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NSC

Steel home for Great Tapestry of Scotland

January 2020
Vol 28 No 1

Steel power for Battersea

Doncaster museum wrapped in steel

Oasis for Oldham

Bridge links Garden City

celebrating

excellence in steel

Call for entries for the 2020 Structural Steel Design Awards

The British Constructional Steelwork Association and Trimble Solutions (UK) Ltd have pleasure in inviting entries for the 2020 Structural Steel Design Awards.

Now in their 52nd year, the Awards celebrate the excellence of the United Kingdom and the Republic of Ireland in the field of steel construction, particularly demonstrating its potential in terms of efficiency, cost-effectiveness, sustainability, aesthetics and innovation.

“Trimble are proud to again be associated with the SSDA and look forward to another successful Awards that showcases the breadth and depth of talent and expertise within our steel construction industry”, Richard Fletcher, Managing Director, Trimble Solutions (UK) Ltd.

Why enter?

If your project is shortlisted, your company would have the kudos of being part of a prestigious Awards scheme - one with a long history, focussed solely on steel construction and the only one where expert judges visit every shortlisted project to truly appreciate its qualities. In addition, you’ll receive:

- Free publicity for you, your project and your client, both online and in the construction press.
- Free attendance at a major Awards event in central London for your project team.
- Recognition of excellence for your project, be it large or small.

How to succeed?

Plan ahead and involve the whole project team from the outset in preparing a high-quality submission, don’t leave it to the last minute. Read the entry criteria and particularly the ‘Submission Material’ section on the entry form and provide exactly what is required, nothing more, nothing less. In addition:

- High quality photos will portray your project at its best.
- A well written, flowing description of the context, concept design, outstanding features and key construction details will allow the judges to swiftly appreciate the essence of your project.
- Broad representation from all parties at the judges’ visit will demonstrate collaboration and enthusiasm.

To find out more and download an entry form visit https://www.steelconstruction.info/Structural_steel_design_awards or call Chris Dolling (BCSA) on 020 7747 8133

Closing date for entries: Friday 21st February 2020

BCSA

Trimble

Cover Image
Battersea Power Station Phase 2
Main client: Battersea Power Station Development Company (BPSDC)
Architect: WilkinsonEyre
Main contractor: Mace
Structural engineer: BuroHappold Engineering
Steelwork contractor: William Hare
Steel tonnage: 24,000t

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No crystal ball required

Nick Barrett - Editor

The start of the year is a traditional time for journalists to get their crystal balls out and write about future prospects. Events this year have thrown all sectors of the economy into even more uncertainty than usual, so no predictions, but a few trends are worth highlighting.

The landslide Conservative general election victory might have removed some uncertainties and it was well received on the financial markets, but analysts seem agreed that the UK economy could be in for a potentially weaker couple of years than otherwise might have been the case thanks to Brexit. The world economy is also showing signs of weakening, and growing protectionism worries potential investors. So, there is still no shortage of reasons for putting investment plans on the back burner.

There is still strength in the market for construction services though. The latest construction market statistics, released by Barbour ABI on the same day that we heard the election result, showed the market making some recovery from recent falls in the total value of contracts awarded in November. It is encouraging that demand is moving in the right direction, but what might be more interesting is the changing nature of demand for developments.

The commercial market has been strengthened in recent years by the ultra-low interest rate environment and commercial property is widely recognised as an asset class that can deliver strong and sustainable income for investors along with long-term capital appreciation. But there are deep structural changes underway affecting the commercial market, deriving from profound changes in the way people are choosing to live, shop and work. The most publicised change concerns retail, with more and more shopping going online without visits to physical stores.

The shift from High Street shopping to the internet has been a major force shaping the commercial property market in recent years, and it is one that steel has been able to support with its ability to quickly fabricate and erect the new logistics buildings needed. Demand has been high for large regional logistics centres to warehouse the products ordered online, and there has been a healthy demand, in the south east especially, for 'last mile' logistics space. It is a fast-moving and agile market, which steel is well suited to serve.

This demand remains strong. A prime distribution warehouse in Wembley has recently been pre-let on a ten-year index linked rent with no breaks; a mouth-watering deal for the property sector. Demand has also been strong outside the south east, for example within the logistics 'Golden Triangle' in the Midlands.

Other types of property are also providing growing demand. The drivers have been technological, demographic and societal as well as economic, and investors have cottoned on to the opportunities. So, private healthcare, student accommodation, hotels and leisure facilities, data centres and private rented housing have all become important sectors in recent years.

NSC has regularly contained reports of these new markets being successfully served by steel. All of these markets demand construction services that are admirably provided by steel construction, including cost-effectiveness, speed, high sustainability credentials, flexibility, and offsite production. No crystal ball is needed to predict that this will continue.

Historic steelwork publication from BCSA

The British Constructional Steelwork Association (BCSA) has published a compendium to its *Historical Structural Steelwork Handbook*, which was originally published in 1984.

Entitled *Historical Structural Iron and Steel Sections* it includes additional information for engineers on the material and section properties for historical steel sections.

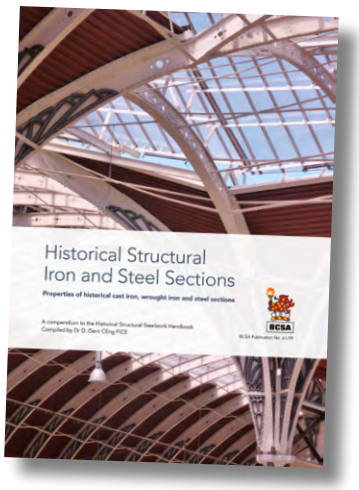
With many cast iron, wrought iron and early steel structures still in use today, it is essential that engineers have access to practical information on the types of material, their properties and the section sizes used, should such structures require repairs, alterations or strengthening for a change of use.

The BCSA's *Historical Structural Steelwork Handbook* has been one of the books to go to for those tasked with inspecting, investigating and assessing historical metallic structures for 35 years. According to the BCSA, the intention of publishing the new publication was not to rewrite the original document, but to build upon it with additional information.

Written by Dr David Gent it brings together in one easy to read publication information that up to now has only been available through a variety of historical documents that few engineers have access to or are able to locate, and will be invaluable in assisting investigations to determine the:

- probable material (i.e. cast iron, wrought iron or steel)
- technical properties of the different members
- origin of the members
- strength of the material from which the members were made

Copies of BCSA's *Historical Structural Iron and Steel Sections* can be obtained from www.steelconstruction.org priced at £25 +VAT for Non-BCSA members and £18.75 + VAT for BCSA members.



Survey reveals payment abuse is harming contractor's wellbeing

Photo: Andrew John – Shutterstock

A survey conducted by the Prompt Payment Directory and the Specialist Engineering Contractors' (SEC) Group has revealed that 90% of construction business owners are reporting a range of mental health issues – from stress to suicidal feelings – as result of payment abuse.

According to the British Constructional Steelwork Association (BCSA), the collapse of a string of several specialist subcontractors after they were left with bad debts from main contractors only reinforces the need for government and industry to act to stop payment abuse.

The BCSA and SEC Group are urging the next Government to adopt a range of measures including 30-day payment terms on all public sector contracts and sub-contracts, penalties on serial late payers, the use of project bank accounts in public sector construction/infrastructure projects, and protect cash retentions in a secure account for firms in construction supply chains.

In her May 2018 report, *Building a Safer Future*, Dame Judith Hackitt said that poor payment practices drove poor behaviours which, in turn, produce poor quality buildings.

Contractor begins bridge work on North Yorkshire Moors Railway

Cleveland Bridge has begun replacing the North Yorkshire Moors Railway (NYMR) landmark Bridge 27, which is the first in a series of scheduled vital repairs for the famous visitor attraction and popular movie location.

Carrying the 180-year-old railway over the Eller Beck at Goathland Station, the 20m-long Bridge 27 is best recognised as the iconic track leading to Hogsmeade Station, where the young wizards embarked for Hogwarts in the first Harry Potter movie, The Philosopher's Stone.

The 84t, single span bridge is being constructed at Cleveland Bridge's factory in Darlington, which has the capacity to enable its engineers to undertake a full trial assembly of the structure.

Cleveland Bridge is undertaking a full turn-key package for the project including the dismantling and removal of the old structure, earthworks, pre-casting of concrete elements, installation of the new structure and in-situ casting of the new deck.

Jim Mawson, Head of Operational Delivery for Cleveland Bridge said: "We are exceptionally proud to be part of such a landmark restoration project at one of the most iconic heritage railway lines in the world.

"It's really pleasing to see our contemporary production methods using modern materials so perfectly blended with the classic design of this bridge to ensure it fits seamlessly into its North Yorkshire National Park surroundings."

BCSA hosts Chinese steel sector delegation

The British Constructional Steelwork Association (BCSA) has hosted a week-long visit to the UK by the China Construction Metal Structures Association (CCMSA), a trip that included tours of Caunton Engineering, Severfield and SH Structures' facilities.

The BCSA hosted 23 people from China, including Hao Jiping, Chairman of CCMSA and the Vice Executive Secretary Chairman, Dang Baowei.

During the visit the group also attended a two-day workshop on the Eurocode design standards for structural steelwork, execution standards for structural steelwork, CE Marking and modular construction held at Imperial College, London.

The workshop included presentations by Dr David Moore, then Director of Engineering at the BCSA, Prof. Leroy Gardner, Professor of Structural Engineering at Imperial College, London and Dr Mark Lawson from the Steel Construction Institute.

Dr David Moore said this was a highly successful visit and it is anticipated that BCSA will have a return visit to China to see the work carried out by some of the Chinese steelwork contractors in 2020.

The Chinese annual output of structural steelwork in 2018 was 71.2 million tonnes, 62% of which was used in buildings, 18% in bridges, 7% in masts and 12% in other non-standard structures.

Steel completes on second of twin King's Cross commercial developments

The main steel frame for the 12-storey S1 commercial block in London's King's Cross development has been completed.

Requiring 2,400t of steel, the building closely resembles its recently completed steel-framed neighbour, S2, as the two have an interlocking appearance.

According to project architect Mossession, the concept provides two structures that look like they have been pulled apart, as they both feature protruding elements along their facing façades.

Building S1 has been constructed around a centrally-positioned core, with cellular beams creating internal spans of up to 18m. All of the internal steelwork, along with the underside of the metal decking will be left exposed within the completed scheme, giving the client the desired modern industrial look.

At ground floor level the building has a footprint of approximately 60m x 40m, but this decreases to 20m x 20m at the upper level as the tenth and eleventh floors are set-back to accommodate outdoor terraces.

Working on behalf of BAM Construction, Elland Steel Structures has

fabricated, supplied and erected the steel for S1.

Winvic set to expand East Midlands Gateway

SEGRO has appointed Winvic Construction to build the fifth industrial unit at its flagship, 700-acre multi-modal logistics hub in the East Midlands.

The 16,500m² warehouse distribution facility will mean end-user Games Workshop joins Amazon, XPO Logistics, Kuehne & Nagel and ShopDirect at SEGRO Logistics Park East Midlands Gateway.

Winvic started on site in early December 2019 and The Games Workshop facility will be a single storey unit including a 1,114m² two-storey office space.

Winvic Construction Director, Rob Bull, said: "Our relationship with SEGRO has gone from strength to strength since we

began one of the largest earth-moving, multi-agency developments in Europe three years ago at the site."

The company also constructed the first four units on the park, with Severfield erecting the steel for three units and Caunton Engineering erecting the steel for the other unit.

NEWS IN BRIEF

MAG (Manchester Airports Group) has appointed McLaren to build a warehouse and logistics facility on the site of a former WWII aircraft hangar at Manchester Airport's World Freight Terminal, for global airport services provider dnata. The airside project, which will be known as 'dnata City North', incorporates the construction of a 13,470m² facility with an integrated two-storey office space.

Plans to turn **Paisley Museum** into a world-class destination have taken a step forward – after planning permission was granted. The Category A-listed Victorian building will be transformed into a leading European museum telling the unique stories of a town known around the world for the cloth pattern which carries its name.

Yorkshire-based **Caddick Group** is set to build a £50M distribution centre near Wakefield for global real estate investment manager AEW. Named Wakefield 515, the facility will offer 47,500m² of floor space.

Developer **St. Modwen** has submitted a detailed planning application to Basingstoke and Deane Borough Council to build three speculative warehouse units of 3,400m², 4,700m² and 9,000m² at an 11.3-acre industrial and logistics park in Basingstoke. The site is said to be strategically located, as it lies between junctions 6 and 7 of the M3 and is expected to deliver up to 250 new jobs in the area once fully occupied.

Glasgow-based **Queen's Park Football Club** has submitted plans for a 1,700-seater stadium at Lesser Hampden in the south of the city. Under the proposals, the site adjacent to Scotland's national stadium Hampden Park will be upgraded to a league-standard ground complete with a new 812-capacity east stand and an extended west stand for 900 spectators.

PRESIDENT'S COLUMN

The adage cash is king is never more real, cashflow is the life blood for any company. Recent developments with late payments, retentions and increases in the cost of Professional Indemnity insurance coupled with the proposals from government to impose reverse VAT on parts of the construction industry are stretching some companies to breaking point.

Many steelwork contractors are suffering from the doubling and trebling of PI insurance premiums. Insurance companies that are willing to offer cover are offering it for 'aggregate' claims and are no longer for 'each and every' claim. Undoubtably, the hardening of the insurance market could have been affected by events at Grenfell that none of us want to see a repeat of, but I suspect there's more to it than that. I'd like to see insurance companies take into account the professionalism and quality of specialist contractors.

All of BCSA's members are subject to annual audits that focus on all the good practices that demonstrate good governance and professionalism.

In October 2020 government is proposing to introduce reverse VAT on construction services. I don't think it will have many supporters and for many construction companies this will adversely affect both cash flow and working capital. BCSA lobbied for the postponement of the introduction of reverse VAT in 2019 and we'll continue to lobby for it to be cancelled altogether.

