of daylight, LED lighting and SMART controls. This will enable fossil fuels to be eliminated from the site, with heat pumps satisfying all heat demands.

## First offices sold at prestigious Stirling development

Cromwell Property Group has announced that it has sold the first office building at Kildean Business Park for £22M to Aviva Investors on behalf of the Stirling Development Agency (SDA), Cromwell's joint venture with Stirling Council.

Cromwell's Head of UK, Matthew Bird, commented, "Upon completion, the building will incorporate a range of measures to ensure staff wellbeing and is designed to score highly against a number of key environmental and sustainability benchmarks."

With an estimated completion date of mid-2022, the 7,150m<sup>2</sup> building is part of a series of planned developments at the 31,600m<sup>2</sup> business park located near Stirling, an area traditionally popular with financial services and life sciences companies in Scotland's Central Belt.

The building has been designed to meet stringent objectives and is targeting a BREEAM 'Excellent' rating, in part through the use of a number of zero and low-carbon technologies.





In order to withstand some harsh and inclement weather conditions, a galvanized steel frame was the ideal solution for this whiskey warehouse in the Scottish Highlands.

# Supporting sustainable steel construction

Andy Harrison, Director of Sales & Marketing at Wedge Group Galvanizing, one of the UK's largest hot-dip galvanizers, explores the key benefits galvanizing brings to sustainable steel construction.

The growing focus on the climate emergency is causing the construction sector to re-examine how the built environment is designed, constructed and maintained. The efficient use of resources with minimal waste and maximising the useful life of buildings are key elements of the way forward, as are circular economy principles.

Steel solutions offer many advantages when it comes to sustainable construction as it is a strong, durable, versatile material that provides structural framing systems that are lightweight, flexible, and adaptable as well as reusable. However, to achieve that durability in atmospheric environments the steelwork must be protected against corrosion.

Hot-dip galvanizing provides a highly effective, durable and sustainable corrosion protection system wherever steel is in use, from the structural steelwork for major building projects, right through to final flourishes such as gates and railings. Hot-dip galvanizing is part of the solution in the drive to net-zero carbon by 2050.

Hot-dip galvanizing is a process that involves immersing the steel component to be coated in a bath of molten zinc (at about 450°C) after pickling and fluxing, until the temperature of the steel component is the same as the zinc, and then withdrawing it. During this process, a series of zinc-iron alloy layers are formed by a metallurgical reaction between the iron and the zinc. As the steel

component is removed from the zinc, the zinc on its surface will begin to solidify. As this happens, excess zinc is removed to ensure a smooth finish.

Resource efficiency is at the heart of the process with minimal waste. Both the zinc ash produced from surface oxidation in the galvanizing bath and the 'dross' - a mixture of zinc and iron that accumulates at the bottom of the bath - are fully recovered and are often used in the same galvanizing process or sold to make zinc dust and compounds for a variety of applications such as rubber additives, cosmetics and electronic components.

The resulting coating is durable, tough, abrasion resistant, and provides cathodic (sacrificial) protection to any small, damaged areas where the steel substrate is exposed. The typical minimum average coating thickness for structural steelwork is 85µm which, depending on the environment, can provide up to 170 years of protection with no future maintenance, in contrast to other corrosion protection systems.

Galvanized steel also contributes to the circular economy at end of life. Whether it's re-galvanizing, removal or reuse, galvanized steel is easily recycled and can also be recycled with scrap steel.

As an industry, the hot-dip galvanizing sector has taken significant steps in recent years to reduce its overall environmental impact. A number of leading organisations, such as Wedge Group

Galvanizing, are leading the way by introducing highly innovative concepts designed to reduce waste, promote better use of resources and improve energy efficiency across galvanizing plants by reusing 'waste' heat created from the furnaces used in the galvanizing process.

One of the most effective of these techniques is rainwater harvesting, which reduces the amount of mains water used in the pre-treatment lines. This multi-stage initial cleaning and rinsing process is integral to the galvanizing process as it removes all grease, scale, dirt and rust, utilising various diluted alkaline and acidic solutions.

This ensures that the steel is in an ideal condition to react with the molten zinc, when finally it is immersed in water to cool. To fulfil the cooling process while reducing demand on the mains water supply, rainwater that falls onto the roofs of plants is being accumulated and stored on-site via a series of gutters and tanks, and then recycled back into the galvanizing process.

With its long life, resource efficiency, minimal waste and its inherent capability for reuse and recycling, hot-dip galvanizing is becoming widely known as one of the most environmentally-friendly forms of corrosion protection available to the steel construction industry, and with the ongoing efforts being made across the sector to ensure that these qualities are continually enhanced, it's clear that hot-dip galvanizing is part of the solution for sustainable steel construction. ■

Wedge Group  
Galvanizing Ltd  
is a gold sponsor  
of Steel for Life





Located at Mercia Park, just south of Burton-upon-Trent, Caunton Engineering is erecting 1,660t of steelwork for a 39,000m<sup>2</sup> distribution centre for DSV. The steelwork package also includes a 10,000m<sup>2</sup> cross-dock terminal and a three-storey office building.

# Sheds perform increasingly vital role

Sheds have become acknowledged as providing a crucial link in the UK's supply chain as the pace of structural change in retail is accelerated by the COVID-19 pandemic. Nick Barrett reports that sheds - which lend themselves exceptionally well to steel construction - are also becoming bigger and more complex.

The Industrial and Logistics property sector - sheds to you and me - has proven to be one of the most resilient throughout the pandemic-induced disruption to normal economic life of the past year. It has in fact managed to grow at a remarkable pace, largely in tandem with a growth in online shopping that meant logistics and retail companies had to scramble to secure the available space, which was already in short supply.

The take up of the available space was dramatic and picked up pace as 2020 went on, but in the early months of the year, as worries over Brexit and the pandemic gripped boardrooms across the economy, there was a slump in orders for the construction of sheds. Planning difficulties have also played their role in a fall in construction

of sheds of over 23%, although steel increased market share slightly to 92.4%. Confidence has picked up considerably since then though and shed developers and builders are reportedly busy again.

Geoffrey Taylor of steelwork contractor Caunton Engineering said: "There was little happening for about four months last year, a lot of projects were put on the back burner. But by midsummer the market took off again. *Design and Build* is proving a popular procurement route, it is the quickest way. The shed market is made for steel, which is *fast* and *cost-effective* and projects can get the material they need when they need it."

During those dramatic swings in sentiment, the humble shed increasingly became recognised as performing a vital role in the UK's supply chain infrastructure, having proven invaluable in

grappling with the COVID-19 pandemic, Brexit and structural changes in the economy, especially the growth in E-commerce. The logistics sector alone is estimated to support almost two million jobs, so this is a key industry being supported by steel. The sector takes up almost half of the structural steel used in *construction*, so this is also a key industry for steel.

The industrial and logistics sector is a broad one and has always been a big user of constructional steelwork, for facilities including *warehousing*, distribution hubs, factories serving all sectors of industry, waste-to-energy plants and now increasingly data centres and self-storage facilities.

The British Property Federation estimates that 21 million sq ft of new logistics space will be needed each year to keep pace with population growth alone. The most dramatic growth in demand has come from logistics. It is easy to pinpoint why - online sales doubled over just nine months in 2020, as much growth as was seen in the previous five years. About 40% of the demand came from E-commerce and Post & Parcel companies, according to property company Cushman & Wakefield (C&W), with Amazon alone accounting for 12 million sq ft across 21 individual sheds.

The pandemic has accelerated structural changes due to the growth of online retail that were underway for some years. 'Last mile logistics' is also creating new demand, often for smaller units, as retailers have to come nearer to city centres to store goods as close as they can to where people need them. Other new demand is coming from retailers acquiring storage space to increase inventory levels at the start of the pandemic, and

*“Design and Build is proving a popular procurement route, it is the quickest way. The shed market is made for steel, which is fast and cost-effective and projects can get the material they need when they need it.”*

National Health Service needs for storing and distributing Personal Protective Equipment.

#### **Brexit may boost demand**

There is also a demand for space to stockpile ahead of the unknown impact of Brexit. The jury is still out on what the final impact of Brexit will be, but it looks like there will be an increasing need for sheds to stock inventory, including imports of non-perishable goods in the UK, to overcome delays at ports.

With an end to the worst impacts of the COVID-19 pandemic hopefully in sight, and the economy gradually opening up again, questions understandably arise over whether the recent stellar performance of sheds as an asset class will continue. The answer for the short to medium terms at least seems to be a confident and encouraging yes.

Property researchers suggest that up to 50 million sq ft of space was taken up in 2020, the highest ever recorded. A previous record was 40 million sq ft, achieved in 2008, just before the financial crisis made funding hard to get; it took until 2018 to get back to that level.

Availability of space fell by 14% over 2020 to 61.6 million sq ft and there is a growing shortage of available stock. Rents and capital values have been rising in response, encouraging developers to recently start backing speculative developments. Cushman & Wakefield expect over 7.7 million sq ft to be delivered this year and Savills has identified over eight million sq ft of speculative space being constructed at the start of this year. This level of

development will only hold the balance of supply and vacant space at about its current level, so there are solid prospects of growth.

