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NSC

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Vol 26 No 8 September 2018

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Loads spread at Heron Quays

Plymouth leisure transformed

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Cover Image
Three Snowhill, Birmingham
Main client: Ballymore Properties
Architect: Weedon Architects
Main contractor: BAM Construction
Structural Engineer: WSP
Steelwork contractor: Severfield
Steel tonnage: 4,500t

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Diversity on display in Awards shortlist

Nick Barrett - Editor

The Structural Steel Design Awards reaches a significant landmark in 2018, it's 50th year of showcasing the best of steel construction. The shortlisted projects can be found in this month's News section, and next month, following the awards ceremony, we will detail the projects deemed worthy of Awards by the independent judges.

As always, the shortlist shows an amazing diversity of project types that have enjoyed steel's advantages including major commercial developments, Jaguar Land Rover's new engine manufacturing centre, several bridges, the London Bridge railway station redevelopment, and a low carbon energy centre.

We hope you have enjoyed our series of articles this year that looked at how steel has played a central role in the development of the UK's built environment over the decades since the SSDA started 50 years ago. The series ends this month with a look at the achievements of the 2010's, featuring the Olympic Stadium at Stratford, now called the London Stadium and used as a Premier League football stadium by West Ham United FC, and two 30 metre high equine sculptures - The Kelpies - that have become a landmark attracting thousands of visitors to their Forth & Clyde canalside location.

There is no doubt that the SSDA has been a huge success in showcasing the best that the UK's architects, engineers and steelwork contractors can achieve with constructional steelwork. What will the awards look like in another 50 years? We live in a rapidly changing world and little can be taken for granted about the future. The way that we design and build and the uses to which our buildings and other structures will be put will doubtlessly evolve, probably in ways as yet unforeseen. But ongoing investment and innovation by the structural steelwork sector will guarantee steel's place in the future built environment, even 50 years from now.

Evolution in the natural world suggests that adaptability to a changing environment is a key survival skill. In the built environment adaptability and versatility are likely to also be keys to future success. Evidence of steel's versatility is seen in every issue of NSC, where many exemplary award-winning SSDA projects are first highlighted.

In this issue, the use of cellular beams is featured in the third major steel-framed building at Birmingham's Snowhill development; weathering steel is seen being used at the major Heron Quays development in London's docklands; and tubular steel is employed at Headingley's new stand. The benefits delivered by these three varying uses of steel alone would be hailed as revolutionary if they could suddenly be claimed today as new attributes of any other building material. But for steel they are everyday and unique benefits, delivered along with a host of other advantages affecting matters like sustainability, cost-effectiveness, and the built in future-proofing of steel's inherent flexibility.

One constant in the changing construction world of the last 50 years has been the presence of BCSA members as steelwork contractors involved in the biggest and most challenging of the SSDA's award-winning projects. It doesn't require a crystal ball to forecast that employing a BCSA member with the right skills, qualifications and experience will continue to be the best way of ensuring successful delivery of the sort of project that will earn success in these unique awards.

SSDA shortlist highlights steel success stories

The shortlist for the 50th Structural Steel Design Awards (SSDA), jointly sponsored by the British Constructional Steelwork Association (BCSA) and Trimble Solutions (UK), has been announced.

The 22 shortlisted projects are all steel success stories, showcasing the material's flexibility and versatility in a number of different and varying applications.

The shortlist also reflects the wide geographical spread of steel's appeal for a variety of projects ranging from museums and entertainment venues to education buildings, with entries also received for a variety of bridges, commercial schemes and infrastructure facilities across the UK.

The winners will be announced at an evening reception in London on 3 October.

"The structural steelwork sector has evolved significantly since the SSDAs were launched in 1969, however one constant has been the ability of steel to deliver the most efficient and cost-effective solution for a building or structure, while also providing practical, flexible and beautiful spaces.