I keep hearing that the time to make payments is coming down. This is nonsense. Some main contractors are 'gaming' the system extending the time to make payment while others are issuing pay-less notices, as the 30-day period starts when the application for payment is agreed. Many of these issues could be addressed by the wider use of Project Bank Accounts, which clearly protects everyone the full length of the supply chain from clients to the specialist contractors.

The Government and the public sector in general could lead the way in enforcing the 30-day payment requirement in Public Contracts Regulations and, as in the devolved governments, mandate the use of PBAs for projects over a certain size. At the moment it seems to be an option, with the choice being taken very early as the project is being set up. Public bodies such as Highways England and Network Rail are leading the way on successfully using PBAs and abolishing retentions, lets have more of that please.

All of the above issues can and should be addressed and in my view the government should take the lead in demonstrating best practice on their projects. However, it remains to be seen if the new government has the will and determination to make these changes. BCSA will liaise with the new minister for construction and the small business commissioner to make them aware of the major issues facing our members.

Tim Outteridge
BCSA President and Jamestown Manufacturing

New passive fire protection coating launched

Coatings manufacturer Hempel has launched a new generation fire protection coating – Hempafire Optima 500 – which is said to be specifically designed to improve the productivity of passive fire protection (PFP) coating applications.

Hempafire Optima 500 is claimed to help maintain the stability of steel structures in large infrastructure buildings such as airports, stadiums and commercial centres by delivering up to 180 minutes protection against cellulosic fires.

It is a one component waterborne acrylic intumescent coating with zero volatile organic compounds (VOC) and can be used for both open or closed steel sections.

Hempafire Optima 500 is also said to be fast drying and highly resistant to sagging.

Hempel Group Product Manager Roger Soler, said: "When developing Hempafire Optima 500, we created a coating to enhance efficiency for customers by increasing their productivity and reducing costs. Thickness build-up of the coating can be achieved in less coats that dry faster. Thus, application costs and time to deliver are reduced.

"We also wanted a coating that outperforms in warm climates such as those found in the Middle East and in parts of Europe. We've managed to achieve this without compromising the protection or the aesthetic finish.

"At 40ºC, it comfortably holds up 750 microns (µm) dry film thickness (DFT) per coat, and can be over-coated in just three hours. For applications where speed is the key, coats of 500 µm DFT can be applied every 75 minutes and recoated with a PU topcoat after 16 hours. This means that the whole system - primer, PFP, and topcoat - can be applied and dry to handle within a 48-hour period."

Teesside to get region's first ski centre

Developer's plans have been submitted for a £30M indoor snow and leisure centre attraction in Middlesbrough, Teesside.

Called Sub Zero, the centre would be the seventh in the UK and the first in England's North East.

Developer Cool Runnings has confirmed plans to build the three-storey complex on a seven-acre site at Middlesbrough Dock in Middlehaven, only a short distance from the town's iconic transporter bridge.

The centre will feature a main slope spanning 165m x 30m and a 52m x 50m nursery slope for beginners.

Designed by architects FaulknerBrowns, the 20,400m^2 centre will also include indoor skydiving, a climbing wall, soft play area, trampoline park and bowling alley that will complete the family-friendly experience.

The adjacent listed Middlesbrough dock Clock Tower will also be incorporated into the design of the project.

Contractor named for Gateshead arena

Sir Robert McAlpine has been named as the contractor for the £260M Gateshead conference and exhibition centre on the River Tyne south bank.

The development includes a 12,500-capacity arena; 6,300m^2 of conference and exhibition space; two hotels, bars, restaurants, car parking and extensive areas of public realm.

Chief Executive of Gateshead Council, Sheena Ramsey, said: "The appointment of Sir Robert McAlpine brings us a huge step closer to delivering this world-class events destination for the region and we're glad to have them on board.

"This development will act as a catalyst for renewed economic growth, maximising local employment, training and supply chain opportunities. This is about being ambitious for Gateshead, we need everyone in the borough to be able to fulfil their true potential and projects like this create the conditions for them to thrive."

Speaking on behalf of the council's development partner Ask:Patrizia, John Hughes, Managing Director of Ask Real Estate said: "Sir Robert McAlpine has a reputation for technical excellence and delivering complex developments safely, on time and within budget. We are looking forward to working with them to see this superb facility materialise."

The new complex is set to open in 2023 with a full planning application expected to be submitted in early 2020.

Severfield hosts first safety awards event

Held at The Grand Hotel and Spa in York, Severfield hosted its first-ever safety awards, which celebrated the highest standards of health, safety and environmental management across the business.

Over the course of the evening, seven awards were handed out - starting with three team awards. These recognised a factory, construction and subcontractor team that demonstrated an outstanding commitment to achieving 'Safety First'.

These were followed by Innovation, Outstanding Achievement and One to Watch awards, concluding with a special Chairman's Award.

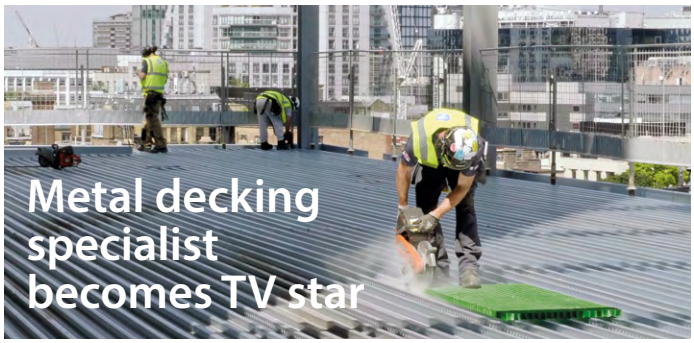
Phillipa Recchia (pictured), Group SHE Director for Severfield, said: "From a safety point of view, there are so many great things happening within the business and we see our people living up to our safety values every day, and it's for that reason that we felt the need to recognise the efforts and achievements of our staff. It's about saying a personal thank you from the company because, at the end of the day, it really is our people that make all of the difference."

Ian Cochrane, Severfield Chief Operating Officer, added: "This is only the start of the story. What's important is how our winners inspire their colleagues around them, and across the company, and go on to become ambassadors for our health and safety culture.

"Safety is our number one priority at Severfield, with everyone having a role to play. That's why events such as this are so important to recognise the achievements of teams and individuals who go above and beyond to ensure everyone goes home safely, every day."

The award winners were:

- **Factory Team Award** - Severfield (UK): Lostock Factory - Andy Smedley, Chris Coyne, Kevin Nowell, Dean Pitchford, Gavin Pettigrew, Jack Bracegirdle, Reece Roberts and the Bay 4 team
- **Construction Team Award** - Severfield (NI) (project in Dublin): Michael Moore, Gareth Liggett and Liam Burns
- **Subcontractor Team Award** - Severfield (UK) & Severfield (NI) Construction: Colin Hanna CM Structural
- **Innovation Award** - Severfield (Design & Build) Construction: Simon Welbourn
- **Outstanding Achievement Award** - Severfield (UK) Dalton: Fred Robson
- **One to Watch Award** - Severfield (UK) Lostock: James O'Connor
- **Chairman's Award** - 22 Bishopsgate Construction and Design teams: Mick Reilly, Grant Short, Paul Roddy, Paul Wake, Trevor Costello, Bryan Milne and David Kidd



Metal decking specialist becomes TV star

Composite Profiles, the specialist metal decking contractor, has starred in a TV programme that was broadcast on Executive TV.

The 15-min programme featured the work undertaken by Composite Profiles at the mixed-use Stage project in Shoreditch, east London, as well as a segment filmed at the company's head office in Poole, Dorset.

Forming an integral part of the Stage scheme, Composite Profiles supplied 15,000m² of Tata Steel's ComFlor 51 metal decking along with 45,000 shear studs for a 12-storey commercial building.

The programme was part of Executive TV's 'Engineering the Future' series, which looks at the modern nature of the UK construction industry. This episode looked at Composite Profiles and how it has evolved into one of the most respected specialists in the industry.

Executive TV brings viewers an insight into the future of British industry, as well as exclusive access to leading figures from across the public and private sectors. Innovation is a core focus of its programmes; telling the story of new ideas and how they are impacting companies in Britain.

Steel climbs new heights in Limerick

Forming an important part of the University of Limerick's new student facilities, a steel-framed building accommodating a climbing wall is nearing completion.

Working on behalf of main contractor Monami Construction, Fox Bros Engineering has supplied 90t of steelwork for the frame.

The steelwork has been delivered to site in large pre-assembled elements, which included columns up to 20m-long, with the heaviest steel section weighing 4t.

According to the university, the climbing wall will be Ireland's tallest, standing at 21m-high and able to cater for the new Olympic sport of speed climbing. The climbing wall is expected to be complete by May.

Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com* web: *https://portal.steel-sci.com/trainingcalendar.html*

Tuesday 14 January 2020
Design of slimfloor composite beams - Webinar
This webinar will give an overview of composite slimfloor beam design in accordance with the Eurocodes. Construction stage and normal stage verifications will be covered. Best practice for this type of construction will be discussed.

Thursday 30 January 2020
Steel Building Design to EC3 Course
This course will introduce experienced steel designers to the Eurocode provisions for steel design. The course focuses on orthodox construction, covering the primary design issues for practicing engineers. Birmingham

Tuesday 11 February 2020
Light Gauge Steel Applications and Design - Webinar
This webinar will discuss the common applications for light gauge and cold-formed steel and explain some of the structural design aspects specific to cold-formed steel sections.

Wednesday 12 February 2020
Steel Connection Design Course
This course is for designers and technicians wanting practical tuition in steel connection design. The course concentrates on the design of nominally pinned connections, in accordance with BS EN 1993-1-8, considering vertical shear and tying. London

Digital Twins

Emerging digital technologies have the potential to help the steel construction industry to be more connected and transparent resulting in increased efficiencies in workflow and communication. In this article NSC looks at one of those technologies, namely digital twins

The steel construction sector has been utilising 3D design software for over 25 years and is well versed in the benefits and efficiencies it provides to manufacturing and construction programmes. The sector is also on the front foot in looking at and incorporating new digital technologies to reduce costs, increase speed of project deliveries and increase environmental sustainability. One of these emerging technologies is digital twins.

A digital twin can be generally defined as an evolving digital profile of a physical object or process that helps optimise performance. Computer-aided design (CAD) or finite element analysis (FEA) models are already widely used in the steel construction industry, but they should not be confused with digital twins. A value which distinguishes those models from digital twins is the presence of a two-way connection between a digital twin and its physical counterpart. A digital twin can be continuously updated with operational data from the physical twin, while the data can be analysed, for instance with machine learning techniques, to make predictions about the performance of the physical twin, to enable preventive measures and positive interventions to take place.

Existing applications

Digital twins have been applied in numerous industries, e.g. Tesla has a digital twin of every car it produces, which enables the company to collect data from the vehicles to discover anomalies and rectify them by updating the software of the cars. General Electric uses digital twins to increase the efficiency of their power turbines and aeroplane engines. On a larger scale, Virtual Singapore is a digital twin which models the built environment of its country, which optimises its use and planning of infrastructure. Likewise, the National Digital Twin for infrastructure is being set up in the United Kingdom to act as a federation of digital twins connected through shared data.

A digital twin of Singapore has been set up to optimise infrastructure planning
Photo: Tavarius – Shutterstock

Machine learning algorithms were used to predict the future performance of the bridge based on historical data from sensors.

SHM was used on the Forth Road Bridge to monitor its health remotely
Photo: Ulmus Media – Shutterstock

Potential applications in steel construction

To date there are minimal existing applications of digital twins in steel construction, but in the following paragraphs we explore some of the potential uses.

Structural Health Monitoring (SHM)

An SHM system collects data from sensors deployed on a structure and consecutively processes them to indicate the structural health of the structure. The types of sensors deployed are based on the readings required, which can be displacements, temperature, and loading etc. For example, an SHM system was deployed recently on the Forth Road Bridge in Scotland to monitor its structural health remotely.

Machine learning algorithms were used to predict the future performance of the bridge based on historical data from sensors. Those predictions were then compared to actual sensor readings to enable more accurate future predictions. As a result, SHM systems can automatically produce early warnings of deterioration allowing preventive maintenance to take place.

Project management

It is also possible to have digital twins of construction sites to assist in project management, in which they can be used for progress and cost monitoring, as well as quality control. Real-time information on a construction project can be obtained by integrating a digital twin with the project's Building Information Model (BIM) and by utilising modern technologies such as drones and laser scanning. The information retrieved can then be used to derive real-time metrics of a project, which include comparisons of a project's progress against its schedule and expenditure against its budget. Discrepancies between as-built conditions and designs can also be captured by potentially using artificial intelligence for cross-referencing. As a result, the digital twin can act as a platform to have a dynamic overview of a project, featuring its real-time metrics and warnings of potential problems, such as cost overruns, slow progress or construction errors.

Inventory management

A digital twin can be implemented for inventory management to reduce unnecessary handling and movement of materials, which accounts for 25% of the on-site productive time. Tagging and tracking of materials can be conducted with sensors, such as near field technology communication (NFC) devices, or with the use of QR codes. The digital twin can then predict the anticipated demand for the materials, and subsequently, notify site managers when the restocking of the materials is required.

Health & Safety

A digital twin of a construction site can improve on-site safety to reduce the number of accidents. The digital twin can obtain information about danger zones or hazardous activities either by reports made manually or by automatically identifying them with artificial intelligence through on-site camera footage. Simultaneously, smart helmets with inbuilt sensors can track the real-time locations of users, which can be linked to the digital twin to automatically alert workers when they are near a danger zone.

Outlook

Due to reductions in the cost of sensors and improvmment in network connectivity, there are positive prospects for a broader application of digital twins in steel construction. With regard to the SHM application of digital twins, it is time-consuming to process data and simulate structural models, but there is potential for close to real-time monitoring of structural health in the future due to increased computational efficiencies.

There is also much more potential in utilising data from digital twins, for instance, to monitor structural health remotely and to leverage existing structural performance data to optimise structural designs of future projects.

STEEL for life

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Thanks to Imperial College London for contributing to this article.

New CEO ready for new challenges

BCSA's new Chief Executive Officer David Moore is no stranger to the steel construction sector and his background as Director of Engineering will stand him in good stead during some technically challenging years ahead, as he explains to Nick Barrett.