#### **Sheds are getting bigger**

Sheds have been getting bigger, as readers of NSC will have noticed over the years. Last year there were 25 warehouses of over 500,000 sq ft taken up, a trend predicted to continue by property researchers at Savills. These big sheds are also becoming more complex as their users introduce the latest technology inside them, such as temperature controls needed by food manufacturers, rainwater harvesting systems, use of energy efficient materials, and LED motion sensor lighting. High BREEAM and EPC ratings are being pursued by many developers.

Providing the larger and more complex national and regional **distribution centres** that the UK needs is a recognised challenge for the property sector, but one that steel is well placed to help meet, thanks to its flexibility, ease of **adaptability** to changing uses and many sustainability benefits.

#### **Manufacturing forecast to grow**

The E-commerce market was in sharp contrast to manufacturing last year where take-up fell from 34% in 2019 to 12% in 2020 as manufacturers and others put investments on the back burner due to Brexit and COVID-19 uncertainties.

Some forecasters expect occupiers will need more UK space because of Brexit; some expect less. Several developers have announced plans

to increase investment in sheds, some citing opportunities created by Brexit. With the shape of the Brexit deal now known, growth is forecast to start rising again.

The announcement of eight Freeports in the Chancellor's recent Budget also looks likely to boost demand for a variety of shed type buildings, for storage as well as possibly manufacturing and assembly of products with supply chains in various countries. Other new sources of demand for industrial sheds include manufacturing for offshore wind, an industry that the UK is a world leader in.

Property company Knight Frank estimates that the growth of E-commerce could create demand for an additional 92 million sq ft of warehouse space by 2024. Knight Frank says that for every £1 billion of online retail sales 1.36 million sq ft of warehouse space is needed; three times the amount of shed space needed by high street retail because of the need to hold stock previously held in shops and to process the high level of returns of goods bought online.

Their analysis suggests that the spike in online sales in 2020 alone will generate demand for 30 million sq ft of space, rising to a total of 92 million sq ft by 2024 if online sales capture an expected 32% of retail sales.

C&W partner Sally Bruer says she is confident of the prospects for the Industrial and Logistics sector in 2021: “We think 2021 will continue this trend in terms of occupational demand. We are seeing an extraordinary level of investor demand and rental growth across the market.” ■



Working on behalf of Winvic Construction, Severfield is erecting 5,300t of steelwork for a 260m-long x 240m-wide DHL distribution centre. Located at the SEGRO Logistics Park East Midlands Gateway in Leicestershire, it is the latest structure to be built at this inland port, which boasts road, rail and air transportation links.



Long span cellular beams have been used throughout the structure.

# South Bank tower

Forming part of a large residential-led master plan, an 18-storey steel-framed commercial building will create a landmark structure on London's waterfront.

The South Bank of the River Thames has seen some significant redevelopment over the last few decades, and today it is regarded as one of the capital's main cultural and tourist destinations.

Although the modern cultural history of the area probably dates back to the opening of the Royal Festival Hall in 1951, more recently this side of the river has seen the addition of Shakespeare's Globe Theatre (replacing the long-lost original Elizabethan venue), the Tate Modern – in what was once Bankside Power Station – as well as numerous art galleries and eateries.

The area has also become a desirable place to live and work, which is borne out by the number of new commercial and residential schemes that have been added to the area's landscape.

One of the more significant of these schemes is Bankside Yards, which is currently underway on a large site located between the southern approaches to Blackfriars Bridge and the Tate Modern.

The residential-led development will ultimately consist of nine buildings, housing nearly 500 homes along with offices, cultural and retail spaces as well as leisure amenities.

Phase one, also known as Western Yards, will

consist of three buildings; two residential towers topping out 49-storeys and 13-storeys respectively, and an 18-storey commercial tower known as Arbor.

In order to create a standout prestigious office block, a different structural design and framing solution has been chosen for the 18-storey tower compared to its residential neighbours.

Multiplex Project Manager Matthew Price explains: "The implementation of a steel frame structure for Arbor versus concrete (which is proposed for the two future buildings on Western Yards) makes it stand alone as a commercial asset and unique to the development scheme as a whole."

Arbor sits on a plot previously occupied by Ludgate House, an out-dated 1980s steel-framed structure, which was demolished a few years ago.

The structural steel frame for the new B3 development begins at ground floor level, springing off a concrete substructure, which consists of a two-storey basement that covers the footprint of the site, and then extends to four-storeys deep to accommodate a car-stacker close to the future B2 building.

*"The use of steel for Arbor's structure allowed us to achieve our architectural goals of crafting a contextual and rational yet exciting gateway building for the new district that extends above a new protected public plaza. It successfully coexists and enhances the existing historic railway infrastructure."*

#### FACT FILE

**Arbor, Bankside Yards, London**  
 Main client: Native Land  
 Architect: PLP Architecture  
 Main contractor: Multiplex  
 Structural engineer: AKT II  
 Steelwork contractor: Severfield  
 Steel tonnage: 3,500t

Combining a high-spec commercial development with the requirement to create public realms within the overall Bankside Yards scheme, levels one, two and three of Arbor are only partial floorplates that help to create Invicta Plaza, an open and covered area at the ground floor level that will serve as one of the district's main gateways, along with and a triple-height reception, with a full-height atrium above.

The partial floorplates also help Arbor to span over part of the adjacent railway arches, with a series of four columns, punched through the Victorian structure supporting part of the building's eastern elevation.

The columns were installed through preformed holes in the arches and support the building's fourth floor, which is the structure's first regular and complete floorplate.

"These 20m-long columns weigh close to 22t each and had to be fabricated and brought to site in two pieces. The baseplates were welded to the lower halves and fixed to the pile caps, while the upper halves were passed through the arch openings and connected via a splice connection,"



A steel-framed option for Arbor was chosen as it offered the most efficient construction solution.

says Severfield Project Manager Scott Robinson.

"As they are left exposed in the completed scheme, the splice had to be welded carefully as an aesthetic finish was very important."

According to AKT II Technical Director Christian Tygoer, the project's structural engineer, one of the main reasons for choosing a steel solution for the building was to minimise the loads onto the foundations, in particular where columns pass through the Network Rail viaduct.

"A concrete tower would have proven to be problematic as it would not have been possible to place formwork above the 'live' railway lines or use back propping for the construction of concrete floors.

"However, a steel solution opened up the possibility of longer internal spans, which on most office floors are up to 14m-long."

From the fourth floor, up to the uppermost 18th level, the structural grid for the tower is regular, with steelwork arranged around 6m-wide bays and minimal internal columns.

"The use of steel for Arbor's structure allowed us to achieve our architectural goals of crafting a contextual and rational yet exciting gateway building for the new district that extends above a new protected public plaza. It also successfully coexists with and enhances the existing historic railway infrastructure," says Partner Daniel Moore of PLP Architecture, who has designed the building and master-planned the entire district.

"The result will be a modern, efficient and amenity-driven office building at a prime location that will become an important part of our overall master plan for the Western and Eastern Yards."

Throughout the structure, steel cellular beams

support metal decking and a concrete topping to form a composite flooring solution. The diaphragm action of the floors provides some stability for the building, but the majority is derived from the concrete core, which is offset at the northern end of the building adjacent to the railway arches.

Because of the offset position of the core, the overall stability system for the building requires a Vierendeel truss, that forms the southern elevation from fourth floor upwards, to balance the steel frame.

Topping the building, the uppermost office floor is a double-height space, created by the structure's sloping roof. This part of the building also features a number of transfer structures that support the Building Maintenance Unit (BMU) and plant floors.

Arbor is due to complete in 2022. ■



A portion of the building spans over the railway arches that serve Blackfriars Station.



Steelwork's flexibility is of upmost importance in the design, as the units can either be used by one tenant or sub-divided for multiple occupants.

# Portal-framed industrial units

Edinburgh's industrial property sector is due to receive a boost when phase one of Northern Trust's development in Newbridge completes this month.



The units all offer clear uninterrupted internal spans.

Located a few miles west of Edinburgh Airport and close to the M8 and M9 interchange, Northern Trust's latest speculative development is quickly taking shape with the aid of structural steelwork's speed of construction.

Three steel-framed industrial blocks, which will provide 2,600m<sup>2</sup> of floor space and will be sub-divided into 14 individual units, are nearing completion on the site.

Commenting on the choice of structural steelwork for the project, GSA's Graham Schofield says: "The use of steelwork for the Newbridge development satisfies the client's brief for an economic, clear uninterrupted span with minimal impact on the internal efficiency of the buildings.

"It offers total flexibility for multi-tenanted usage, enhances the speed of construction, and has a favourable carbon footprint in comparison to alternative structural solutions."