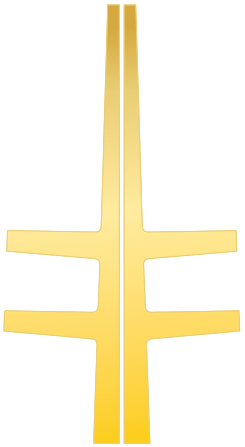
As the original offsite framing material, structural steel is now looking to the future to deliver a more complex level of design for manufacture and assembly," commented BCSA Director General Sarah McCann-Bartlett.

Trimble Solutions (UK) Managing Director Richard Fletcher said: "It's good to see that the shortlisted entries in this 50th anniversary year of the SSDAs are an outstanding combination of complex and interesting projects which in some cases have been modelled to very high levels of detail.

"This illustrates the strength of structural steel within the UK and Ireland and also the maturity of digitalisation of design for manufacture and assembly within this industry, which Trimble are proud to be part of."

The SSDA 2018 shortlist is:

- Bloomberg London
- Two St. Peter's Square, Manchester
- Thirty Broadwick, Soho, London
- Seventy Wilson, 70 Wilson Street, London
- Four Pancras Square, King's Cross, London
- 101 The Embankment, Greengate, Salford
- 1 & 2 London Wall Place, London
- The Greenwich Peninsula Low Carbon Energy Centre, London
- Jaguar Land Rover Engine Manufacturing Centre, Wolverhampton
- Brooklands Museum Aircraft Factory and Racetrack Revival, Weybridge
- Victoria Palace Theatre Refurbishment, London
- Walthamstow Wetlands, Forest Road, London
- Belfast Waterfront Conference & Exhibition Centre, Lanyon Place, Belfast
- The Beacon of Light, Sunderland
- V&A's Exhibition Road Quarter, London
- The Ordsall Chord Viaduct, Salford and Manchester
- Approach Viaduct South, Queensferry Crossing
- Somers Town Bridge, King's Cross, London
- Knostrop Weir Foot and Cycle Bridge, Leeds
- Walkway Bridges, London Wall Place, London
- Manchester Victoria Redevelopment
- London Bridge Station



BCSA issues CE Marking reminder

After receiving reports of some steelwork contractors continuing to operate without CE Marking, the British Constructional Steelwork Association (BCSA) has issued a reminder to clients and main contractors that, by law, all structural steelwork must be CE Marked.

"CE Marking of fabricated steelwork has now been a legal requirement since 2014. It seems unbelievable that there are still non-compliant companies out there winning work," said BCSA Director General Sarah McCann-Bartlett.

Clients and main contractors should check that their steelwork contractor has a valid Factory Production Control (FPC) certification from a UKAS Notified Body.

The BCSA requires all of its member companies to be CE Marked as required by law.

Manchester Airport celebrates one year of construction

Manchester Airport has marked one year of construction on the biggest investment project in its history, which will see Terminal 2 become 150% bigger.

The programme got under way a year ago after a visit by the Secretary of State for Transport, Chris Grayling. Since then, the airport's skyline has changed dramatically as the first pier has been built and over 70% of the steelwork has been erected on the terminal extension.

It is one of the biggest construction programmes in the north of England and there are currently 1,200 people working on site – including 80 apprentices, in trades ranging from plumbing and scaffolding to quantity surveying and civil engineering.

So far on the project, more than 14,500 pieces of steel have been installed by steelwork contractor William Hare.

The first pier is set to open to passengers in April 2019. At 216m-long if it was stood upright it would be the tallest building in Manchester. The terminal extension is on course to open in 2020.

Laing O'Rourke Project Director Bryan Glass said: "We're on schedule to deliver the transformation of Terminal 2 and that certainty of delivery has been driven by our offsite construction approach, with elements of the project manufactured offsite and assembled by our expert project team and technicians. There's no room for complacency of course! Our team is focused on the next milestone – hand over of the first pier in January 2019."

British Steel announces strong profit and investment

Steelmaker British Steel has reported a first quarter profit for the current financial year (2018/19) of £21M, and has stated that its turnaround remains firmly on track.

In its second annual trading update since its change of ownership, the previously loss-making company has seen full year profits rise to £68M for 2018, up from £47M in its first year.