Challenging times are ahead for the construction industry's technical experts as the European codes and standards are being comprehensively revised over the next few years.

Almost three dozen steel construction design guides will be updated and amended for 2023. Therefore, it is opportunely timed that BCSA's Director of Engineering David Moore has moved up to the top job as Chief Executive Officer where he can oversee updating the design guides like the Blue Book and provide continuity of the BCSA's deep involvement in the relevant technical committees.

"There will be challenging times ahead for the steel construction sector on a number of fronts, all of which fall under the remit of the CEO," says David, who is a member of Structurals as well as having a PhD.

"Revising all the technical design guidance that we provide for architects and engineers is going to be a major project spread over a number of years, which will involve a lot of effort from all BCSA's staff, but we have been preparing for it. Everything is in place with the appointment of a new Director of Engineering to continue the preparatory work and then execute what will be an essential and challenging project."

David, has been steeped in steel construction and its technical development for 15 years at BCSA, where he was involved in the development of many of the national and European standards (Eurocodes) for steel design and execution. He is also an expert on CE marking of fabricated steelwork and is the author of over 70 peer reviewed publications and design guides, some of which are used daily by practising engineers.

Before BCSA he spent 23 years at the Building Research Establishment (BRE) where he was part of the Construction Division during its privatisation period, and led a team of 32 scientists, directing its Centre for Structural and Geotechnical Engineering.

During his time at the BRE he came into intimate contact with the steel sector, managing the construction and testing of three full-scale buildings at BRE's Cardington facility. In the resulting fire tests steel emerged as by far the best performing structural framing material. "Those were really exciting tests, and resulted in a new approach to the design of composite flooring systems subject to fire," remembers David, "the experiments were carried out on full size structures and I don't think they will ever be repeated."

Assuming Brexit now goes ahead following the decisive election result, whether with a deal or without, there will be a period of tough negotiating with former European Union partners as well as any new markets that trade related technical deals have to be struck with; all of which the new CEO is well qualified to oversee on behalf of steel construction.

"I have represented the steel industry on European, national and government committees and regularly lobbied MEPs, government ministers, MPs and civil servants," says David, "and I will be passing on the knowledge gained to my successor as Director of Engineering."

As Director of Engineering David organised and established industry committees and groups, including the Process and Technical committee, the Digital Technology Group, the Steel Stockholders Group, the Cold-formed Steel and Decking Group and the National Structural Steelwork Specification Steering Committee, as well as chairing the Fabrication and Welding Group which is one of the BCSA's biggest committees.

He has also been involved in the development of several BCSA publications including the National Structural Steelwork Specification (NSSS), one of the industry 'bibles' whose 7th edition will be released in 2020.

David's external roles included acting as chairman of the British Standards Institution (BSI) committee responsible for the UK's input into the development of the steel Eurocodes, the Execution standards for structural steel and the CE marking standard for fabricated structural steel.

He is also the leader of the UK delegation for steel construction and represents the UK steel industry's views at the Comité European de Normalisation (CEN) committees responsible for the development of the steel design Eurocodes and the Execution and CE Marking standards.

David is well known as a lecturer and public speaker on steel construction related topics. He gave verbal evidence to the European Parliament on CE Marking and has given lectures on CE Marking, galvanizing, steel design and fabrication, BIM, and sustainability to BCSA members and the wider steel construction industry.

He took up his new role in early December and he hopes to organise a trade visit for the steel construction sector to China. David explains: "We recently hosted a delegation from the Chinese steel industry which produces around 70 million tonnes a year, compared to our 900,000 tonnes in the UK.

We would like to see the market nearer its previous peak of 1.4 million tonnes. The UK steel construction sector is recognised as the world leaders and I think the Chinese learned a few things from us. There might well be things we can learn from them, so a visit could be worthwhile."

The day-to-day experience David has acquired over the past 15 years working with BCSA's Steelwork Contractor and Industry members has provided him with detailed knowledge, insight and understanding of what is required and needed for and from the UK constructional steelwork sector.

David is excited by the opportunity and looks forward to working closely with BCSA members to ensure they get the most out of membership, continue to be represented as a sector on key issues and ensuring ever closer collaboration with consulting engineers.

Under its new leadership BCSA will continue to campaign on the wide range of issues affecting steelwork contractors and companies and colleagues in specialist engineering sectors, such as ensuring 'level playing fields' with overseas contractors coming into the UK market. "We have to be sure that health and safety, and product quality standards match the high benchmark set by UK steelwork contractors."

Another area David has said will have considerable focus under his reign is sustainability. "Steel has an outstanding sustainability case and I intend to spread that message in my new role. This is an imperative time for the construction sector to tackle sustainability especially carbon and I'm keen to build upon the good work the steel sector have and continue to do to tackle this issue."

The future for steel construction in the UK looks promising, although there are changes in the market to be monitored and new challenges to be met. David said: "I see a rising interest in modular and offsite building, all of which suggest an increasing role for steel."

His appetite for promoting steel construction and BCSA's members remains strong however: "I see my new BCSA role as a career pinnacle. I look forward to the years ahead working closely with BCSA members and our stakeholders representing our sector with much excitement".

The origami-style roof radiates out from a central ring beam

Steel frames a yarn

An irregular-shaped building with a folding origami-style roof is being built to house the Great Tapestry of Scotland. Martin Cooper reports on a project which will bring socio and economic benefits to Galashiels.

FACT FILE
Great Tapestry of Scotland centre, Galashiels
Main client: Scottish Borders Council
Architect: Page\Park Architects
Main contractor: Ogilvie Construction
Structural engineer: Goodson Associates
Steelwork contractor: Hescott Engineering
Steel tonnage: 180t

It may have gone under the radar for many, but the world's longest tapestry has recently been completed in Scotland and will soon be housed in a specially designed steel-framed building in the Borders town Galashiels.

The Great Tapestry of Scotland is a 143m-long linear pictorial history, depicting keys events north of the border going back 12,000 years.

Carefully embroidered by the hands of over 1,000 stitchers, the tapestry is not a continuous item, but separated into numerous panels, which will allow it to be exhibited in a radial arrangement within the new building.

Explaining how this work of art forms part of Galashiels' regeneration masterplan, Alistair Moffat of the Tapestry Trustees says: "The Great Tapestry of Scotland is an object not only of great beauty and power, it will also act as an engine for renewal.

"As large-scale retail moves to the periphery of towns and cities, it is magnetic cultural attractions like the Tapestry that will bring back life to town centres.

"The huge success of the V&A in Dundee, attracting 500,000 visitors in six months, doubling estimates, is only the latest example of how well this strategy works."

The new building sits on vacant plot in the town centre next to the old post office, which recently closed down and moved further up the main street. The two-storey post office building is being renovated as part of the project, as it will be linked to the new structure and will house an education room on the ground floor with offices, meeting rooms and a staff canteen on the upper level.

Behind the old post office building, there is still a functioning sorting office, to which main contractor Ogilvie Construction is adding an extension as another part of its overall programme.

Renovations and extensions apart, the main part of the scheme is the construction of the home for the tapestry. This is a two-storey steel braced frame, which is roughly a square-shaped building measuring 40m x 40m. Two elevations face on to streets, and these have slight folds and bends, breaking up the solid mass of the walls and adding some architectural interest.

The design needed to create enough wall space, within a relatively restricted town centre site, to display this extraordinarily long artwork. To do this, the design incorporates walls that bend and fold and thereby provide as much surface area as possible.

Because of this, the columns for the structure are spaced irregularly around the perimeter, while internally, the layout has been designed to have as few interior columns as possible.

The ground floor will house the main entrance foyer and a café/wine bar, while the upper floor will be dedicated to exhibiting the tapestry.

The decision to use steelwork for the building was taken quite early in the design process and the material was primarily chosen for its spanning qualities.

Page\Park Architects' Suzy O'Leary says: "The tapestry gallery is a single space, approximately 635m², and occupies the whole of the first floor. We did not want any columns intruding into the space, so a steel structure allowed us to create the clear span."

The building is topped with a complex origami-style curving and folding roof, which is a key feature in the overall architectural design.

"The steel structure made this complicated design achievable. It gave us the flexibility to design the roof exactly the way we wanted it, without limitations on the overall form," adds Ms O'Leary.

The steel erection programme required the central element of the roof to be one of the initial parts to be installed. A large 3.7m-diameter ring beam, weighing 5.2t, was lifted into place and held up by a temporary support.

Once this fully welded ring beam had been surveyed and adjudged to be in it is correct position, all of the roof rafters, which radiate out from this central element, were incrementally installed with bolted connections, along with their supporting columns. To create the folding style of the roof, each of the rafters, which are up to 17.5m-long, are positioned at varying pitches.

Only after the entire steel frame was completed and the structure was deemed to be stable, could steelwork contractor Hescott Engineering remove the ring beam's temporary support.

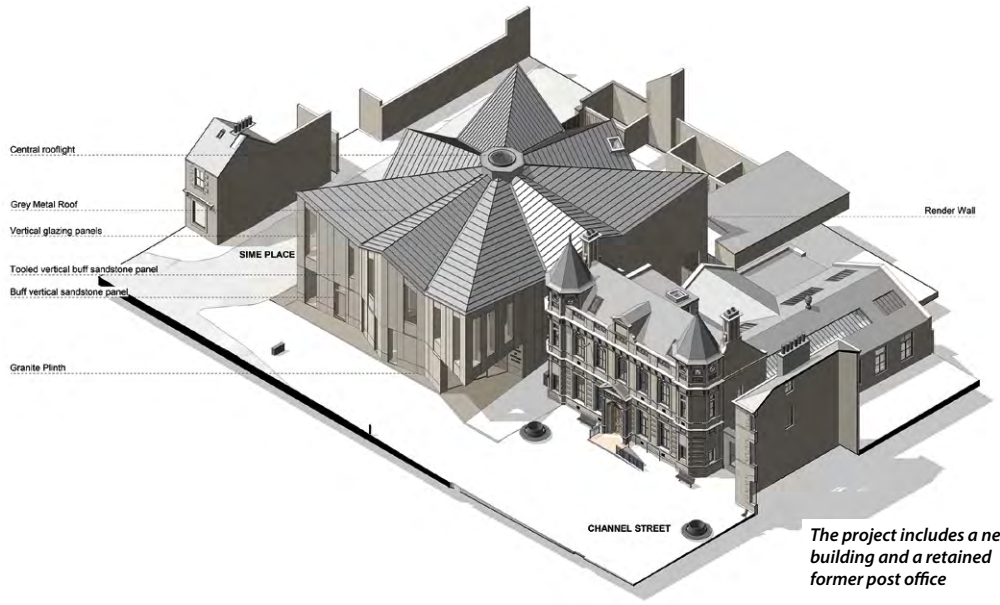
The design for the Tapestry Gallery and in particular the roof, was inspired by Galashiels. The town sits within a valley framed by the Eildon Hills. If driving, you approach the town from above and your first view is out over the rooftops.

The town centre is a conservation area with a largely Victorian building stock. The roofscape of this historic centre can be characterised by pitched roofs, dormers, gables and turrets occasionally pierced by the tall spire of a church. The architects looked to design a folded roof to sit within the context of the historic folding roofscape.

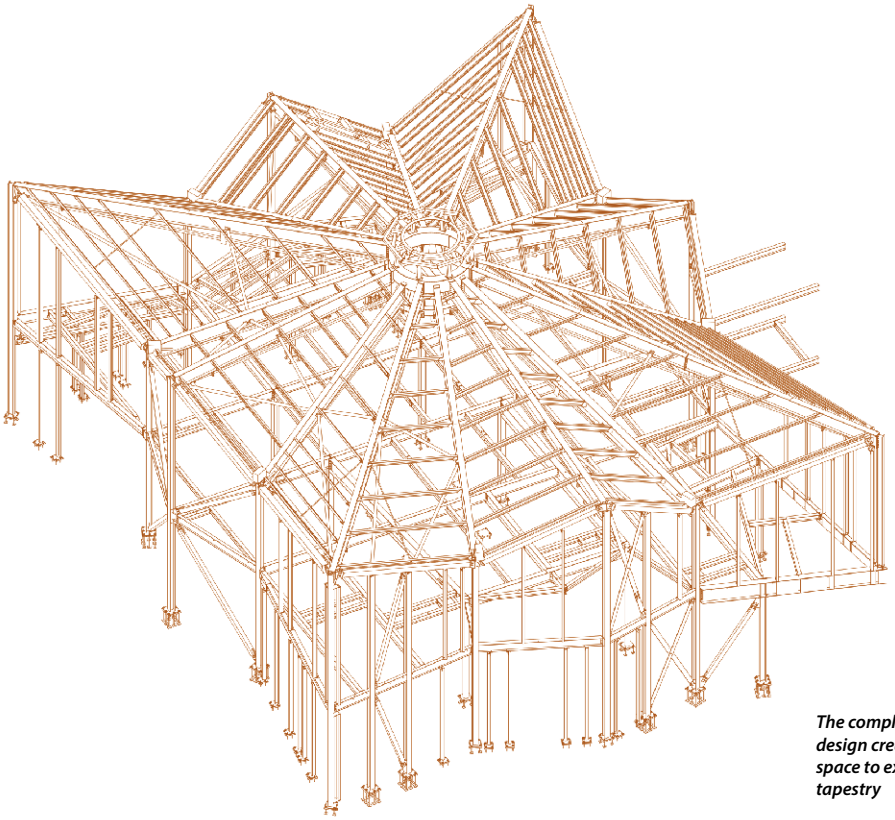
"We feel, by acknowledging and interpreting the historic context, our distinctly contemporary design can sit comfortably within the conservation area," adds Ms O'Leary.

The resultant shape of the building and its roof creates pockets of external space. According to the design team, this generosity with space within the public realm will encourage people to stop and linger a bit longer and enjoy all the town has to offer. Thereby, bringing some extra vibrancy back into the town centre.

The Great Tapestry of Scotland is due to be open to the public by Summer 2020.



The project includes a new building and a retained former post office



The complex steel design creates enough space to exhibit the tapestry

The ring beam is lifted into place and onto a temporary support

"We needed a material that would allow us to span over the retained structure..."