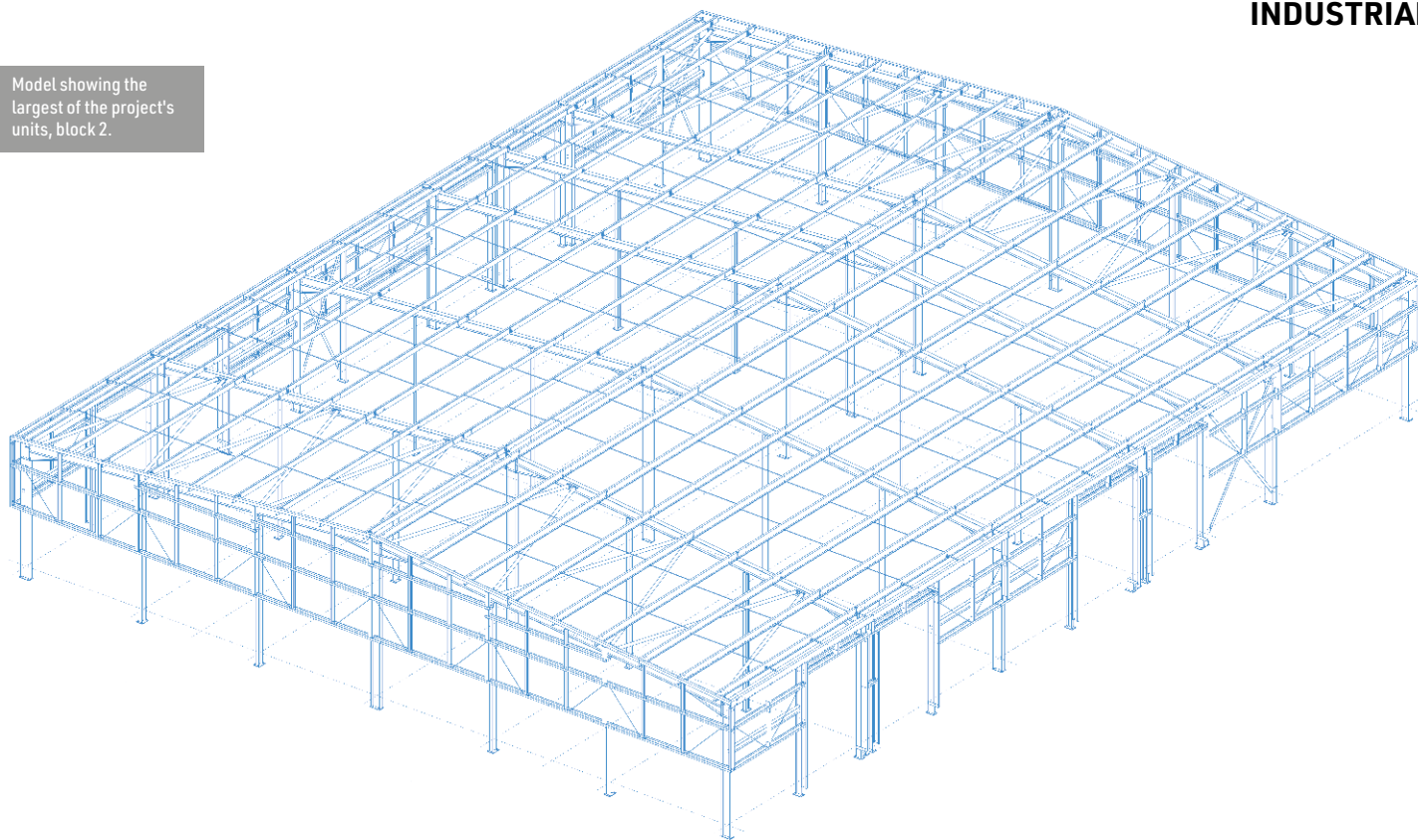
Work on the brownfield site began in 2019, with main contractor MJ Fellows undertaking extensive groundworks that included a compaction programme to alleviate the previously poor ground conditions.

Concrete strip foundations were then installed, which allowed the steelwork erection to commence. Unfortunately, this part of the programme did not go to plan as the first national COVID-19 lockdown meant all site work had to be halted.

Once these restrictions were eased during the summer of 2020, Border Steelwork Structures



Model showing the largest of the project's units, block 2.



## FACT FILE

### Industrial units, Newbridge, Edinburgh

Main client: Northern Trust

Architect: Paddock Johnson Partnership

Main contractor: MJ Fellows

Structural engineer:

Graham Schofield Associates (GSA)

Steelwork contractor:

Border Steelwork Structures

Steel tonnage: 90t

(BSS) were able to erect 90t of steelwork for the three units and then install the project's roof and wall cladding.

"The site closedown was something we couldn't foresee, but steel's speed of construction meant the three frames were still up and clad before Xmas, meaning we are on schedule for our completion date," says MJ Fellows Project Manager Les Anderton.

Each of the three blocks is different, with the largest structure (block 2) measuring 36m-long and 4.8m to the eaves. This propped portal building has two spans of 14.5m.

Unlike the other two buildings, this block will feature back-to-back units, with the central row of columns acting as a dividing line through the middle of the structure.

Block two will contain eight units, four on each side, with two of the units slightly larger than the others. Perimeter columns are generally spaced at 7.2m centres and 356UB columns have been used to support 356UB roof rafters.

Within the main frame of each of the blocks, BSS has inserted steel posts that are not structurally integral but will partially support the blockwork partition walls. Further internal partitions will form office areas within each of the industrial units.

Blocks one and three are both 4.5m-high mono-pitch structures with 18m spans and measuring 36m and 58m-long respectively. There will be two large units accommodated within block one and

*"The use of steelwork for the Newbridge development satisfies the client's brief for an economic, clear uninterrupted span with minimal impact on the internal efficiency of the buildings."*

four inside block three.

BSS used two 50t-capacity mobile cranes for their entire programme. One was used to erect the steel frames, while the second unit followed behind helping to complete the roof and wall cladding.

"Once each steel frame was erected, we installed the roof cladding first as this gave the follow-on trades a watertight environment to work in," explains BSS Contracts Director Stuart Airey.

Working in close proximity to an international airport always requires some important planning especially for the use of cranes operating with tall jibs.

"Working close to the airport was not too onerous, although we did have to organise a permit and notify the airport everyday about when our cranes were being used and when our working day ended," explains Mr Airey.

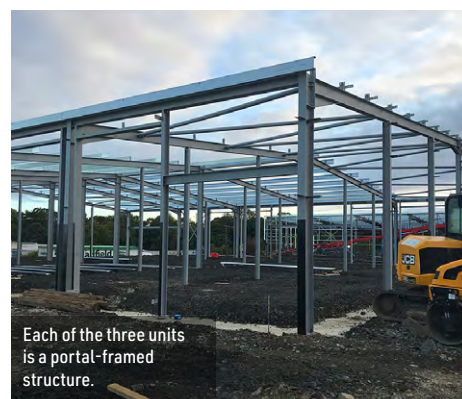
Northern Trust has a second phase planned at the site and this will comprise four large units arranged in a single terraced block with unit sizes ranging from 824m<sup>2</sup> up to 1,400m<sup>2</sup>.

Summing up, Northern Trust Project Manager Jim Moffat says:

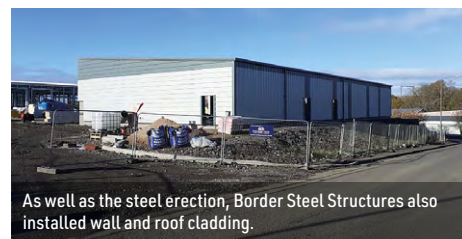
"This new development complements our existing ownership in Scotland, which will extend to over 43,500m<sup>2</sup> of multi-let industrial and office accommodation when completed.

"This scheme highlights our ambition to invest further in Scotland and provide more flexible space for the SME sector and create new jobs." ■

Steel erection commenced once lockdown restrictions were eased last summer.



Each of the three units is a portal-framed structure.



As well as the steel erection, Border Steel Structures also installed wall and roof cladding.

# Steel scales new heights

The steel frame incorporates the sloping site into its overall design.

A steel-framed structure, incorporating three separate floor levels, has proven to be the ideal solution for an Olympic-level climbing centre in Oldham.



Steel was the only option to create the open-plan areas needed for the climbing centre.

Mention rock climbing and most people will immediately think of intrepid teams of adventurers scaling the world's highest peaks and enduring extreme weather conditions.

The exploits of notable mountaineers, such as Sir Edmund Hillary and Chris Bonnington are ingrained in the popular culture, but one does not need to climb a Himalayan mountain to enjoy a more modest form of this pastime, which has in recent times gained worldwide popularity.

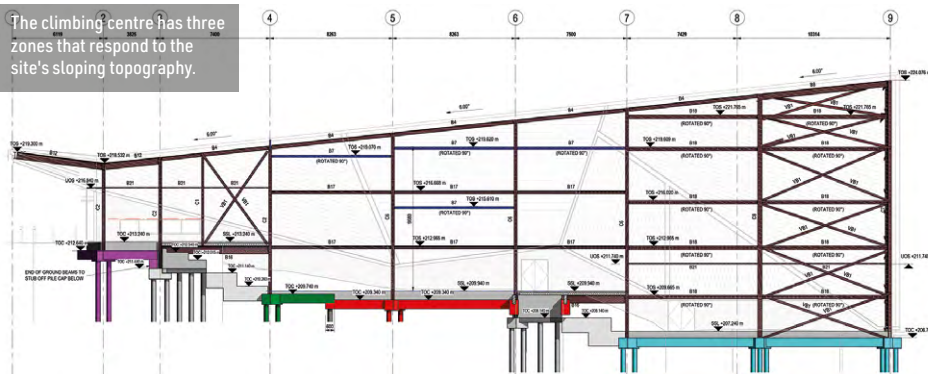
Ascending rock faces or walls measured in tens of metres instead of hundreds or thousands, and usually taking place indoors, climbing is one of the fastest growing sports, so much so that it is due to make its debut at the next Olympic Games.

To accommodate this latest craze, **leisure centres** generally include climbing walls among their facilities, while a number of bespoke centres catering solely for the sport are being built up and down the country.