British Steel Executive Chairman Roland Junck said: "Our transformation continues apace with unprecedented levels of investment going into the business.

"Increased raw material costs and fluctuating steel prices continue to be a challenge. It's important safeguarding action is taken to prevent the dumping of cheap steel into Europe following the imposition of steel tariffs by the US. However, we remain in positive talks with the Government, and our other

stakeholders, and are confident about our future.

"Our order book is strong and we've the capacity and capability to play a significant role in major infrastructure projects such as HS2 and the Heathrow expansion. We continue to invest in our people and products, remain focused on reducing the cost of liquid steel and are growing into new markets across the globe."

The company has also announced a £50M wire rod investment that will see a new modern wire rod line open at the company's current Scunthorpe Rod Mill.

The new line is set to be commissioned in autumn 2019.

Polar research ship to get steel wharf

Steelwork is currently being fabricated for a new wharf and docking facility for the polar research ship, the RRS Sir David Attenborough, which is scheduled to come into operation in 2019.

In order for the 129m-long, 10,000t ship to dock at the British Antarctic Survey's Rothera base, the existing wharf needs to be rebuilt.

Hampshire-based Four-Tees Engineers has been enlisted by main contractor BAM Nuttall to fabricate and help erect the steelwork for the 60m-long × 24m-wide wharf.

"The steelwork is being fabricated in single elements for ease of transportation," explains Four-Tees Director Steve Stacey. "The longest member is 19m-long and the heaviest 3t."

The steel wharf will be made up from a series of frames, 10 at the front and a further 10 at the rear. Each frame consists of three vertical tubular piles with beams tying them together at the top level and diagonal braces below. All of the frames will be secured to the pile wall with waling beams.

A team of expert construction workers will arrive in Rothera in November to begin work to remove the existing wharf. The new facility, which will be significantly bigger, will then be built in two stages.

All of the steelwork will arrive by sea at the start of this year's Antarctic summer (October), with the rear frames being erected first. The construction team will then return the following summer (2019-20) to erect the remaining front half frames.

Bridge installed for East Midlands inland port

A new bridge that forms an important part of infrastructure works for the SEGRO Logistics Park East Midlands Gateway has been successfully launched across the M1 motorway.

The steel composite bridge was fabricated by Cleveland Bridge and assembled on a site adjacent to its final position. During a weekend-long operation, the completed bridge, which weighed almost 1,200t, was installed using a Self-Propelled Mobile Transporter.

SEGRO's Business Unit Director, National Logistics Andrew Pilsworth said: "The successful installation is the result of an extensive programme of planning and coordination with our partners.

"The bridge will form part of the Kegworth Bypass and will reduce the amount of traffic and HGVs travelling through the historic village by around 60%."

As well diverting traffic away from the village, the bridge is a vital part of infrastructure for SEGRO's 700-acre inland port, which will accommodate numerous distribution centres and create 7,000 jobs.

NEWS IN BRIEF

FICEP UK is holding a two-day open house, on 3rd and 4th October, to promote the latest in technological advancements in steel processing. The company will demonstrate along with Tekla how efficiency, technology, data capture and feedback allows companies in the steelwork industry to capitalise on the latest advanced software systems and automation. For more information contact Ficep UK on 01924 223 530 or *sales@ficep.co.uk* for your invitation.

The **University of Strathclyde** has revealed plans for a £60M learning and teaching hub at the heart of its campus in Glasgow city centre. It is said that the facility will provide students with leading-edge teaching resources, digital technologies and new modes of learning that will support a first-class student experience.

IM Properties (IMP) is set to build its third and final phase of speculative development at the Hub, Birmingham where it will develop three distribution units totaling 14,100m². Local contractor Benniman is partnering with IMP's in-house project delivery team to build one main 9,200m² warehouse, alongside two smaller units.

Yorkshire-based waste management company **PMAC Energy** has secured 25 acres of Redcar Bulk Terminal (RBT) to construct a £250M waste to energy plant. Subject to permitting and planning approvals, the plant could be producing waste derived fuels in 2021 and generating enough electricity to power 56,000 homes.