Showing off the past

Steel construction was deemed to be the ideal solution for this iconic building

Accommodating many of Doncaster's historical relics, a new steel-framed cultural hub has also been designed to surround and exhibit a retained Edwardian school entrance.

FACT FILE
Doncaster Cultural and Learning Centre
Main client: Doncaster Metropolitan Council
Architect: Bond Bryan Architects
Main contractor: Willmott Dixon
Structural engineer: Tier Consult
Steelwork contractor: Hambleton Steel
Steel tonnage: 380t

Doncaster will soon have a new £14M, iconic 21st Century combined museum and library building, which will transform how library and heritage resources are provided in the borough.

The new steel-framed building encapsulates part of the frontage of the former Doncaster Grammar School for Girls. A glazed elevation will allow the retained structure to be visible from the street and thereby make it one of the borough's most eye-catching buildings.

Three existing buildings (Doncaster Central Library, Doncaster Museum and Art Gallery and the Library Services for Schools) will be consolidated into this new central hub.

The building will have the space and facilities to display exhibits that have been locked away from public view for years, including the town's famous Roman Danum Shield, which was unearthed in 1971, and the Royal Borough Charters.

The retained structure can be viewed within the new building

A council spokesperson said: "Keeping this element of the former girls' school means we can preserve Doncaster's heritage and create a building that could possibly bring local and national awards.

The new building is set over four floors and covers much of the footprint of the former school. The steel braced frame supports metal decking and a concrete topping to form a composite flooring solution throughout the structure.

Main contractor Willmott Dixon started onsite during October 2018, and inherited a site where much of the demolition had already been completed.

"The school had been closed for a number of years and our initial task was to complete the demolition process that had been partially undertaken. We then had to secure and retain a wedge-shaped portion of the building. This contains the entrance, which consists of two turrets connected by a portico, behind which the former main staircase is located," explains Willmott Dixon Operations Manager Richard Stowell.

The retained portion is a masonry structure and this had to be temporarily propped and supported by a scaffold system while the steelwork was erected.

Steelwork wraps around and over the retained structure, but does not connect into it, as the old and new structures are independent, with only the floors forming a link.

"We needed a material that would allow us to span over the retained structure, and this was one of the main reasons for choosing a steel-framed solution for this project," says Tier Consult Engineer John Cooper.

"Steelwork also helped us easily create a feature cantilever that is positioned above the main entrance."

Spanning over the top of the two-level high retained structure is a 20m-long x 4.8m-deep steel truss, which creates the new building's second floor within its depth as well as supporting the new roof.

The cantilever Mr Cooper is alluding to is located to the side of the retained structure. Here a 10m-long x 2m-deep Westok cellular beam, with 1,400mm holes, has been positioned at roof level to create the entrance feature.

There will be windows in this part of the building and so a truss was ruled out as its cross members would have been visible through the glass.

The solution was to use a large Westok cellular beam - chosen for its lightness compared to a solid member - which supports the cantilevering second floor via hangers.

Kloeckner Metals UK Westok Design Team Manager John Callanan commented: "Detailing of the cantilever and backspan arrangement to the large Westok was quite intricate. We manufactured the cantilevered

end of the section with a gradual rise, to ensure the tight deflection limits in this location were adhered to."

Founded on CFA piles and pad foundations, the steel frame forms a glazed curved frontage that sits 4m in front of the retained structure. A series of 16m-high 400mm x 200mm box section columns support the glazing and the roof.

As well as allowing people to see the old school entrance from outside, the glazing will flood the interior of the building with natural light and create a pleasant area for customers to sit in. This area will be used as an overspill seating area for the café, which will be located within the ground floor of the retained structure.

Behind the café, the restored staircase will provide access to the first floor of the new building, while an extension to the staircase will continue up to the second level.

The site slopes, so behind the retained structure the building drops down and includes a lower ground floor. This level will accommodate a museum for the Kings Own Yorkshire Light Infantry and a rail heritage museum displaying two locomotives built in Doncaster.

Much of the central portion of this floor, where the locomotives will be positioned, will be a double height space, with ground floor viewing galleries positioned along either side.

These will allow visitors to observe the rolling stock from above, while a centrally-positioned atrium, also partially located above the trains, will help to illuminate the exhibits and allow visitors on the first floor to look down on the trains.

A set of sliding doors and two sets of rail tracks, that extend beyond the rear of the building, will allow the locomotives access into the building.

A series of 18m-long beams span the double-height space over the trains and form the second floor of the building.

Meanwhile, the ground floor will also accommodate a children's and adult lending library, while the first floor will house further museum space, and an education and conference space.

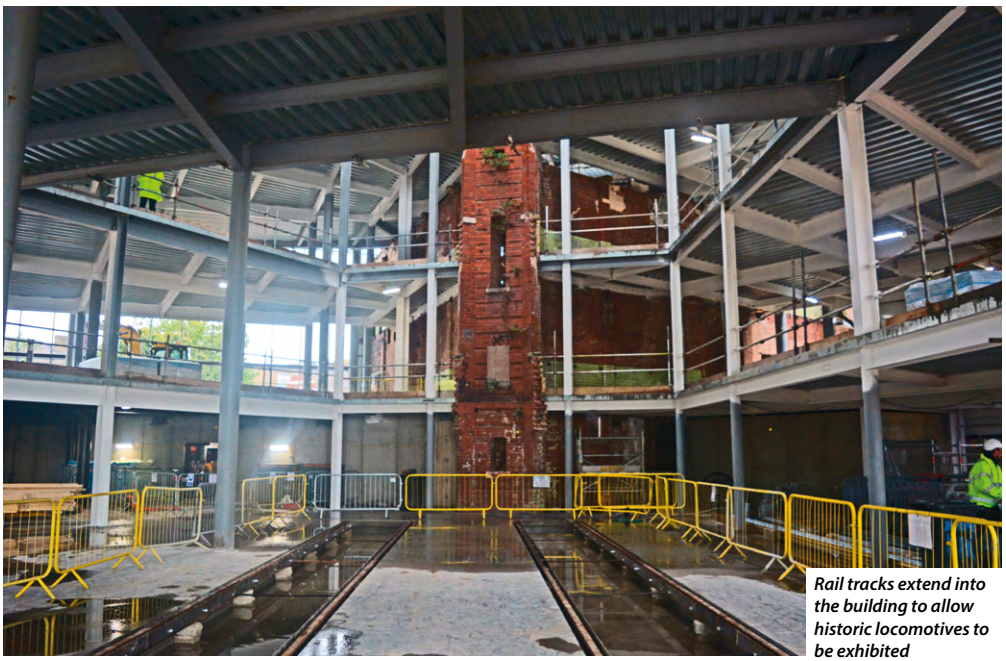
"Creating the required high floor-to-ceiling heights – 3.2m-high in many areas - was easier using a steel-framed solution," explains Willmott Dixon Construction Manager Mark Cox.

"However, for the second floor this is increased to a 3.7m floor-to-ceiling height as this level accommodates a gallery."

This uppermost level also provides space for an outdoor plant zone. Although this area has no roof, it is screened off with the same metallic gold-coloured cladding system that adorns much of the building.

The completed Doncaster Central Library and Museum is due to open in August 2020.

Steelwork wraps around the former school entrance



Rail tracks extend into the building to allow historic locomotives to be exhibited

Steelwork nears completion on the main power station works

Powering ahead

New steelwork construction and an extensive restoration programme are transforming Battersea Power Station into a huge multi-use destination, which will be the centrepiece of a much larger eight-phase development. Martin Cooper reports.

FACT FILE
Battersea Power Station Phase 2
Main client: Battersea Power Station Development Company (BPSDC)
Architect: WilkinsonEyre
Main contractor: Mace
Structural engineer: BuroHappold Engineering
Steelwork contractor: William Hare
Steel tonnage: 24,000t

Standing on the south bank of the River Thames, Battersea Power Station has been one of the capital's iconic landmarks for decades as its four chimneys are instantly recognisable to millions of people.

Completed in two phases either side of the Second World War, the massive Grade II listed power station once supplied around one fifth of London's electricity needs, which required it to consume more than one million tonnes of coal annually.

With its output falling due to age, the power station was decommissioned in 1983 and unfortunately stood derelict for many years.

After a number of failed attempts to redevelop the site, the power station is now being transformed into a huge mixed-use scheme, which will sit in the middle of a seven-phase project that will convert the entire 42-acre plot into a new community.

Work on the former power station is known as phase two, and not only consists of the redevelopment of this iconic building, but also includes the construction of an energy centre – which will supply power to the entire scheme – and the creation of a six-acre public riverside park.

BPSDC Project Director of Phase 2 Jason Cowell says: "Battersea Power Station and the surrounding area is undergoing a major transformation that will see the creation of a new neighbourhood, which is set to become one of the most exciting places to live, work and visit in London.

"Regenerating a Grade II listed building is not without its challenges. However, we are working closely with Historic England and Wandsworth Council, as well as construction, engineering and architectural experts including Mace, BuroHappold Engineering, WilkinsonEyre and William Hare to ensure the building is treated sensitively and with the respect it deserves."

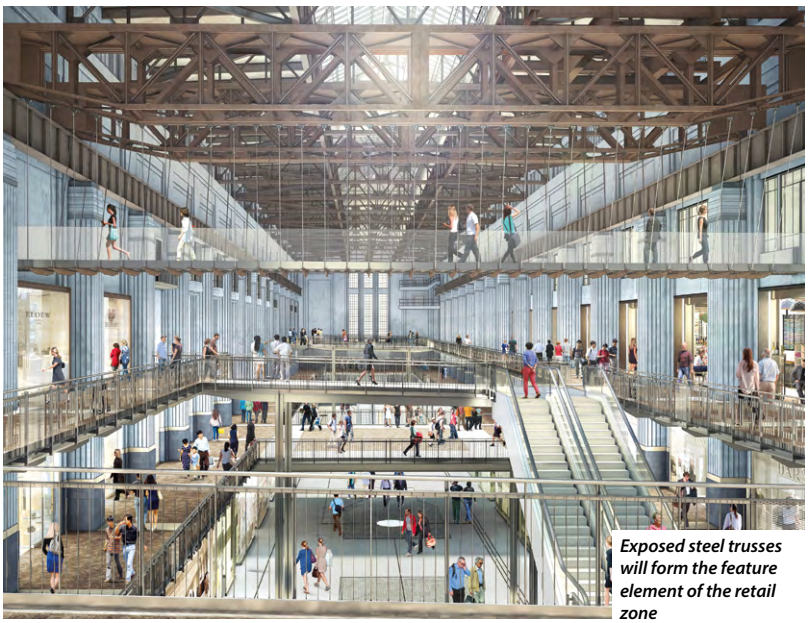
Phase one of the overall scheme was completed in 2017 and includes residential buildings that sit to the west of the power station. Phases three to seven are in various stages at present, but they will all add further residential, commercial and retail elements to the development.

Having initially had its four original chimneys rebuilt, the reconfigured power station building will include more than 100 shops, restaurants and cafes; a 2,000-person capacity events venue; a multi-screen cinema; six floors (46,000m^2) of new office space, which will be home to Apple's new London campus; and 253 apartments arranged around the uppermost levels.

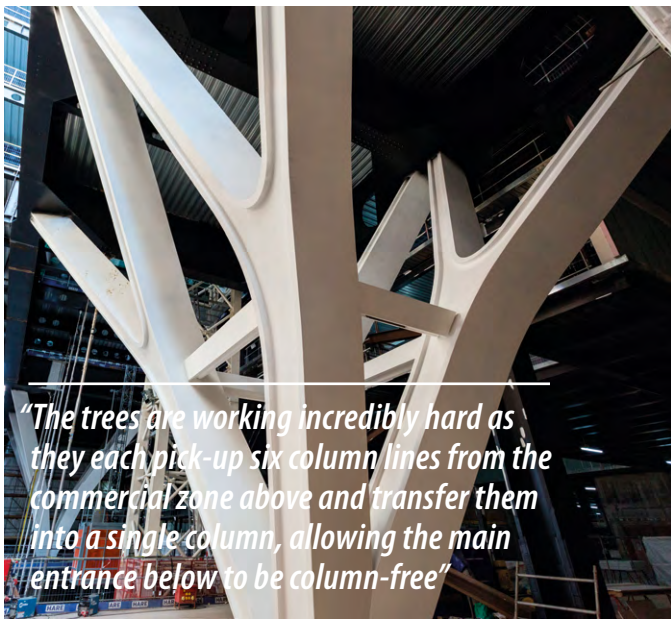
Early works also included the excavation of a two-level basement that extends beyond the footprint of the existing structure. This subterranean area includes the underground box for the energy centre, which will sit beneath the area that will become the riverside park.

"This was a challenging engineering feat," says BuroHappold Project Engineer Franck Robert. "We effectively dug a two to three storey basement around the entire perimeter of the Power Station, as well as deep basements under each Turbine Hall, which generated significant movements for the existing fabric and dictated when the new frame could be connected back to the existing."

Above the basement, much of the building's fabric has been retained, including the majority of its original steel frame and brickwork façades.



Exposed steel trusses will form the feature element of the retail zone



"The trees are working incredibly hard as they each pick-up six column lines from the commercial zone above and transfer them into a single column, allowing the main entrance below to be column-free"

The building is divided up into a number of elements, consisting of a central boiler house, with a turbine hall, a switch room and annexes on both sides – east and west. Each of these elements are separated from the adjoining areas by internal walls, which have also been largely retained.

Within these retained elements, new steelwork forms the shops, restaurants, offices and apartments. Most of the floors are formed with steelwork supporting metal decking, with the only exception being a few areas on the eastern side where precast elements have been utilised for programme reasons.

Erecting these new steel elements was not a straightforward procedure as the entire programme had to be coordinated around a vast array of temporary works and bracings that had been installed to support the existing structure after a partial demolition programme had been completed.

The temporary works could only be removed once the new steel frames had been installed and connected to the retained walls, thereby providing the required support.