One example is currently under **construction** in Oldham, where a 1,850m<sup>2</sup> centre will house an array of climbing facilities.

*"As well as providing the ideal solution for site's topography and the need for long spans, steel was also the lightest framing option, which was another important consideration."*

The climbing centre has three zones that respond to the site's sloping topography.



Visualisation of the completed centre.

#### FACT FILE

**Indoor climbing centre, Oldham**  
 Main client: The Stoller Charitable Trust  
 Architect: AEW Architects  
 Main contractor: Conlon  
 Structural engineer: JEM Consulting Engineers  
 Steelwork contractor: Leach Structural Steelwork  
 Steel tonnage: 170t

It is being built by the Stoller Charitable Trust, and the centre is expected to create 40 new jobs and all the profits made by the centre will be reinvested back into the charity.

Explaining the importance of the project, The Stoller Charitable Trust Project Manager Stephen Lowe says: "Climbing is very popular at present and we expect to attract up to 90,000 visitors a year. The centre, which is a legacy project for the town, will be a huge boost to the area, as all of the profits generated will be used for charitable causes that support the young people of Oldham."

The climbing centre is located on a sloping site that was previously occupied by a church and terraced housing, all of which have been demolished.

The building has been designed with the site's steep gradient in mind; the entrance is via Egerton Street at the top of the site, with the building consisting of an upper ground, mezzanine, and lower ground floor. Using the gradient, the climbing centre appears as one storey from the Egerton Street side, and three storeys from Rock Street at the bottom of the site.

The three level changes in the building respond to the site's slope and create the ideal zones for the climbing centre's different activities.

As well as the entrance, the upper ground level will accommodate bouldering, a soft play area, two 'ValoClimb' walls that use interactive gaming technology, together with changing rooms and a café, overlooking the activity zones. The clip 'n' climb, which will be the tallest and biggest in the North of England, featuring 35 challenges, is located on the mid-level mezzanine, while the main climbing walls – used for speed climbing and lead climbing – are on the lower ground level taking advantage of the structure's full 18m height.

The Charity says the purpose-built climbing centre aims to provide a fun and safe space for the community to experience something new and push their limits, as well as simply offering an exciting new leisure activity.

Getting the correct design for the building, so that it could incorporate the site's topography, was very important as JEM Consulting Engineers' James Mackey explains: "The project has a really interesting back story and was very close to never being built, due to the complexities of the sloping site and the capital costs.

"Initially the design was for a large single storey steel-framed box that would require a lot of excavation works in order to fit it into the slope. We helped the project team with a redesign, whereby the slope was incorporated into the building's design and so we avoided extensive

substructure enabling works and reduced construction costs."

The building's design remained as a steel-framed structure with a precast slab, but instead of a major excavation programme, the project utilises a series of retaining walls that create two steps and three level changes throughout the building's length.

The steel braced frame is designed around 6m-wide bays with one row of internal columns running down the spine of the structure. The columns support a series of beams that create two spans of 24m for the upper two levels. For the lower ground floor, the steel configuration changes slightly as this area is a column-free zone, created by a series of 15m-long beams, which are positioned 90-degrees to the other roof beams.

"As well as providing the ideal solution for site's topography and the need for long spans, steel was also the lightest framing option, which was another important consideration," adds Mr Mackey.

"Consequently, we were able to have shallower foundations, which in this case meant piled foundations to a depth of around 14m."

With a structural design that matches the sloping site, the rock climbing centre's exterior will also blend into its environment. It will feature a slate grey cladding system, similar in hue to the nearby Pennines.

Oldham's Olympic-level climbing centre is due to open its doors to its first batch of intrepid enthusiasts in August. ■



# Steel provides leisure boost

The need for long spans, and a flexible and economic design, meant a steel-framed solution was chosen for a new leisure centre in Barnstaple.

Support and leisure is getting a major boost in North Devon as a new multi-sport facility is under construction in the town of Barnstaple.

Using a steel-framed solution in order to create the required long column-free spans, the new Tarka Leisure Centre is carefully located and linked to the existing steel-framed Tarka Tennis Centre, to provide a comprehensive sport and leisure offering.

Steel is considered to be a tried and tested economic option for leisure facilities, which require a range of spans and various column-free spaces.

Also, using a steel-framed option provides various benefits, such as it is quick to erect, it offers flexibility with layouts and the material provides a high strength-to-weight ratio that assists in keeping foundation loads down.

“The steel-framed structure should also be relatively low maintenance with long life expectancy,” adds Hydrock Senior Structural Engineer Isaac Climpson

Funding for the scheme has come from Sport England, which has provided £1.75M of National Lottery funding towards the project, while £1.5M has been granted by the Coastal Communities Fund. Contributions from local housing developments have also been put towards the build costs.

According to North Devon Council, the new build leisure centre will offer the local community a unique, improved and distinctive sporting, leisure, health and wellbeing destination; a place which will significantly enhance the existing facilities to the benefit of the wider community. It will provide a wide range of sport and leisure facilities, creating a

compact and effective complex reflecting a modern approach to leisure centre delivery.

To this end, the centre will include: an internal skiing area; 25m eight-lane main pool with spectator seating, 8.5m x 20m-long four-lane learner pool (both pools having moveable floors); a four-court sports hall; 120-station fitness suite and two exercise studios.

Additional children’s facilities include a double-height children’s adventure play area and an external civic area with a playground. Further amenities consist of a café that is linked with an external terrace (and comes with views of the covered skiing area, swimming pool hall and sports hall), a foyer and reception area, while outdoors there will be a full-size 3G synthetic turf pitch.

Leader of North Devon Council, Councillor David Worden says: “This significant investment will create outstanding new facilities for the town and surrounding communities.

“The current leisure centre is now at the end of its commercial life and in need of replacement. The landmark new centre will be a focal point not just for local residents, but for visitors from further afield and will add to the area’s tourism offer.”

The project is a good example of a successful collaborative working relationship between the client, contractor, design team and the operator of the facility – represented by Parkwood Project Management.

Main contractor Speller Metcalfe started onsite last summer, after a short delay to the works due to the COVID-19 pandemic. Having put all necessary government procedures in place, the initial works included a groundworks programme and the

installation of piled foundations.

Speller Metcalfe Contracts Manager Stephen Willetts explains: “The piled solution was chosen because of the poor ground conditions, however the main challenge was the timing and coordination of the swimming pool excavation. Was it better to excavate it before or after the steel erection?”

“We eventually decided to do the excavation after the steel erection, so we could avoid compromising the stability of the crane mat and didn’t incur the cost of larger crane that would have to work from outside of the building’s footprint.”

Steelwork contractor Adstone Construction has completed the majority of the steel erection using a single mobile crane. Perimeter columns are arranged around a regular 5.8m spacing, forming two large, and adjacent column-free spaces that house the main sports hall and the pools.

Using Westok cellular beams, these roof rafters span 20.5m in the sports hall and 23.8m over the swimming pools hall.

Mr Climpson says: “To achieve these long spans and to minimise beam self-weight, we used Westok pre-cambered beams. These members also help to control deflections in the roof.”

Between these two double-height areas, the leisure centre has a two-storey element that also extends along the front of the facility forming a T-shaped element.

Stability for the steel frame is derived from a combination of in-plane bracing to the roof structure and the diaphragm action of the composite deck of the first floor transferring lateral

*"To achieve these long spans and to minimise beam self-weight, we used Westok pre-cambered beams. These members also help to control deflections in the roof."*



The new leisure centre adjoins an existing facility.



Steelwork's speed of construction was an important consideration when deciding on a framing solution.

## FACT FILE

### Tarka Leisure Centre, Barnstaple

Main client: North Devon Council

Architect: Watson Batty Architects

Main contractor: Speller Metcalfe

Structural engineer: Hydrock

Steelwork contractor: Adstone Construction

Steel tonnage: 315t

loads to vertically braced bays within the **façade** and some isolated internal locations.

Keeping the steel frame as efficient as possible, there are no cantilevers or transfer structures.

However, giving the front elevation some architectural interest, this façade features raking columns that form a **canopy** and are tied back to the superstructure via a series of horizontal beams.

In summary, Chairman of the Council, Councillor Frank Biederman, says: "One of the council's key aims is to get more people of all ages involved in physical activity to improve and maintain a healthy lifestyle. The new centre has been designed after consultation with existing users and this is reflected in the facility mix. We have movable floors in both pools to cater for the extra depth our surf life-saving clubs and water polo players require and has two additional lanes in the main pool to accommodate more casual swimmers.

"We have also improved facilities for disabled users, with state-of-the-art "pool pods" which allow a more dignified form of entry into the pools for those with mobility difficulties."

The Tarka Leisure Centre is due to open in 2022. ■



How the completed Tarka Leisure Centre will look when it opens next year.



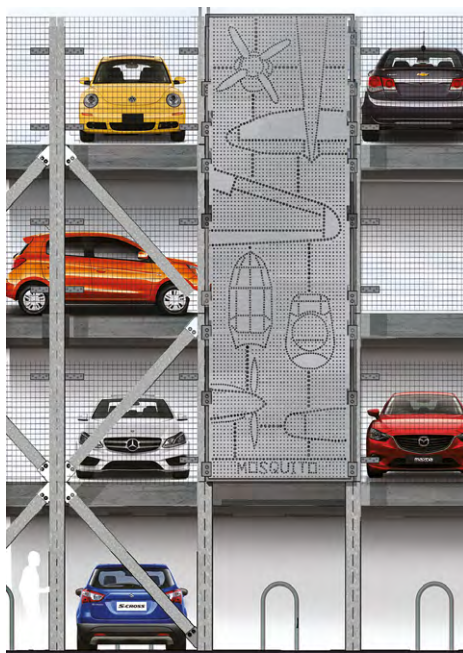
Westok cellular beams form the required long-span areas of the centre.

# Ton up for car park specialist

Steel construction has been completed, in quick time, on a car park in Hatfield, a project which also represents a significant landmark for contractor Bourne Parking.

**FACT FILE**

**The Commons multi-storey car park, Hatfield**  
 Main client: Welwyn Hatfield Borough Council  
 Architect: BrightSpace Architects  
 Main contractor: Bourne Parking  
 Structural engineer: Bourne Parking  
 Steelwork contractor: Bourne Parking  
 Steel tonnage: 400t



The aluminium cladding features patterned perforations depicting the town's aviation heritage.



Work is progressing speedily on The Commons multi-storey car park (MSCP) in the Hertfordshire town of Hatfield. The steel-framed structure, which incorporates four parking levels offering 420 spaces, is notable not just for the fact that it has been erected quickly but also because it represents Bourne Parking's (part of Bourne Group) 100th car park project since the turn of the century.

Employed as main contractor by client Welwyn Hatfield Borough Council, Bourne Parking has undertaken all design aspects of the job, including the all-important steelwork design, fabrication and erection. Overall, Bourne Parking required 400t of steel for the project.

As well as the above, this is a full turnkey project for Bourne Parking as the firm also secured planning permission for the scheme on behalf of the Council and appointed the architect.

Commenting on the importance of the scheme, Bourne Parking Managing Director Karl Butters says: "This is our landmark 100th car park constructed this century and it still amazes me and makes me feel immensely proud when I see the speed of erection of our bespoke steel and precast system build.

"The frame and floor erection commenced on 7 September 2020 and was completed on 5 November 2020. That's 420 spaces constructed in under two months! A fantastic achievement on a very tight site surrounded by live vehicle and pedestrian routes."

The Commons MSCP forms one of the initial elements of Hatfield's 2030 regeneration programme, which aims to complete numerous town centre improvements by the end of the decade. The first phase will see 151 new homes and 1000m<sup>2</sup> of commercial space constructed over the next two years.

"This new car park is the catalyst for the regeneration of Hatfield town centre. Surface level car parks currently take up a third of the town centre, and the consolidation of parking frees some of those for redevelopment," explains Welwyn Hatfield Borough Council Property Development Manager Rachael Walsh.

"On this important project, offsite manufacture and steel construction have been used to reduce programme time, which has ensured the continued accessibility and vitality of the town centre as well



as delivering these objectives in the shortest time possible."

Steelwork for the 36m-wide x 75m-long structure is based around two 16m x 2.5m column grids and a 4m-wide external ramp, meaning the car park floorplate has just one internal row of columns. Steel beams support precast planks to form the



*"The frame and floor erection commenced on 7 September 2020 and was completed on 5 November 2020. That's 420 spaces constructed in under two months!"*



The car park is formed with a steel frame supporting precast flooring units.

three upper suspended levels.

Before the steel frame could be erected, preliminary groundworks had to be undertaken and this included the building of an attenuation tank – to alleviate the possibility of localised flooding – and the installation of mass concrete pad foundations.

The **steel-framed** car park structure pretty much

fills up the entire site's footprint, leaving little room for cabins. Therefore, the majority of site accommodation and welfare cabins are located in rented premises nearby.

"The confined nature of the plot and the fact that we had to manage the traffic flow on all four sides of the site was a perfect advertisement for our

**Montex steel and precast flooring system,"** explains Mr Butters.

"Steelwork and precast flooring planks all come to site as prefabricated elements ready to be erected immediately. This leads to a **quick erection** programme and there is minimal need to store materials onsite." **>24**



The car park is part of a wider Hatfield town centre regeneration scheme.



The car park fully occupies the island site in Hatfield town centre.

►23 The structure's 16m-long cambered beams support the precast flooring units, which measure 8m × 2.5m. Using just a single **mobile crane** to complete the main erection sequence, the entire structure was built, starting at the eastern end of the site and continuously moving to the western end. Sequencing of deliveries was important, as the **erection** involved installing one row of bays at a time, and each floor level of planks had to be installed before the steel beams for the floor above could be erected.

The only other crane onsite was used to install the **precast core** at the western end of the site, but

this work was completed before the main steel erection reached this end of the site.

The MSCP has two cores in total; the previously mentioned main precast core that contains a lift and an open staircase core at the eastern end. Neither of these two cores provide any **stability** to the main structure, as this is all derived from strategically placed **bracing** along with the rigidity provided by the completed floors.

As the project forms one of the initial elements of Hatfield's 2030 vision, it was important the structure stood-out as a landmark. To

achieve this, a **façade** system is being used that symbolises Hatfield's proud aviation design and manufacturing heritage. The cladding consists of aluminium panels, that feature patterned perforations depicting iconic aircraft designs. The MSCP is part funded by a £4.8M Local Growth Fund contribution from Hertfordshire Local Enterprise Partnership (LEP), with the Council funding the remaining £1.2M of the £6M budget. This forms part of the LEP's wider £6M investment into the town centre.

The Commons MSCP is due to open this month (April). ■

## Some aspects of car park design

David Brown of the SCI comments.

**H**aving completed 100 car parks since 2000, Bourne Parking are obviously familiar and experienced with **parking layouts**, traffic management and structural form of this type of structure. For those with less experience, the Institution of Structural Engineers publish a comprehensive guide: *Design recommendations for multi-storey and underground car parks*. Now in its fourth edition, this guide is a comprehensive treatise on all aspects of car park design. Advice on **steel-framed car parks** is also available on [Steelconstruction.info](#), including a range of typical beam arrangements and sizes, which may be particularly helpful for those sitting the Institution's examination.

One design load not usually encountered in other steel buildings is impact on the columns. Impact from within a car park is all too common, judging from the visible evidence. Vehicles must not be allowed to crash through edge protection and fall off the structure. Impact from within may be directly on the columns, or from loads transferred from the edge protection. Impact is also potentially possible from outside of the structure, if vehicles travel adjacent to the car park.

The rules for impact loads are given in BS EN 1991-1-1, BS EN 1991-1-7 and

their associated **National Annexes**. Firstly, Annex B of BS EN 1991-1-1 provides guidance on impact forces within car parks. The forces depend on the gross mass of the vehicle and an assumed velocity. Perhaps unsurprisingly, the loads are doubled opposite the ends of straight ramps for downward travel.

BS EN 1991-1-7 concerns impact from the outside of superstructures, providing design forces. For car parks of more than 6 storeys, which therefore become **Consequence Class 3**, the UK National Annex provides revised impact forces in Table NA.9. The Note to Table NA.9 points out that the impact forces for columns inside the building must be taken from Annex B of BS EN 1991-1-1.

Some designers have conveniently observed that Table NA.9 and the Note only refer to Consequence Class 3 buildings, and suggested that for other car parks, Annex B of BS EN 1991-1-1 is not invoked. This suggestion is clearly wrong: Annex B of BS EN 1991-1-1 applies to all car parks. This advice is confirmed in AD 456.

The Institution's guide should be consulted for other important aspects of car park design, including **fire resistance** and **durability**.



# UK average embodied carbon of structural steel

Ana Girão Coelho of the British Constructional Steelwork Association (BCSA) and Michael Sansom of the Steel Construction Institute (SCI) present the findings of some new research to establish the first average emissions factor for structural steel specifically for the UK construction market.

Growing awareness of the need to reduce greenhouse gas emissions is impacting the construction industry and more attention is being paid to the carbon emissions associated with the construction materials we specify and use; commonly referred to as **embodied carbon**.

The structure makes up a large proportion of the overall embodied carbon impact of the building, typically 60% of the impact of a multi-storey building (Modules A1-A5). Consequently attention is focussing on the embodied carbon of the structure and importantly, how this can be measured and reduced.

**Embodied carbon targets** for buildings have been published by RIBA, LETI and the Mayor of London and structure-specific targets have recently been proposed by the IStructE. Although these targets are voluntary, there are growing calls to regulate embodied carbon, for example through the Building Regulations, as is currently done for operational carbon emissions.

Environmental information, including embodied carbon, for **steel construction products** is commonly made available to designers by means of **environmental product declarations** (EPD). These are generally, producer-specific declarations. During the early design stages however, where the steel supplier is unknown, the question arises over what embodied carbon value to use for structural steelwork.

Steel sections are globally traded commodity products and therefore the most appropriate embodied carbon value to use is one based on an average value of structural steel used in the UK. Note that this is a consumption-based average rather than a production-based UK average.

In its recent publication on the carbon credentials of structural steel, BCSA recommended using the European average embodied carbon value from the European sections and plate EPD<sup>[1]</sup> published in 2018. This was the most representative UK average value available at the time but was criticised by parts of the construction sector since it did not include any UK production. In response to this BCSA and SCI have now derived a UK average embodied carbon for structural steel sections by obtaining UK demand and import data from the International Steel Statistics Bureau (ISSB). These data have been corroborated with

additional data held by BCSA and provided by CRU. Using this data, together with embodied carbon impact data for UK production<sup>[2]</sup>, European production<sup>[1]</sup> and rest of the world production<sup>[3]</sup> of **hot-rolled sections**, BCSA has derived the embodied carbon (Module A1) values for 2016-2018, these being the latest years for which data are available.