"One of the biggest challenges has been the integration of new steelwork elements and then connecting these to the original retained steel frames," says Mace Project Manager Andrew Barrow.

"Unsurprisingly, a lot of the old steelwork, which dates from the 1930s and 40s was in a poor condition as a lot of water ingress had occurred since the building had been decommissioned. This meant a lot of work was needed to treat the corrosion and rust."

The brickwork façades that the steelwork supports have also been restored, with some areas needing new bricks. This work required the project team to track down the original brick manufacturers.

"The bricks used to build the power station were imperial rather than the smaller metric sized ones which are more commonly used today. We have worked closely with the producer of the new bricks to ensure they complement the existing ones. Individual blends of brick have also been created to match the colour and texture of the original bricks used in the different phases of construction," says Mr Cowell.

Time-consuming restoration work has also been carried out on the interior of the structure. Tiles that cover many of the inside walls have been cleaned and in some places replaced with new identical pieces.

The outer zones of the building, such as the turbine halls and switch rooms predominantly accommodate retail and residential floors. Within the retained walls of the two switch rooms for example there are three levels of retail outlets (ground, upper ground and first floor) and up to seven floors of residential. Three of these residential levels are new floors, protruding above the structure's original brickwork façades.

Steelwork for the retail and residential parts has different column grid patterns, as the former requires larger column-free areas. This means there are a number of transfer structures located at level two, to support the increased number of columns in the residential levels.

The two turbine halls, which are approximately 150m-long x 25m-wide and 25m-high, will house three-level retail zones, topped and spanned by a series of trusses, which will support either glazing or roof gardens. The western turbine hall's trusses date back to the 1930s-original build and have been retained, albeit with some strengthening works.

The eastern turbine hall was a later addition, built during the second stage of the power station's construction in the 1950s. These trusses have been replaced with a new set to accommodate the increased roof garden loads.

All of the new steel frames are independent structures getting their stability from new concrete cores, which have also been installed within the original structure. However, many of the steel frames are inter-connected to their adjacent frames, via floors and bridges.

Some of the most interesting work and the project's largest quantity of steelwork is in the centrally-positioned boiler house.

WilkinsonEyre's Lead Architect Sebastien Ricard explains. "Sandwiched between the retail and commercial elements we have a large column-free events space and entrance foyer, while the building's uppermost floors will accommodate apartments."

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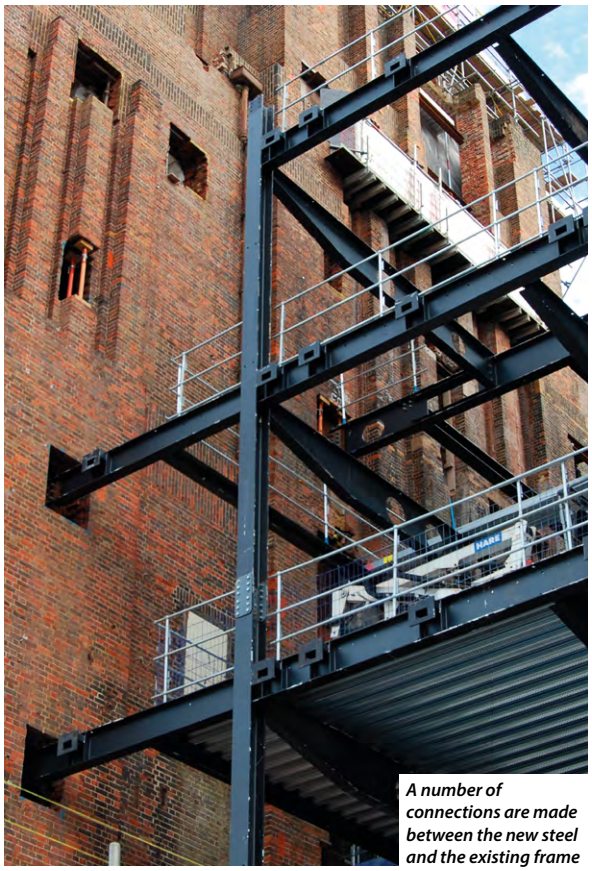


A number of connections are made between the new steel and the existing frame

Retained steelwork will be visible within the retail atrium

▶19 The events space is positioned at second floor level, above the retail levels. Creating this large column-free space, which is a triple height space in some areas and double-height in others, are a series of transfer structures.

At the northern end of the boiler house, framing the entrance to the main retail zone and events space is a large 27m-long x 2.6m-deep plated girder weighing a massive 62t, which is positioned at the underside of the fifth floor. As well as helping to create the large open space below, it also transfers a load in excess of 2,000t down the building, while supporting eight floors above.

The beam, which is one of the largest single pieces of steel to be manufactured in the UK in recent times was brought to site in one section.

"The operation to transport the beam, lift and install it required detailed planning and close cooperation with our supply chain, local authorities and police. We also had to install one of Europe's largest tower cranes for the job," says Mr Barrow.

Working in conjunction with the large beam, and also helping to create the events space's column-free interior are two feature 12m-high steel trees, that each support a 30m x 30m floor area.

Steelwork contractor William Hare delivered each of the two trees in three main elements, with a fully-welded base node weighing 48t being the first part. Four Y-shaped arms, each weighing 43t were then bolted to the node to form the main tree element, along with a further four infill arms, connecting up the main elements. Each tree has an overall steel tonnage of approximately 300t.

"The trees are working incredibly hard as they each pick-up six column lines from the commercial zone above and transfer them into a single column, allowing the main entrance below to be column-free," adds Mr Ricard.

Above the events space and occupying the fifth to tenth floors of the boiler house are six floors of commercial space (Apple's Campus) on top of which are two uppermost levels of residential apartments.

A further series of transfer structures are required at the underside of level 11, as the number of columns increase for the residential floors.

The phase two works are scheduled to open in 2021, coinciding with the opening of the new Northern Line underground extension, which will connect Battersea into the London tube network for the first time.

Repurposing existing buildings – integrating old and new.

Richard Henderson of the SCI discusses some of the issues encountered at Battersea Power Station.

The external walls of Battersea Power Station are brickwork supported by structural steel framing and have been retained in the new structure. Dividing walls also separate the internal spaces and have been retained. External or internal temporary structures provide support for these retained walls and in some places have done so for many years.

Permanent restraint must be provided by the new structures in the final state of the refurbished building. New concrete cores provide lateral support to new internal steelwork by which the retained walls are to be restrained.

In designing the connection of the new steelwork to the existing structure to provide the restraint, reliable geometric information is clearly fundamental. Also when making the connections, construction tolerances must be allowed for. The order of magnitude of these is indicated by the overall plumb tolerance of +/– 34 mm given in the NSSS[1] for a six-storey structure 25 m high.

Relative movements must also be considered, such as:

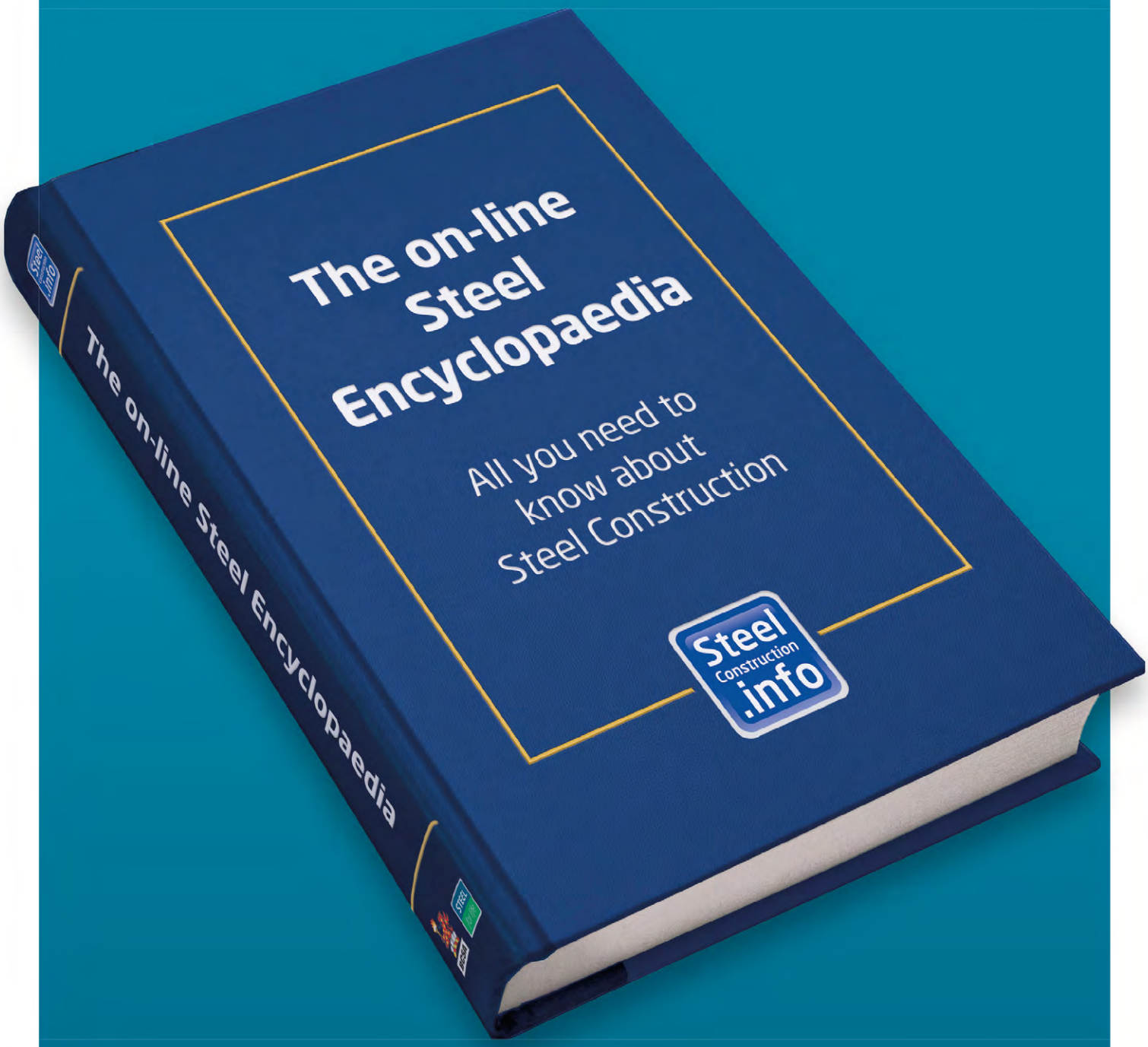
- short-term and long-term ground movements;
- movements of the structure during construction;
- live-load movements in-service.

Prediction and monitoring of the ground movements and of their effect on the retained structures are necessary. Provision for future relative movements must also be made to ensure that connections can be appropriately detailed. The movements can be accommodated by use of sliding or articulated connections to provide lateral support without attracting vertical load. Total axial shortening of columns can be expected to be 2 to 3 mm per storey, about two thirds of which is due to added dead load during fit-out and live load. Deflection of beams in the new structure relative to the retained external and dividing walls is clearly much greater[2].

The presence of extensive temporary works to support retained structures following removal of the original restraints necessitates detailed coordination between the construction of the new steelwork, connection to the retained structures and the removal of the temporary structures to ensure that stability of the walls is always maintained.

Where the new floors do not directly abut the external wall, new structures in the form of horizontal cable trusses have been provided to restrain it. These elements provide support while maintaining the sense of openness.

1. National Structural Steelwork Specification for Building Construction 6th Edition
2. Façade supports and structural movements, www.steelconstruction.info



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- Cost data
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- Sector information
- Topic based content

As you would expect, **www.steelconstruction.info** contains a wealth of guidance on the design and construction of steel frames for buildings, but it encompasses much more. Information is also freely available on a range of related topics including:

- **Recycling and reuse**
- **Life cycle assessment and embodied carbon**
- **Operational carbon**
- **BREEAM**
- **Thermal mass**

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BCSA

STEEL *for life*

School report

Steel construction was chosen for a new North West academy for speed of construction and its flexibility if structural alterations were required in the future.

Visualisation of the completed academy

There have been a number of educational projects in the former mill town of Oldham over the last decade, (see NSC Jan 2012) and the latest is the Oasis Academy Leesbrook, which is currently being constructed by Galliford Try.

Located on the outskirts of Oldham, overlooking the village of Lees, the new school is being built on the site of the former Breeze Hill School, which was closed down in 2013.

The new school, which is currently located in temporary accommodation in the town centre, will cater for 1,500 pupils, aged between 11-16.

Rising to four-storeys, the school includes an indoor sports hall, while outside, it will have three sports pitches, a playground, a multi-use games area and car parking.

The main school block is a rectangular structure measuring approximately 80m x 30m. It is a steel braced frame supporting metal decking to form a composite flooring

FACT FILE
Oasis Academy Leesbrook, Oldham
Main client: Department of Education
Architect: Pozzoni Architecture
Main contractor: Galliford Try
Structural engineer: Scott Hughes
Steelwork Contractor: EvadX
Steel tonnage: 520t

The academy features an attached sports hall

The entire steel frame was erected in nine weeks

solution throughout.

Commenting on choice of steelwork for the project, Catherine Mulley, Director at Pozzoni Architecture, says: "When it comes to education projects, the price and potential of materials are key in meeting the stringent Department of Education standards. To put it simply, steel is far quicker and more cost-effective to work with than concrete, while providing us and our clients far greater flexibility for any future adaptations."

Galliford Try Project Manager Mark Heginbotham agrees and says: "Schools are usually steel-framed projects, but they don't always use metal decked flooring. We've used a composite solution on this project as it is quicker to install in my experience."

Speed is of the essence for most construction projects and this one is no exception. The steel frame was entirely erected by EvadX is nine weeks, with the flooring quickly following on behind.

Bearing in mind the fickle nature of the autumnal weather in this part of the world, the steel erection team had no days winded off and completed the task ahead of schedule.

Before the steelwork arrived onsite, Galliford Try had completed an extensive groundworks programme on this brownfield site. The previous school buildings had already been demolished, under a separate contract, and the site was ready for an earthmoving operation to level the sloping terrain.