Year	Average emissions factor [A1] (tCO <sub>2</sub> e/t)	Average Module [D] (tCO <sub>2</sub> e/t)
2016	1.819	-0.978
2017	1.764	-0.947
2018	1.706	-0.891
<b>Three-year average</b>	<b>1.74</b>	<b>-0.92</b>

In addition to **steel production** carbon emissions (Module A1) data are also provided for Module D which is an important metric for quantifying the **circular economy** and particularly the inherent reuse and recycling benefits of structural steel. Note that Module D has been calculated using the methodology included in the World Steel life cycle inventory report<sup>[4]</sup>. The negative Module D values indicate a saving through future reusing and recycling.

In summary therefore, the BCSA recommends the use of the following average emissions factors for embodied carbon assessments conducted when the source of the structural steel is not known:

- For Module [A1], 1.74 tCO<sub>2</sub>e/t of sections.
- For Module [D], -0.92 tCO<sub>2</sub>e/t of sections.

It is noted that these latest recommended UK average values compare well with the earlier (2013) European sections and plate EPD<sup>[5]</sup>, which did include UK sections production.

Reflecting the volatility of the UK market for steelwork, the BCSA will update these recommended averages periodically.

For further information, please contact Ana M. Girão Coelho ([ana.girao-coelho@steelconstruction.org](mailto:ana.girao-coelho@steelconstruction.org))

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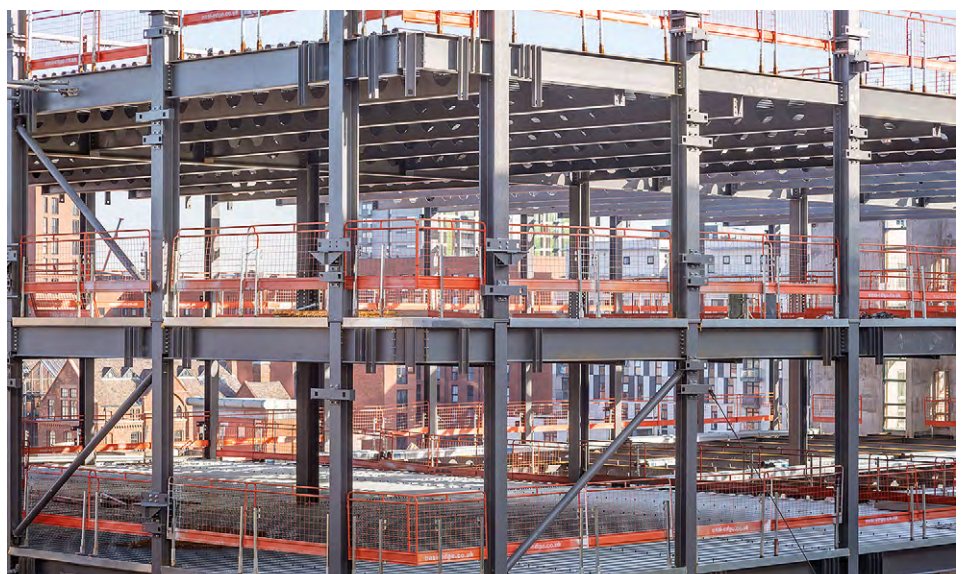
- [1] bauforumstahl e.V. (2018). Environmental Product Declaration – Structural Steel: Sections and Plates, Declaration No. EPD-BFS-20180116-IBG2-EN.
- [2] British Steel (2020). Environmental Product Declaration – Steel rails and Sections, Declaration No. EPD-TS-2020-003.
- [3] LCI data for steel products: 2019 LCI data release. World Steel Association
- [4] World Steel life cycle inventory report (2017)
- [5] bauforumstahl e.V. (2013). Environmental Product Declaration – Structural Steel: Sections and Plates, Declaration No. EPD-BFS-20130094-IBG1-EN.

## Acknowledgments

The BCSA gratefully acknowledges the support from ISSB and CRU. The International Steel Statistics Bureau (ISSB Ltd) is a leading supplier of global trade data for steel and raw materials, <https://www.issb.co.uk/>

The CRU Group delivers independent market analysis on a comprehensive range of global commodities, <https://www.crugroup.com/>

**Dr Ana M. Girão Coelho**, Director of Engineering, BCSA  
**Dr Michael Sansom**, Associate Director – Sustainability, SCI



# Fire resistance of light steel framing

Mark Lawson and Andrew Way of the Steel Construction Institute (SCI) discuss issues related to fire resistance of light steel framed buildings and introduce new guidance recently published by SCI.

Since the Grenfell fire disaster, the question of the fire safety of medium- and high-rise residential buildings has been heightened. Clients and checking authorities are understandably concerned about fire safety, particularly for buildings that exceed 18 m in height, and Regulations have been introduced to prevent the use of combustible materials in external walls. SCI has been working with members of the Light Steel Forum and other industry experts to update design guidance on the fire resistance of light steel framing, which is well established as a construction system for medium-rise residential and mixed-use buildings.

Steel has well-known properties at elevated temperatures and comprehensive design data is presented in BS EN 1993-1-2 and formerly in BS 5950-8 (dating from 1990). BS 5950-8 was the first fire engineering code worldwide and it influenced Eurocode developments. The critical temperature of structural steel beams and columns is taken as 550°C for the design of the fire protection to these members and this critical temperature increases as the proportionate loading (known as the load ratio) on the member reduces. Structural engineers are familiar with the design approach for structural steel but the application of methods for cold



Figure 1: Typical application of light steel loaded walls supporting a joisted floor



Figure 2: Light steel frame construction with metal decking for composite floors

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# RAINHAM



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formed steel is the subject of the recent work by SCI.

Light steel framing has gained a market share because one of its benefits is that it is non-combustible and does not add to the fire load of the building. It may be used with joisted floors (Figure 1) or increasingly, with composite floor slabs that are supported by light steel load-bearing walls, as shown in Figure 2.

**Strength retention of cold formed steel**

Cold formed steel has slightly reduced strength retention properties at elevated temperatures compared to structural steel I and H sections and hollow sections because of the influence of local buckling of its thin profile. Nevertheless, the strength reduction factor (SRF) for Class 4 light steel sections at 550°C is still 0.41 of the nominal yield strength, as seen in Figure 3. This reduction in strength is broadly consistent with the reduction in load level at the fire limit state, which means a structure designed in the normal way at ambient temperatures is likely to be able to resist the reduced loads of the fire limit state.

Light steel framing differs from structural steel in that it is a planar construction system. The 2D walls and floors are protected by layers of Type F or similar fire-rated plasterboards. In the last 3 years, an unprecedented number of loaded fire tests have been performed by light steel framing and plasterboard suppliers to satisfy 60, 90 and 120-minutes fire resistance requirements for loaded walls and floors.

A fire test on a loaded wall (Figure 4) is generally performed using the thinnest steel section in a range with the highest sensible load that can be applied by the test house. Temperatures are measured on the flanges and web on the 'C' sections at a number of positions, so that the critical temperatures can be related directly to the load that is applied for the particular wall build-up. This is the so-called 'load ratio' method.

With this test information, the design of a 'C' section with thicker steel or with a different wall height to that tested can be calculated using the method developed by SCI. The only issue that affects the design solution is then the effect of non-uniform heating through the 'C' section for fire on one side,

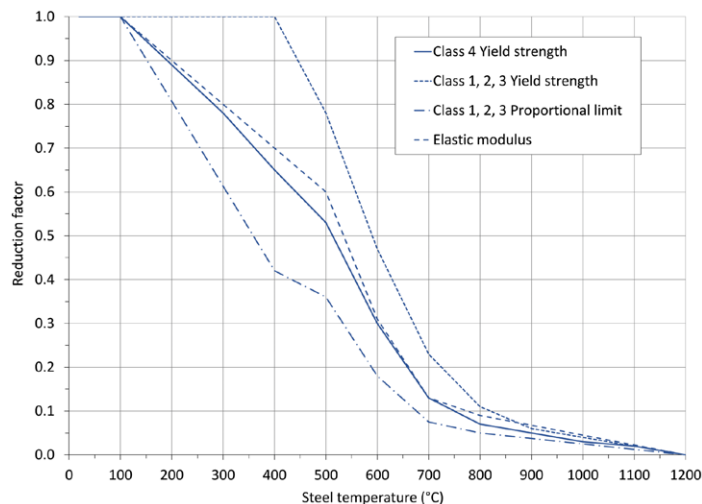


Figure 3: Strength and stiffness reduction factors for steel at elevated temperature



Figure 4: Typical fire test arrangements for light steel loaded wall

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which has two opposing effects: it causes some thermal bowing which adds to bending effects (or P-Δ effects); but on the beneficial side, the centre of resistance of the ‘C’ section moves towards the cooler unexposed flange. Although the two effects generally cancel each other for the normal range of wall lengths, both effects are taken into account in the design process.

## Design Methodology for Loaded Walls

The formula that links the design resistance of a loaded ‘C’ section in a planar wall at the fire limit state to its buckling resistance in normal conditions is given by:

$$N_{b,Rd,fi} = k_1 N_{b,Rd} SRF(\theta_{ref})$$

$N_{b,Rd,fi}$  is the axial load that may be supported in fire.