Once a level footprint was created, the ground was stabilised and a 0.5m-deep concrete raft foundation was installed, in readiness for the steel frame.

"Because some of the site was not suitable for building the school on, and another area of the site had shallow coal seams beneath it, the area for the new build was constrained and so the design was somewhat squashed into a four-storey structure," explains Scott Hughes Project Engineer Ben Burns.

As well as accommodating some classrooms around its perimeter, the ground floor of the school also hosts some large open column-free double-height spaces that are located in the middle of the block.

These spaces will accommodate the main hall, a drama studio and a dining area. The first two rooms can be combined into one large area with the removal of a sliding wall partition.

To create these large spaces, a series of transfer structures were necessary, the biggest of which is an 18.6m-long x 2m-deep truss that is positioned at first floor level above the main hall.

"The truss weighs 11t and was the heaviest and largest single steel element on the project," says EvadX Project Manager Steve Morris. "It was delivered to site as one piece and lifted into position by one 50t-capacity mobile crane."

Because of the double-height spaces, the first floor does extend over the entire block's footprint, as it wraps around the spaces, and its internal corridor will overlook the main hall and drama area.

The school's indoor sports hall is attached to the side of the main block and links into the school near to the entrance. The changing rooms are in fact located inside the main block on the ground floor.

The sports hall is another large steel braced structure which is divided into two parts. The main part is formed by a series of 18m-long haunched rafters, creating the column-free sports hall. Along the eastern elevation, the structure drops down to include a single-storey high area that accommodates a gym and a plant room.

The sports hall and the main teaching block are both one large braced steel structure as they are tied together. The former's bracing is located within its elevations, while the main block gets its stability from portalised sway frames and further bracing positioned in stairwells.

In keeping with the many former mills still evident within Oldham's landscape, the majority of the new school will feature traditional red brick façades.

Commenting on the construction, Oasis Academy Principal Sarah Livesey says: "Our school is passionate about providing the very best for families, the community, and our wonderful students who are our pioneers and the future of this community."

"This building will be one small part of us delivering on our promise to do our best for this community by providing an inspiring, engaging and caring educational environment in which our students can flourish."

Summing up, Catherine Mulley says: "It's fantastic to see our vision for Oasis Academy taking shape, as we look forward to unveiling this exceptional new learning and leisure environment for the people of Oldham.

"With such a large site to develop, we've been able to focus on some really generously-spaced outdoor areas that will give students room to learn, play and grow. We've aimed to anchor these great facilities at the very heart of the community, so that everyone can benefit from the improvements.

"Providing attractive and accessible leisure facilities will also make a huge difference to the health & wellbeing of local people. We hope that the experiences on offer at the new Oasis Academy will lead to happier, healthier and more fulfilling lives in the future.

Oasis Leesbrook Academy will open for the 2020 autumn term.

"To put it simply, steel is far quicker and more cost-effective to work with than concrete, while providing us and our clients far greater flexibility for any future adaptations."

To erect the bridge, Severfield had to make 12 steel deliveries to site

Community bridge

Steelwork has been completed on the Springhead Bridge, which will form an integral part of the Ebbsfleet Garden City development

FACT FILE
Springhead Bridge, Ebbsfleet, Kent
Main client: Ebbsfleet Development Corporation
Architect: Peter Brett Associates
Main contractor: Balfour Beatty
Structural engineer: Peter Brett Associates
Steelwork contractor: Severfield
Steel tonnage: 500t

Nearly 4,000 residents are already residing at Ebbsfleet Garden City, a new community rapidly taking shape in north Kent.

Located either side of Ebbsfleet International railway station, this new City is being constructed in an area that was previously a collection of chalk quarries.

According to Ebbsfleet Development Corporation (EDC), it will be recognised as a place to do business, capitalising on its role as a European high speed rail hub 17 minutes from Central London and two hours from Paris, as well as benefiting from its proximity to the Bluewater shopping mall and junctions with the M25 motorway and the A2.

It is envisaged that up to 30,000 people will live and work in this green, modern environment and the EDC hopes the delivery of well-designed and well-served neighbourhoods, workplaces, schools and town centres will ensure that residents enjoy a high quality of life.

One of these new neighbourhoods is Springhead Park and in order to facilitate easy access to and from the railway station a new steel bridge is under construction.

Springhead Bridge crosses a river and will enable people to walk to the railway station in around eight minutes, thereby helping to reduce residents' reliance on cars.

Julia Gregory, Director of Projects with Ebbsfleet Development Corporation says the £16M bridge project had been a real feat of precision engineering.

"Not only does this bridge cross a river but it is also next to the High-Speed railway line so you can imagine the engineering precision and skill that went into every stage of planning. Engineers had to work within only a few millimetres to ensure the steel beams fitted correctly, with no over-slewing of the rail assets.

"When it is open, the bridge will be multi-purpose as it will provide an easy route on a dedicated walking lane for residents, a cycle track and access for all vehicles including a new Fastrack bus route."

The bridge is founded on continuous flight auger (CFA) piles, which is a technique used to create a deep concrete foundation. There are 70 piles in total and they are 29m-long and 1,050mm in diameter.

Placed on top of the CFA piles are reinforced in-situ concrete foundations, which form the pile caps. The abutment walls are constructed on the pile caps at each end of the bridge which support the steel beams and superstructure.

Explaining the choice of steel for the bridge, Balfour Beatty Regional Director of Operations in the South of England, Nick Osborne says: "With works procured

through Scape's Civil Engineering and Infrastructure framework in 2018, we considered a variety of materials during the design stages of Springhead Bridge.

"In total, the bridge spans 87m with a 55-degree skew and a central pier to support the middle of the structure.

"Due to the span, coupled with restricted site access, steel beams were selected to enable the structure to be split into smaller lengths for transport to site by road. The team split the steel beams into four sections and then joined them together onsite. Splitting the beams offsite helps support our commitment to reducing the amount of work we undertake onsite by 25% by the year 2025."

The bridge deck is a conventional multi-girder steel composite arrangement with longitudinal plate girders and a reinforced concrete deck slab, which spans transversely between the girders and cantilevers outside the outer girders. Composite action between the deck slab and girders is achieved by means of shear connectors welded on the top flanges of the steel girders.

Overall the bridge is a 14.5m-wide two-span weathering steel structure comprising three braced pairs of girders.

The steel girders are 1.8m-deep and were transported to site by steelwork contractor Severfield in paired elements with cross bracing attached.

In order to minimise working at height, most of the temporary formwork for the deck slab installation was fitted to the steelwork in Severfield's factory prior to delivery.

Severfield Associate Project Director Andrew Hall says: "To install the bridge we had 12 major deliveries of paired girders to site, which meant six deliveries to each abutment.

"Two paired girders were spliced together in an assembly area to form one 47.5m-long paired section, which was then lifted into position using a 600t-capacity crawler crane."

One side of the bridge was initially erected with three lifts. The crane was then dismantled and de-rigged, which allowed it to be moved to the opposite end of the bridge, so it could install the final three elements.

Summing up, Mr Osborne says: "The works are still ongoing at Springhead Bridge, and we are in the process of installing the reinforced concrete deck slab; this will be supported by temporary formwork whilst the reinforced concrete deck is cast. Once the concrete has cured, by reaching its 28-day strength, we will remove the temporary formwork."

Work started on the bridge last May and it is scheduled to open later this Spring (2020).

The bridge will allow easier access to the railway station

The bridge's final pair of girder is lifted into place

The bridge is a two-span weathering steel structure

Truss joint design – open sections

Following on from the truss joint design presented in the October issue, David Brown of the SCI reviews the design of a joint with a conventional arrangement of open sections.

Conventional – or common?

The October issue of New Steel Construction addressed a heavily loaded joint in a truss, explaining the thought process that led to the decisions firstly to orientate the UC chord members with web horizontal, secondly to use similar sized sections for the web members to facilitate the joint design and lastly to fabricate the node from plate.

In common practice, truss joints between open sections are often simply arranged with the webs vertical and with the web members as smaller sections than the chords.

That arrangement leaves the connection designer to determine how the forces in the members are to be transferred, recognising that elements in the joint are often perpendicular to each other, which is never ideal.

The particular joint considered in this article is shown in Figure 1, although the thought process and element verifications are more important than the actual detail.

The vertical web member has an axial compression of 1800 kN. The diagonal, which is at 45°, therefore has an axial tension of 2545 kN and the joint is in vertical equilibrium. Many connection designers will release anguished howls at this point, since in reality they are unfortunately often given 'envelope' forces which are not in equilibrium and therefore doubly challenging to address.

For the purposes of this example, it is assumed that the force in the chord is 75% of its tension resistance. Because the flange of the 305 UC 158 is 25 mm, the design strength is 345 N/mm^2 (all members are S355) and the axial force is therefore 5200 kN.

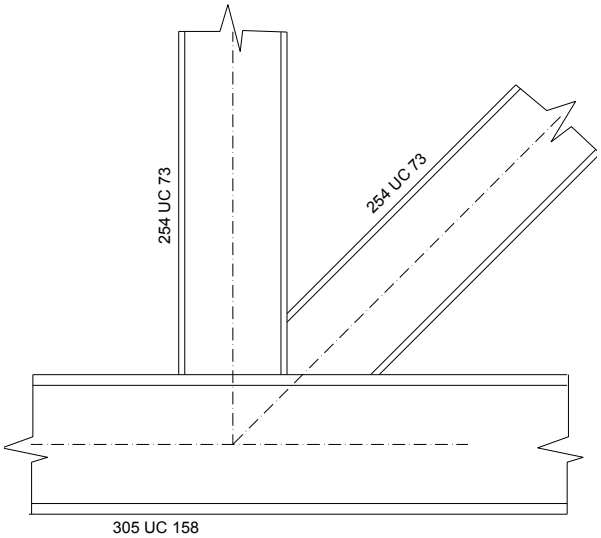

Figure 1: Open section joint

Distribution of forces

A helpful approach is to consider how the forces are distributed within the elements of the cross section. The area of a UC flange is typically 40% of the entire cross section (38.8% for the 254 UC 73), meaning that the element forces in the diagonal and vertical members are as shown in Figure 2.

At the connection points, these element forces have been further split into the two orthogonal components.

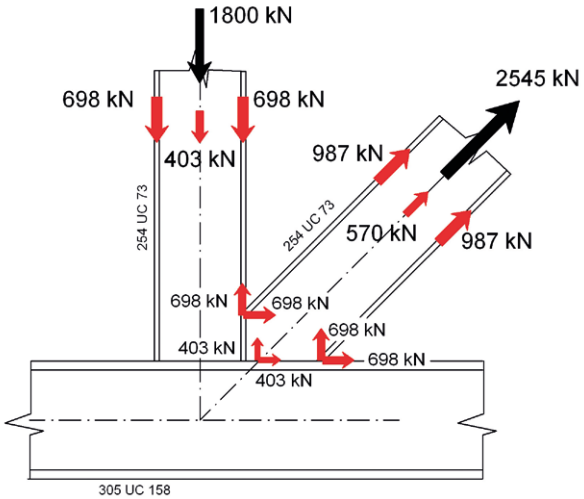

Figure 2: Forces in cross section elements

Connections to unstiffened flanges

Under local loads, webs might need reinforcement under compression, or under tension.

Before those checks are considered, stiffeners might also be required to stiffen the flange so that the full width of connected parts is effective. Stiffeners required for this purpose are more likely to be needed than to reinforce the web, so it is wise to complete these checks first.

There are connections to (potentially) unstiffened flanges at points A and B (in tension) and C and D (in compression) as shown in Figure 3.

If the flange is unstiffened, the more flexible tips of the flange deform and the stress distribution across the connected plate (in this case the flange of the incoming UC) is non-uniform. Design codes calculate an effective breadth, over which the stress is assumed to be uniform.

The verification is covered in clause 4.10 of BS EN 1993-1-8. The effective breadth, b_{eff} must be calculated, which assumes a spread through the flange from the web and root radius. b_{eff} is given by:

▶28

NSC online

more that just a magazine

It's a digimag.

You can read this issue and all previous issues of NSC going back to 2005 online as digital magazines. You can read it on your computer, your tablet or your phone. And it comes with enhancements like links to further information on steelconstruction.info, and the ability to share, bookmark, print and download pages.

It's a website.

All the content of NSC is also available on our website at newsteelconstruction.com. Like the magazine, the front page is divided into sections like News, Features and Technical. Once again, it's all cross referenced with links to steelconstruction.info, and contains extra video content. And it's all fully searchable with information going back to January 2005.

▶26

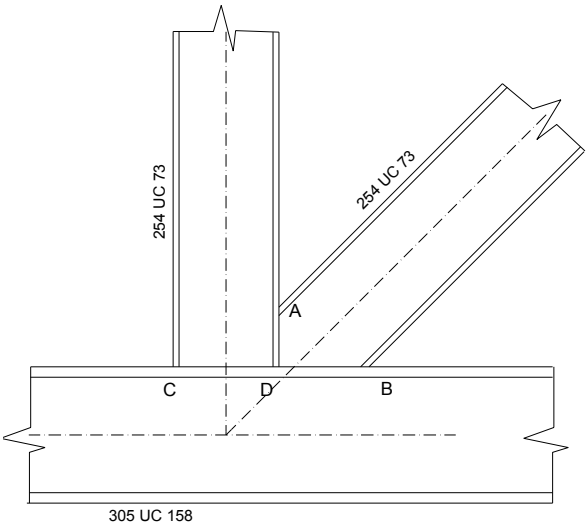

Figure 3: Connections to potentially unstiffened flanges

$b_{eff} = t_w + 2s + 7kt_f$

where $k = \left(t_f / t_p\right)\left(f_{y,f} / f_{y,p}\right)$ but $k \le 1$

The requirement is then:

$b_{eff} \ge \left(f_{y,p} / f_{u,p}\right) b_p$

It should be noted that both $f_{y,p}$ and $f_{u,p}$ relate to the plate (again in this case, the flange of the incoming UC). This requirement means that:

$b_{eff} \ge 0.75 b_p$

If this requirement is not met, then clause 4.10(3) says "Otherwise the joint should be stiffened". Readers will note that the applied force has not featured in this verification – the check is purely geometric, without reference to any force. If the force is small, this requirement seems unreasonable.