$N_{b,Rd}$  is the buckling resistance of the ‘C’ section in normal conditions taking account of the effective length.

$SRF(\theta_{ref})$  is the strength reduction factor for a Class 4 cold formed steel section.

$\theta_{ref}$  is the reference steel temperature for a non-uniformly heated section.

$k_1$  is a coefficient that takes account of thermal bowing effects and is typically 0.8 for walls supporting joisted floors or 0.9 for walls supporting composite (concrete) floors due to the greater restraint provided by the stiffer floor.

The procedure uses measured temperatures in a test and so it is important that this data is obtained as temperature versus time in order to be able to back-analyse the test. It is a pre-requisite that a valid test result is obtained for the particular wall build-up before the calculation method may be used.

The complete design guidance is presented in a new SCI publication P424. The guide includes numerical design examples and a wealth of [construction details](#) for walls, roofs, ceilings and junctions between elements.

## External Fires on Loaded Walls

The same approach may be applied to external walls, although there are uncertainties about the severity of an external fire. At present, there is no agreement on this as logically it should be less severe than a fully developed fire within a compartment in a building. The approaches that have been proposed for an external fire are:

- A fully developed ISO fire curve, but with a cut-off temperature of 680°C as permitted by BS EN 1363-2 for external walls. With this limit, the fire endurance will be increased relative to an equivalent internal wall, but this test is rarely performed.
- A fully developed ISO fire curve, but with compliance for an external wall taken as a notional [fire resistance](#) of 60 minutes or alternatively the fire resistance period for the internal structure, reduced by 30 minutes. This is a simple way of recognising that a natural fire occurring outside a building or emanating from windows and radiating back onto the external wall has a lower effect than a fully developed fire internally, assuming adequate fire stopping around windows etc.
- A fully developed ISO fire curve without any reduction.

The external sheathing boards that are used are very robust structurally but do not necessarily possess the inherent insulation characteristics of gypsum-based plasterboard. Furthermore, for buildings more than 18 m high



Figure 5: Typical fire test arrangements for a light steel loaded floor

(currently for England), non-combustible insulation and sheathing boards are required.

## Composite floor slabs

[Composite floor slabs](#) can provide up to 120 minutes fire resistance without requiring a fire protected ceiling by virtue of the embedded reinforcing bars in the deck ribs. Guidance on the fire resistance of composite slabs is given in BS EN 1994-1-2 and in the former BS 5950-8, and SCI publication P375 - *Fire Resistance Design of Steel Framed Buildings*.

## Design Methodology for Loaded Floors

Loaded floors differ from loaded walls in that the effects of thermal bowing do not add to the applied moments and the critical temperature is taken as the bottom flange temperature. Also, for floors, the plasterboard ceilings can become detached as they weaken in fire. The design approach for loaded floors is based on a similar approach to walls but a constant coefficient of 0.6 is used and the buckling resistance can take account of the restraint offered by the floor boarding, as follows:

$$N_{c,Rd,fi} = 0.6 N_{b,Rd} SRF(\theta_{exposed})$$

Most joisted floors (shown before a fire test in Figure 5) are designed for serviceability limits of deflection; their load ratio will generally be less than 0.4, meaning their performance at the fire limit state is likely to be satisfactory.

## Conclusions

The new SCI publication presents detailed design guidance for light steel framing at the fire limit state. Fire tests are required, with the data used to extend the range of application to different steel thickness, size, loading and span. The publication has been circulated to SCI members; it may be downloaded from [Steelbiz](#). ■

# AD 460:

## Amendment A2 to EN 1993-1-4

In February 2021, the second amendment to the 2006 version of the stainless steel Eurocode was published, EN 1993-1-4:2006+A2:2020.

The amendment consists of one revision – Table 5.3, which lists the imperfection coefficient ( $\alpha$ ) and the plateau length ( $\bar{\lambda}_0$ ) that are used in the buckling curves for flexural, torsional and torsional-flexural buckling.

The revised table in this new amendment is presented below as Table 1.

Buckling mode	Type of member	Axis of buckling	Austenitic & austenitic-ferritic (Duplex)		Ferritic		
			$\alpha$	$\bar{\lambda}_0$	$\alpha$	$\bar{\lambda}_0$	
Flexural	Cold formed angles and channels	Any	0.76	0.2	0.76	0.2	
	Cold formed lipped channels	Any	0.49	0.2	0.49	0.2	
	Cold formed rectangular hollow sections	Any	0.49	0.3	0.49	0.2	
	Cold formed circular hollow sections	Any	0.49	0.2	0.49	0.2	
	Hot finished rectangular hollow sections	Any	0.49	0.2	0.34	0.2	
	Hot finished circular hollow sections	Any	0.49	0.2	0.34	0.2	
	Hot rolled sections & welded open or box sections	Major	0.49	0.2	0.49	0.2	
	Minor	0.76	0.2	0.76	0.2		
Torsional and torsional-flexural	All members	The values of $\alpha$ and $\bar{\lambda}_0$ for minor axis flexural buckling apply.					

Table 1 Values of  $\alpha$  and  $\bar{\lambda}_0$  for flexural, torsional and torsional-flexural buckling (Table 5.3 of EN 1993-1-4:2006+A2:2020)

The reason for the amendment is that since the original buckling curves were developed (more than 25 years ago), a considerable amount of additional experimental data on stainless steel compression members has been generated. The test data, supplemented by extensive numerical analyses and reliability assessments, indicate that for cold formed hollow and open sections, the existing buckling curves were too optimistic. Assessment of the data also showed that in some cases, a different buckling curve was justified for ferritic stainless steel due to its less non-linear stress-strain characteristics. Additionally, it was possible to make a distinction between rectangular and circular hollow sections, as well as lipped channels and plain channels. New data on hot finished hollow sections also enabled the addition of buckling curves for this product form. Welded box sections were conservatively assigned the same buckling curve as hot rolled and welded open sections.

Further information on the new flexural buckling curves is given in the Commentary to the *Design Manual for Structural Stainless Steel*, available from [www.steel-stainless.org/designmanual](http://www.steel-stainless.org/designmanual)

For torsional and torsional-flexural buckling, new test data has also suggested that the original buckling curve is too optimistic for channel section columns. In the absence of data for other open cross-sections susceptible to torsional or torsional-flexural buckling, the minor axis flexural buckling curve is recommended as a safe approximation. The same approach is used in prEN 1993-1-1:2020.

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## New and revised codes and standards

From BSI Updates March 2021

### BS EN PUBLICATIONS

#### BS EN ISO 8407:2021

Corrosion of metals and alloys. Removal of corrosion products from corrosion test specimens  
*supersedes BS EN ISO 8407:2014*

### BS IMPLEMENTATIONS

#### BS ISO 23864:2021

Non-destructive testing of welds. Ultrasonic testing. Use of automated total focusing technique (TFM) and related technologies  
*no current standard is superseded*

### UPDATED BRITISH STANDARDS

#### PD 7974-7:2019+A1:2021

Application of fire safety engineering principles to the design of buildings. Probabilistic risk assessment

### NEW WORK STARTED

#### EN 14717

Welding and allied processes. Environmental check list  
*will supersede None*

#### EN ISO 16925

Paints and varnishes. Determination of the resistance of coatings to pressure water-jetting  
*will supersede BS EN ISO 16925:2014*

#### BS 8135

Fire performance of external thermal insulation for walls of multi-storey buildings  
*will supersede None*

### DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

#### 21/30412482 DC

BS EN ISO 3382-3 Acoustics. Measurement of room acoustic parameters. Open plan offices  
*Comments for the above document were required by 24 March, 2021*

#### 21/30423487 DC

BS ISO 22058 Construction procurement. Guidance on strategy and tactics  
*Comments for the above document were required by 29 March, 2021*

### DRAFTS FOR PUBLIC COMMENT

#### BS EN 1993-1-8

Eurocode 3, Design of steel structures, Design of joints.  
Visit <https://standardsdevelopment.bsigroup.com/projects/2020-02626> to view the draft details  
*Comments for the above document are required by 25 May, 2021.*  
*Anyone wishing to submit comments will need to register/login to access the Standards Development Site.*



# Non-Industrial buildings

Arunside Primarv School, Horsham County Architect: B. Peters, Esq.

**A large number of schools today are built using some form of catalogued building. One of these is SCOLA the commercial member of which is Sanders & Forster Ltd. Mr R. S. Brocksom, a Director of that company, describes the use of systems in schools, hospitals and commercial buildings with special reference to the SCOLA method.**

The educational field is where system building has achieved its greatest degree of success by any standard of measurement. Founded on the work of Hertfordshire in the fifties and then the formation of the large consortia of local authorities, CLASP (1957), SCOLA (1961) followed by SEAC, CMB, ONWARD, CLAW, MACE, etc, the position has now been reached where about two thirds of all schools started in 1971 will be system-built schools. The SCOLA system will, in fact, be starting its 1,000th project in 1971. Most of the above systems are fully steel-framed, whilst the remainder have steel roof structures

All of these systems are client sponsored, designed by architects for the use of architects, and have been constantly developed through the years since their inception, so that they are, in the main, quite sophisticated, with a wide range of options using both 'system components' and building materials and products available in the open market. They are therefore a mixture of the 'closed' and the 'open' systems, depending on architectural choice, a situation that is helped

by the provision of a basic steel frame following the accepted rules of dimensional coordination and acting as an accurate matrix for all the other building elements.

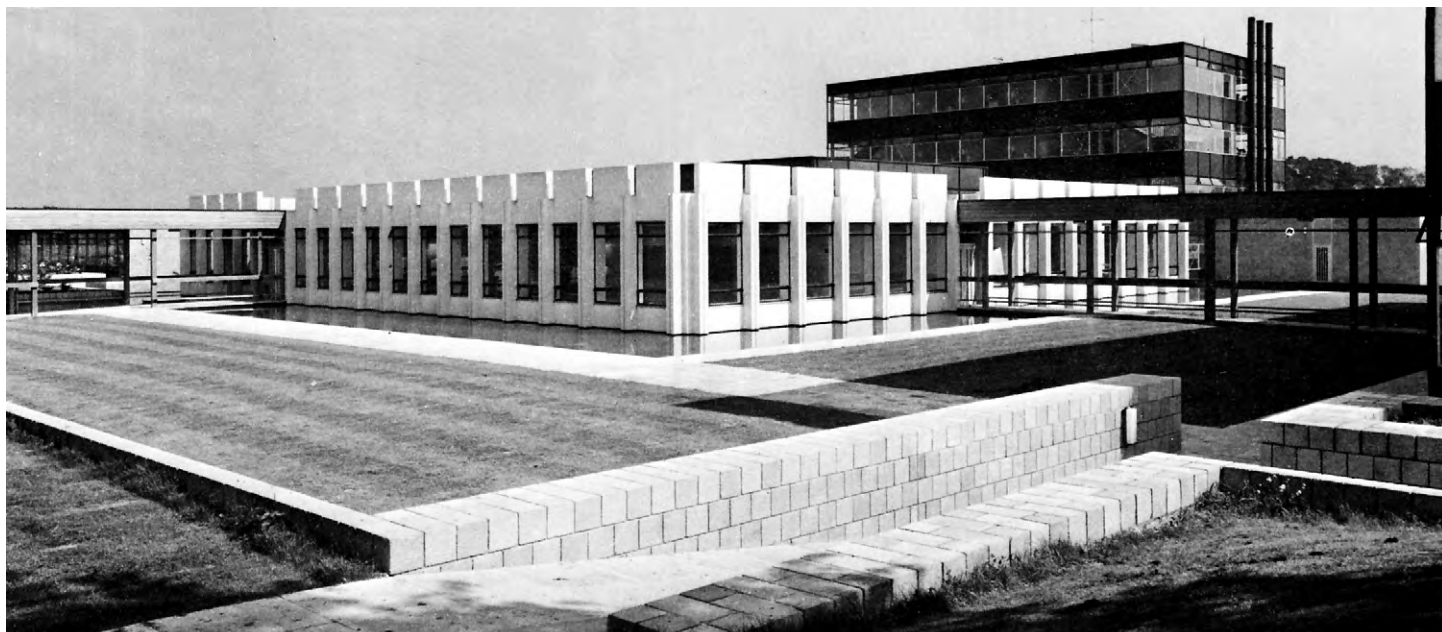
A 'closed' system, using only the range of components laid down by the system designer, may well be in the right cost bracket, but leaves little architectural scope to the job architect, whilst the 'open' or 'half open' systems allow him a much higher degree of architectural freedom, still within the allowable costs.

The economics of the client sponsored systems are based on competitive tendering at two levels. At the level of building components, the consortia seek tenders based either on performance specifications or enquiries for specific products. This results in bulk purchasing arrangements at keen prices for a large proportion of each building project. Then, at the second level, each separate building is usually offered in the normal way to the competitive tendering of builders, either singly or in serial.

The local authorities who are members or associate members of consortia (e.g. 54 out of

59 English and Welsh counties) build in their systems for a variety of reasons:

- (a) Within the limits of expenditure laid down for them, and respecting the principles of competitive tendering, their systems give them better value for money than 'one-off' construction.
- (b) Their systems give much more dimensional flexibility and many more architectural options than any 'closed' or 'proprietary' system at the same price level.
- (c) The job architect, relieved from the chore of detailing every element and assembly in his project, has much more time available to spend on the design and planning of his building- his total time commitment being much reduced.
- (d) The preparation of bills of quantities and other documents and drawings needed for competitive tendering all become less time consuming, whilst the provision of building information to the successful contractor is simply a matter of extracting and issuing the appropriate sheets from the system manual - allied to the layout and elevation drawings prepared by the architect for the particular project.
- (e) The saving in time in the constructional process itself varies appreciably with the circumstances of each job, but many school building authorities have cut their old traditional building times by one-third.



Popley Secondary School, Hampshire County Architect: A. Benson Ansell, Esq.

The design, detailing and fabrication by batch production of the steelwork components for system building needs a specialized knowledge and experience that only a few members of the constructional steelwork industry have accumulated.

Sanders & Forster Ltd, who are now providing the steelwork for four schools per week in the SCOLA system, have to date designed the structural components for six consortium systems for educational buildings, plus one system for hospitals and one system for supermarkets and warehouses, and a comprehensive range of standard buildings for industrial and commercial use.

These standard industrialized buildings, computer designed to plastic theory in a very wide range of spans and building lengths, have so far been portal frames of varying types, complete with several varieties of wall and roof coverings, both for the home market and already exported to over sixty countries overseas. This type of pioneer work, together with the development and introduction of new types of plant, new works procedures and processes, has resulted in Sanders & Forster Ltd being, so far, the only firm of constructional engineers to be awarded the Queen's Award to Industry for technological innovation.

Additionally, Sanders & Forster Ltd is now launching the Multiplan range of flat-roofed buildings for industrial and commercial use, which have alternatively steel or concrete columns as the architect may require.

As the commercial member of the Second Consortium of Local Authorities, Sanders & Forster Ltd are authorized to offer complete SCOLA buildings outside of the SCOLA membership and to arrange for the export or the licensing of the SCOLA system overseas.

In the field of hospital building, a number of structural systems are available to Hospital Boards under the I H B scheme sponsored by the then Ministry of Health in 1968, and based upon the official performance specification prepared by the Ministry and their advisers.



Grove School, Market Drayton County Architect: Geoffrey Hamlyn, Esq.



Frogmore Junior School, Hampshire County Architect: A. Benson Ansell, Esq.

Bearing in mind the traditionally lengthy periods spent in planning, design and construction of almost all hospital buildings, it is remarkable that these I H B systems have, up to now, received so little support from the Hospital Boards.

In considering the very large part played by steel as a material in system building, both in structural and non-structural components, one can recognize that the prime advantages of its high strength/weight and strength/cost ratios, together with its potential for consistently accurate fabrication, are factors that meet the

basic need of all 'open' or 'closed' building systems. That is, the accurate assembly of diverse components from many sources and the elimination of the traditional building skill of getting over dimensional inaccuracies in site work.

The basic steel frame of a system, assembled from jig-tailored components, can give on site an extremely accurate skeleton that controls and simplifies the proper assembly of all the other building elements - in other words, it is an essential part of any system.



# 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 £6,000,000
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 £400,000
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 £4,000,000
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









# 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

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

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

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Structural components							
Company name	Tel	QM	CA	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		●	
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				
Tata Steel - ComFlor	01244 892199		M				
<b>voestalpine Metsec plc</b>	<b>0121 601 6000</b>	✓	M	4		●	Gold

Computer software							
Company name	Tel	QM	CA	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				

Steel producers							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
British Steel Ltd	01724 404040	✓	M				
Tata Steel - Tubes	01536 402121	✓	M				

Manufacturing equipment							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Behringer Ltd	01296 668259		N/A				
<b>Cutmaster Machines (UK) Ltd</b>	<b>07799 740191</b>		N/A				Bronze
<b>Ficpep (UK) Ltd</b>	<b>01924 223530</b>		N/A				Gold
<b>Kaltenbach Ltd</b>	<b>01234 213201</b>		N/A				Bronze
Lincoln Electric (UK) Ltd	0114 287 2401	✓	N/A				
<b>Peddinghaus Corporation UK Ltd</b>	<b>01952 200377</b>		N/A				Silver

Membership services							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Deconstruct UK Ltd	02035 799397	✓	N/A				

Protective systems							
Company name	Tel	QM	CA	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
Joseph Ash Galvanizing	01246 854650	✓	N/A				
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	CA	FPC	NHSS	SCM	SfL
easi-edge Ltd	01777 870901	✓	N/A			●	

Steel stockholders							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
<b>AJN Steelstock Ltd</b>	<b>01638 555500</b>	✓	M	4			Bronze
Arcelor Mittal Distribution - Scunthorpe	01724 810810	✓	D/I	4	3B		
<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 567722485	✓	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	4	3B		Gold
Rainham Steel Co Ltd	01708 522311	✓	D/I	4	3B		

Structural fasteners							
Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
BAPP Group Ltd	01226 383824	✓	M		3		
Cooper & Turner Ltd	0114 256 0057	✓	M		3		
Henry Venables Products Ltd T/A Blind Bolt	01299 272955		M				
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	CA	FPC	NHSS	SCM	SfL
Air Products PLC	01270 614167		N/A				

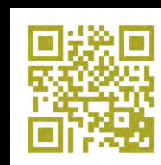
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