BS 5950 had an altogether more sensible approach in clause 6.7.5. The applied force F_x was limited to the resistance P_x obtained from the effective breadth, so connections with low forces could be accommodated without stiffening.

According to BS 5950, stiffening had to be provided if $b_e < 0.5\,(F_x / P_x)\, b_p$ but this is a much less onerous requirement than the Eurocode.

At point A, the effective width, b_{eff} is 133mm ($k = 1$)

The limit = $\left(f_{y,p} / f_{u,p}\right) b_p$ = (355/470) × 254.6 = 193.5 mm

So according to the Eurocode, stiffening is required at point A.
At point B, the value of k in clause 4.10(2) is calculated as 1.7, but limited to a maximum of 1.0.
The effective width, b_{eff} is 221 mm ($k = 1$)

The limit = $\left(f_{y,p} / f_{u,p}\right) b_p$ = (355/470) × 254.6 = 193.5 mm,

which means that stiffening might not be needed – other verifications need to be completed.

Tension stiffener design

At point A, it is convenient simply to assume all the applied horizontal component must be carried into the stiffeners in the vertical member. The resistance of two stiffeners, each 120 × 10 mm in S355 is 852 kN, which exceeds the 698 kN applied.

The weld to the inside of the flange is continued round the root radius, rather than being stopped, so only one leg length (strictly to the Eurocode, a throat length) is deducted from the weld length.

Thus there is 4 × (120 – 8) = 448 mm of weld, assuming an 8 mm fillet weld. This is a transverse weld, so has a resistance of 1.65 kN/mm. The applied force is 698 / 448 = 1.56 kN/mm, so 8 mm fillet weld is OK.

That force must be transferred to the web, between fillets, (it has nowhere to go at the other flange!), so the force in the weld is 698 / (4 × 200) = 0.87 kN/mm. A 6 mm fillet weld would be OK, but practically the same 8 mm fillet weld all round would be specified. Note that this force transferred into the web appears as a shear force in the vertical member.

Web in tension at point B

Although no stiffeners to support the flange are needed, the web of the chord experiences the local tension of 698 kN.

The resistance of the web is given in BS EN 1993-1-8 clause 6.2.6.3, which involves an effective breadth of web, $b_{eff,t,wc}$ and a reduction factor ω due to shear in the web.

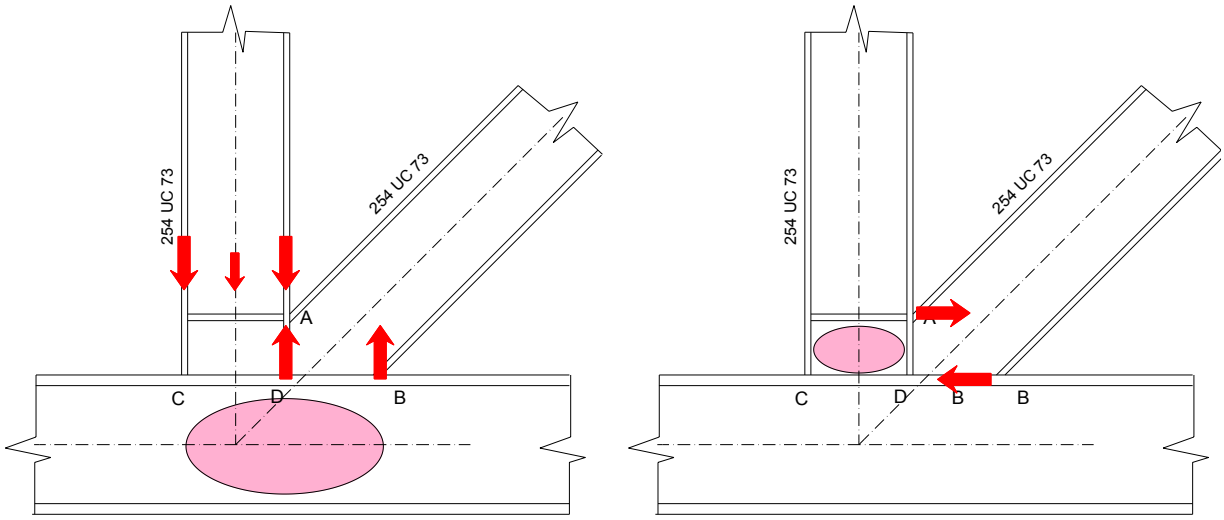

Figure 4: Zones where shear resistance must be verified

This is determined from Table 6.3, which leads backwards to Table 5.4 and a challenging decision on the value of β to be taken. After some consideration, the situation seems most like the shear in a web panel from a one sided moment connection, so $\beta = 1$.

After a frustrating trip back to BS EN 1993-1-1 to calculate the shear area, ω is computed to be 0.82.

The web resistance is computed to be 988 kN, which is more than the applied force of 698 kN, so no stiffener is needed for web tension.

Shear resistance

The shear in the web of the chord and in the web of the vertical member can be calculated by considering the components of force in the appropriate direction, as shown in Figure 4.

A convenient approach is to draw the local shear force diagram due to the applied components of force. Note that this only works if the applied forces are in equilibrium. The shear force diagram for the chord is shown in Figure 5.

Looking in the Blue Book, the shear resistance of the 305 UC 158 is 1130 kN, so it seems highly unlikely that the chord web will be satisfactory when the shear stress is considered in combination with the axial stress.

Shear and axial stress combined

The combination of stresses can be considered using the Von Mises criterion, found in clause 6.2.1 of BS EN 1993-1-1. Designers may not often use this clause, as normal cases have their own specific verifications later in section 6, but this elastic check is useful in unorthodox situations.

Considering just longitudinal and shear stresses, the criterion becomes:

$$\left(\frac{\sigma_{x,Ed}}{f_y / \gamma_{M0}}\right)^2 + 3\left(\frac{\tau_{Ed}}{f_y / \gamma_{M0}}\right)^2 \leq 1$$

The ratio $\left(\frac{\sigma_{x,Ed}}{f_y / \gamma_{M0}}\right) = 0.75$

The value of τ_{Ed} must be calculated as it is the elastic shear stress at the neutral axis. Normally, designers calculate a plastic resistance, so do not know the value of τ_{Ed}.

Designers will use an expression such as $\tau = \frac{SA\bar{y}}{It}$ depending on the form of the mnemonic they use!

The values of $\bar{y}$ and A can be taken directly from the section properties for tees cut from UC sections.

$$\tau_{Ed} = \frac{1101 \times 10^3 \times 10100 \times 13^3}{38700 \times 10^4 \times 15.8} = 242 \text{ N/mm}^2$$

Substituting into the Von Mises criterion:

$(0.75)^2 + 3\left(\frac{242}{345/1}\right)^2 = 2.03$, which is unsatisfactory, as expected.

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▶29

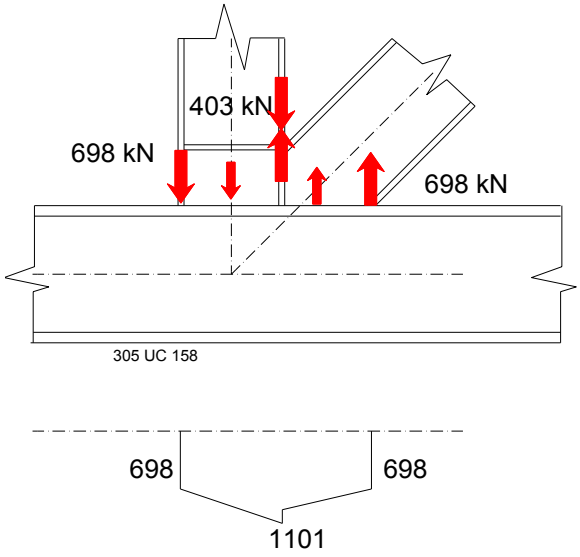

Figure 5: Shear force diagram for the chord

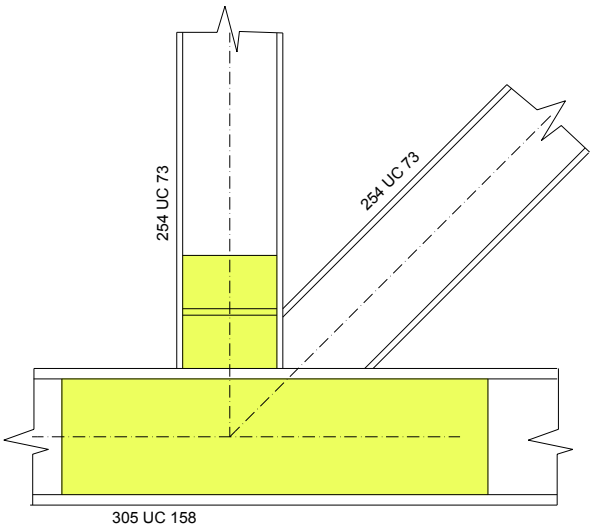

Figure 6: Final joint detail

Supplementary web plate

A supplementary web plate is one option, with the design rules given in clause 6.2.6.1. Because of limited research, the contribution of a supplementary web plate is limited to a maximum thickness equal to the web it reinforces, even if the additional plate is thicker than the web. Adding a plate to the other side of the web makes no further increase in the shear resistance, which seems implausible.

With the objective of using the Von Mises criterion a second time, the shear stress in the compound section must be calculated. Although a thicker plate was selected, the calculated inertia, area and distance to the centre of gravity used only the additional 15.8 mm permitted by the Standard. The longitudinal stress was also reduced by considering the additional area, once again limiting the credited addition to the 15.8 mm, despite specifying a 20 mm plate.

The calculates stresses were

$\tau_{Ed} = 125$ N/mm² and $\sigma_x = 218$ N/mm²

Substituting the Von Mises criterion:

$$\left(\frac{218}{345/1}\right)^2 + 3\left(\frac{125}{345/1}\right)^2 = 0.79$$

The length of plate past the critical area needs to be sufficiently long so that the welds can transfer the axial forces assumed in the supplementary web plate.

Other checks

The same process is needed for shear in the vertical member (see Figure 4), where it will be found that reinforcement is also required. Welds between the web and chord members must also be designed.

The compression resistance of the web at point C (Figure 3) requires verification – but is not a problem with the supplementary web plate provided.

The final joint is indicated in Figure 6. Instead of supplementary web plates, a detail using diagonal shear stiffeners could be developed, although the room for diagonal members is rather limited.

Conclusions

As always, a thoughtful consideration of the member selection and member orientation might have avoided some of the more expensive reinforcement required for this particular detail. A second observation is that the necessity to stiffen without any reference to the applied force seems very onerous – it is hoped that some work can be done to modify this requirement.

The good news is that the proposed revisions to BS EN 1993-1-8 do allow more benefit to be taken from supplementary web plates. Finally, the example serves as a reminder that the Von Mises criterion, presented in clause 6.2.1, can be useful when no other option exists.

FROM

Building with Steel

February 1970

High-Rise Trusteel

The Trusteel steel-framed system is well known in the low rise housing field, 37,000 Trusteel homes equally in the Local Authority and Private Housing fields, testify to this.

When the recent requirements for high loadings were introduced, Trusteel decided that the time had come for steel to re-enter the high rise field and by the wide use of Trusteel's existing components, a most economical solution was found.

Advantage was taken of the 'Report of the enquiry into the collapse of flats at Ronan Point', Ministry Circular No. 62/68 and Trusteel found that a steel structure was clearly the best means of meeting the requirements for structural safety. Firstly, hot-rolled sections are used to form a multi-storey portal longitudinally and to tie walls and floors together against explosion and secondly Trusteel's lightweight beams and channels form the floor units.

The possible combination of dead, super and wind loads together with suitable section data was run through a computer to determine the most economical sections, the foundation loading, frame strength and wind sway.

The detailing was such that three dimension units could be assembled on the ground before being lifted into position, thus greatly reducing work at high levels, and greatly increasing safety.

Trusteel believe that there is now no longer any doubt that steel used correctly can be competitive in the high rise field and in every way is a lot safer.

New and revised codes & standards

From BSI Updates November and December 2019

BS EN PUBLICATIONS

BS EN ISO 3269:2019
Fasteners. Acceptance inspection
Supersedes BS EN ISO 3269:2001

BS EN ISO 6947:2019
Welding and allied processes. Welding positions
Supersedes BS EN ISO 6947:2011

BS EN ISO 10642:2019
Fasteners. Hexagon socket countersunk head screws with reduced loadability
Supersedes BS EN ISO 10642:2004+A1:2012

BS EN ISO 12944-5:2019
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Protective paint systems
Supersedes BS EN ISO 12944-5:2018

BS EN ISO 15607:2019
Specification and qualification of welding procedures for metallic materials. General rules
Supersedes BS EN ISO 15607:2003

BS EN ISO 15609-1:2019
Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Arc welding
Supersedes BS EN ISO 15609-1:2004

BS EN ISO 15609-1:2019 – TC
Tracked changes. Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Arc welding
No current standard is superseded

BS EN ISO 15609-2:2019
Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Gas welding
Supersedes BS EN ISO 15609-2:2001

BRITISH STANDARDS WITHDRAWN

BS EN ISO 3269:2001
Fasteners. Acceptance inspection
Superseded by BS EN ISO 3269:2019

BS EN ISO 6947:2011
Welding and allied processes. Welding positions
Superseded by BS EN ISO 6947:2019

BS EN ISO 15607:2003
Specification and qualification of welding procedures for metallic materials. General rules
Superseded by BS EN ISO 15607:2019

BS EN ISO 15609-1:2004
Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Arc welding
Superseded by BS EN ISO 15609-1:2019

BS EN ISO 15609-2:2001
Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Gas welding
Superseded by BS EN ISO 15609-2:2019

BRITISH STANDARDS UNDER REVIEW

BS EN 10306:2002
Iron and steel. Ultrasonic testing of H beams with parallel flanges and IPE beams

BS EN ISO 17632:2015
Welding consumables. Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels. Classification

BS ISO 16842:2014
Metallic materials. Sheet and strip. Biaxial tensile testing method using a cruciform test piece

NEW WORK STARTED

PD 6705-2
Recommendations for the execution of steel bridges to BS EN 1090-2
Will supersede PD 6705-2:2010+A1:2013

EN ISO 898-3:2018/A1
Mechanical properties of fasteners made of carbon steel and alloy steel. Flat washers with specified property classes
Will supersede BS EN ISO 898-3:2018

EN ISO 10675-1
Non-destructive testing of welds. Acceptance levels for radiographic testing. Steel, nickel, titanium and their alloys
Will supersede BS EN ISO 10675-1:2016

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT - ADOPTIONS

19/30390069 DC
BS ISO 3506-5 Fasteners. Mechanical properties of corrosion-resistant stainless steel fasteners (also including fasteners from nickel alloys) for high temperature applications
Comments for the above document were required by 3 December, 2019

19/30401563 DC
BS EN ISO 2560 Welding consumables. Covered electrodes for manual metal arc welding of non-alloy and fine grain steels. Classification
Comments for the above document were required by 10 December, 2019

19/30401566 DC
BS EN ISO 14341 Welding consumables. Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels. Classification
Comments for the above document were required by 21 December, 2019

19/30401569 DC
BS EN ISO 15792-1 Welding consumables. Test methods. Test methods for all-weld metal test specimens in steel, nickel and nickel alloys
Comments for the above document were required by 10 December, 2019

19/30401572 DC
BS EN ISO 15792-2 Welding consumables. Test methods. Preparation of single-run and two-run technique test specimens in steel
Comments for the above document are required by 6 January, 2020

CEN EUROPEAN STANDARDS

EN 15804:2012+A2:2019
Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products

ISO PUBLICATIONS

ISO 8504-1:2019
Preparation of steel substrates before application of paints and related products. Surface preparation methods. General principles
Will be implemented as an identical British Standard

ISO 8504-2:2019
Preparation of steel substrates before application of paints and related products. Surface preparation methods. Abrasive blast-cleaning
Will be implemented as an identical British Standard

ISO 14713-2:2019
Zinc coatings. Guidelines and recommendations for the protection against corrosion of iron and steel in structures. Hot dip galvanizing
Will be implemented as an identical British Standard

AD 436: Section classification of a flat plate

SCI is sometimes asked how to determine the section class of a flat plate as BS EN 1993-1-1 does not include this section in table 5.2. The purpose of this note is to provide guidance.

A flat plate of width *b* and thickness *t* loaded in axial compression is not susceptible to local buckling because there is no intersection of plates to provide a stiff axis. Classification for axial compression is therefore irrelevant.

If the plate is acting as a beam with the minor axis vertical, lateral torsional buckling about the minor axis does not occur.

Lateral torsional buckling can occur due to bending about the major axis. It is assumed that the member is not likely to be designed plastically so the relevant limit is that for Class 3. SCI recommends a value of $b/t \leq 19\varepsilon$ to provide a conservative limit for the Class 3 - Class 4 boundary.

Contact: **Richard Henderson**
Tel: **01344 636555**
Email: **advisory@steel-sci.com**

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*

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

- **C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc
- **D** High rise buildings (offices etc over 15 storeys)
- **E** Large span portals (over 30m)
- **F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- **G** Medium rise buildings (from 5 to 15 storeys)
- **H** Large span trusswork (over 20m)
- **J** Tubular steelwork where tubular construction forms a major part of the structure
- **K** Towers and masts
- **L** Architectural steelwork for staircases, balconies, canopies etc
- **M** Frames for machinery, supports for plant and conveyors
- **N** Large grandstands and stadia (over 5000 persons)
- **Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)
- **R** Refurbishment
- **S** Lighter fabrications including fire escapes, ladders and catwalks

FPC Factory Production Control certification to BS EN 1090-1
1 – Execution Class 1 **2** – Execution Class 2
3 – Execution Class 3 **4** – Execution Class 4

BIM BIM Level 2 assessed
QM Quality management certification to ISO 9001
SCM Steel Construction Sustainability Charter
(● = Gold, ● = Silver, ● = Member)

Notes

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

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

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
H Young Structures Ltd	01953 601881			●	●	●	●	●						●	●	✔	2		●	Up to £2,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✔	4			Up to £3,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●			●	●		●		✔	4		●	Up to £6,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			Up to £3,000,000
Intersteels Ltd	01322 337766	●			●	●	●	●		●				●	●	✔	3			Up to £2,000,000
J & A Plant Ltd	01942 713511				●	●									●		4			Up to £40,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●				●	●		●			4			Up to £6,000,000*
Kiernan Structural Steel Ltd	00 353 43 334 1445	●		●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4			Up to £6,000,000
LA Metalworks	01707 256290				●	●				●	●			●	●	✔	2			Up to £2,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●					✔	2			Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●		●		●	●	●			●	●		3			Up to £800,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✔	4		●	Up to £2,000,000
M J Patch Structures Ltd	01275 333431				●					●	●				●	✔	3			Up to £1,400,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		3			Up to £2,000,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✔	4			Up to £1,400,000
Maldon Marine Ltd	01621 859000				●	●			●	●				●		✔	3			Up to £1,400,000
Mifflin Construction Ltd	01568 613311			●	●	●	●				●						3			Up to £3,000,000
Murphy International Ltd	00 353 45 431384	●			●		●	●	●		●				●	✔	4			Up to £1,400,000
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●			●	●				✔	4		●	Up to £2,000,000
North Lincs Structures	01724 855512			●	●					●	●				●		2			Up to £400,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	Up to £3,000,000
Painter Brothers Ltd	01432 374400	●			●				●	●	●				●	✔	3			Up to £6,000,000*
Peter Marshall (Steel Stairs) Ltd	0113 307 6730									●					●	✔	2			Up to £1,400,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £1,400,000
S H Structures Ltd	01977 681931	●			●	●	●	●	●	●	●	●			●	✔	4	✔	●	Up to £2,000,000
SAH Engineering Ltda	01582 584220			●	●	●				●	●			●	●		2			Up to £800,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●				●			●	●	✔	4			Up to £2,000,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
SGC Steel Fabrication	01704 531286				●					●				●	●	✔	2			Up to £200,000
Shaun Hodgson Engineering Ltd	01553 766499	●		●	●		●			●	●			●	●	✔	3			Up to £800,000
Shipley Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●		2			Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✔		Up to £2,000,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●		2			Up to £1,400,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £1,400,000
Steel & Roofing Systems	00 353 56 444 1855	●		●	●	●	●				●	●		●	●	✔	4			Up to £3,000,000
Structural Fabrications Ltd	01332 747400	●			●	●		●	●	●	●			●	●	✔	3		●	Up to £1,400,000
Taunton Fabrications Ltd	01823 324266				●	●				●	●			●	●	✔	2		●	Up to £2,000,000
Taziker Industrial Ltd	01204 468080	●		●	●		●			●	●		●	●	●	✔	3			Above £6,000,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●			●	●			●	●	✔	2			Up to £400,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●			●	●	✔	3	✔	●	Up to £2,000,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●			2	✔		Up to £2,000,000
Underhill Engineering Ltd	01752 752483				●		●	●	●	●	●			●	●	✔	4	✔		Up to £3,000,000
W I G Engineering Ltd	01869 320515				●					●					●	✔	2			Up to £400,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✔	4			Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●		●	●	●	●	●	●	●	●				●	✔	4		●	Up to £800,000
William Haley Engineering Ltd	01278 760591				●	●	●									✔	4		●	Up to £4,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
WT Fabrications (NE) Ltd	01642 691191			●	●	●	●				●			●	●	✔	4			Up to £40,000
Company name	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**FPC**	**BIM**	**SCM**	**Guide Contract Value (1)**

Steelwork contractors for bridgeworks

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

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

- **FB** Footbridges
- **CF** Complex footbridges
- **SG** Sign gantries
- **PG** Bridges made principally from plate girders
- **TW** Bridges made principally from trusswork
- **BA** Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
- **CM** Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
- **MB** Moving bridges
- **SRF** Site-based bridge refurbishment
- **FRF** Factory-based bridge refurbishment
- **AS** Ancilliary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
- **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
- **BIM** BIM Level 2 compliant
- **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.

BCSA steelwork contractor member	Tel	FB	CF	SG	PG	TW	BA	CM	MB	SRF	FRF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
AJ Engineering & Construction Services Ltd	01309 671919	●			●	●	●	●	●			●	✓	4				●	Up to £3,000,000
Billington Structures Ltd	01226 340666	●		●	●	●	●					●	✓	4	✓	✓	✓	●	Above £6,000,000
Bourne Group Ltd	01202 746666	●			●	●				●		●	✓	4	✓		✓	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓		Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●	●	●	●		●	●	●	✓	4			✓	●	Up to £4,000,000
Cementation Fabrications	0300 105 0135	●		●	●	●	●					●	✓	3			✓	●	Up to £6,000,000
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000
D Hughes Welding & Fabrication Ltd	01248 421104	●		●		●			●	●	●	●	✓	4			✓		Up to £800,000
Donyal Engineering Ltd	01207 270909	●		●						●	●	●	✓	3			✓	●	Up to £1,400,000
ECS Engineering Services Ltd	01773 860001	●			●	●	●		●			●	✓	3					Up to £3,000,000
Four-Tees Engineers Ltd	01489 885899	●			●	●	●		●	●	●		✓	3			✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●				●				●		●	✓	4	✓		✓	●	Up to £6,000,000
M Hasson & Sons Ltd	028 2957 1281	●	●	●	●	●	●	●	●	●		●	✓	4			✓	●	Up to £2,000,000
Millar Callaghan Engineering Services Ltd	01294 217711	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓		Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●	●	●	●	●	●					●	✓	4			✓		Up to £1,400,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £4,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £2,000,000
Severfield (UK) Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499									●		●	✓	3			✓		Up to £800,000
Structural Fabrications Ltd	01332 747400	●		●	●	●	●			●	●	●	✓	3				●	Up to £1,400,000
Taziker Industrial Ltd	01204 468080	●		●	●	●	●	●	●	●	●	●	✓	3		✓	✓		Above £6,000,000
Underhill Engineering Ltd	01752 752483	●	●	●	●	●				●	●	●	✓	4	✓		✓		Up to £3,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●		●	✓	4	✓	✓	✓	●	Above £6,000,000
Non-BCSA member																			
Centregreat Engineering Ltd	029 2046 5683	●		●	●	●	●	●	●	●	●	●	✓	4					Up to £2,000,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓		Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●	●	●	●		●	✓	4			✓	●	Up to £1,400,000
Ekspan Ltd	0114 261 1126	●				●			●	●	●	●	✓	2					Up to £400,000
Francis & Lewis International Ltd	01452 722200											●	✓	4			✓	●	Up to £2,000,000
Harrisons Engineering (Lancashire) Ltd	01254 823993	●		●	●	●	●	●	●	●		●	✓	3		✓			Up to £1,400,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●		●	●	✓	4					Above £6,000,000*
HS Carlsteel Engineering Ltd	020 8312 1879									●	●	●	✓	3			✓		Up to £200,000
IHC Engineering (UK) Ltd	01773 861734	●										●	✓	3			✓		Up to £400,000
In-Spec Manufacturing Ltd	01642 210716								●	●		●	✓	4			✓		Up to £400,000
Kelly's Welders & Blacksmiths Ltd	01383 512 517											●	✓	2			✓		Up to £200,000
Lanarkshire Welding Company Ltd	01698 264271	●		●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £2,000,000
Total Steelwork & Fabrication Ltd	01925 234320	●		●		●			●	●	●	●	✓	3			✓		Up to £3,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	●		●	✓	4		✓	✓	●	Above £6,000,000

Corporate Members

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

Company name	Tel
Gene Mathers	0115 974 7831
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	08457 504030

Company name	Tel
Inspire Insurance Services	02476 998924
Sandberg LLP	020 7565 7000
Structural & Weld Testing Services Ltd	01795 420264

Company name	Tel
SUM Ltd	0113 242 7390

Industry Members

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

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

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

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

SfL
Steel for Life Sponsor

Structural components

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
Albion Sections Ltd	0121 553 1877	✓	M	4			
BW Industries Ltd	01262 400088	✓	M	3			
Cellbeam Ltd	01937 840600	✓	M	4	20		
Composite Metal Flooring Ltd	01495 761080	✓	M	3			
Composite Profiles UK Ltd	01202 659237		D/I				
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		●	
Jamestown Manufacturing Ltd	**00 353 45 434288**	✓	**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**				**Silver**
voestalpine Metsec plc	**0121 601 6000**	✓	**M**	**4**		●	**Gold**

Computer software

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
SDS/2 Ltd	07734 293573		N/A				
StruMIS Ltd	01332 545800		N/A				
Trimble Solutions (UK) Ltd	**0113 887 9790**		**N/A**				**Silver**

Steel producers

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
British Steel Ltd	01724 404040	✓	M				
Tata Steel – Tubes	**01536 402121**	✓	**M**				**Silver**

Manufacturing equipment

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

Protective systems

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

Safety systems

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

Steel stockholders

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
AJN Steelstock Ltd	**01638 555500**	✓	**M**	**4**			**Bronze**
Arcelor Mittal Distribution - Scunthorpe	**01724 810810**	✓	**D/I**	**4**	**3B**		**Headline**
Barrett Steel Services Limited	**01274 682281**	✓	**M**	**4**	**3B**		**Headline**
British Steel Distribution	01642 405040	✓	D/I	4			
Cleveland Steel & Tubes Ltd	**01845 577789**	✓	**M**	**3**			**Gold**
Dent Steel Services (Yorkshire) Ltd	01274 607070	✓	M	4	3B		
Duggan Profiles & Steel Service Centre Ltd	00 353 567722485	✓	M	4			
Kloeckner Metals UK	0113 254 0711	✓	D/I	4	3B		
Murray Plate Group Ltd	0161 866 0266	✓	D/I	4	3B		
NationalTube Stockholders Ltd	**01845 577440**	✓	**D/I**		**3B**		**Gold**
Rainham Steel Co Ltd	01708 522311	✓	D/I	4	3B		

Structural components

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

Welding equipment and consumables

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

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