Facebook and King's Cross Central Limited Partnership have signed a deal that will see the former acquire 56,700m² of office space across three buildings at King's Cross, London.

PRESIDENT'S COLUMN

While BCSA steelwork contractors are required to have a fabrication facility in the UK or Ireland that meets stringent quality standards and undergo a competence assessment relating to the company's work facilities, track record and technical and management experience, there are still some companies out there without the skills, experience and financial standing to be taking on structural steelwork projects.

Who are these companies? On paper, they might look like legitimate steelwork fabricators. Some have ISO 9001, CE Marking certification and have undergone well-known prequalification assessments. But incredibly, they don't have a fabrication facility at all. These 'desk and stool' companies take on steelwork projects as if they're an actual steelwork contractor that undertakes fabrication, and then they re-subcontract the whole lot out. Every last piece.

BCSA has even heard of examples where 'desk and stool' companies have passed off their subcontractors' workshops as their own.

What's wrong with this?

- First, their certifications are not for steelwork fabrication. They are for their office and paperwork processes because that's all that's available to be assessed on.
- Their knowledge and understanding of structural steelwork will be far more limited than someone who manages a steelwork fabrication facility day-in day-out.
- They won't have the wide range of experienced, permanent staff that a qualified steelwork contractor employs directly.
- They won't be keeping up with key technical issues or changes in regulations and standards, which means they may not be compliant.
- They may not be undertaking rigorous design checks on every project to ensure that the structural steelwork is safe at all times.
- They won't be in direct control of health and safety in the factory, as the factory is not theirs.
- And lastly, they will not have the financial standing to provide cash flow or manage project delays which could put the contract and overall project at risk.

For these reasons, BCSA has always excluded this kind of company from membership because it's impossible to review the fabrication processes, personnel and quality.

BCSA does understand that subcontracting some steelwork out can be good business practice for legitimate steelwork contractors. But these steelwork contractors manage their subcontractors tightly, holding them to their own high standards and mainly using fellow BCSA members to undertake the subcontract work.

So what should clients and main contractors do to reduce this risk:

- Always use a BCSA member company. Go to https://www.steelconstruction.org/directories/
- Ask specifically whether they have their own fabrication facility and check its ownership.
- Ask whether they have a welding certificate for CE Marking – they can only hold one if they have their own factory.

Another reason to always use a BCSA member.

Tim Outteridge
BCSA President & Sales Director Cleveland Bridge

Birmingham hospital gets go-ahead for second steel phase

Simons Group has been awarded the contract for building the second phase of the new Circle Health private hospital in Birmingham's medical quarter in Edgbaston.

The Lincoln-based contractor is currently on site at the former BBC Pebble Mill studio location, working on Phase 1 of the build. This new award brings the total contract to £33.5M and, when complete, will be the second largest private hospital in the UK.

The hospital is based on an expandable steel-framed model which can be adapted and enlarged to meet clinical demand now and in the future.

Phase 1, [see NSC April 2018] which includes three operating theatres (expandable to six), an endoscopy procedure room, and 18 in-patient bedrooms, is due to complete in March 2019. Work is already under way on Phase 2, a dedicated rehabilitation centre, which is expected to be complete in July next year.

Caunton Engineering will supply, fabricate and erect approximately 900t of structural steelwork for both phases.

Work starts on final phase of Salford Embankment

Construction work has started on 100 Embankment, the second and final phase of the Embankment scheme in Salford's Greengate neighbourhood.

As well as marking the start of work on-site the joint venture team also launched a new campaign called 100 Reasons, which will celebrate the wide variety of people helping to build the scheme and enhance the community in the Greengate area.

The 15,400m², BREEAM 'Excellent' office building is being delivered by Ask Real Estate and the Richardson Family in a joint venture with a Tristan Capital Partners' fund and Salford City Council.

Representatives from the JV partnership and BAM Construction marked the occasion by completing the concrete sealing of the 23rd steel stub which connects to the frame of the basement car park below.

This will form the base of the new nine-storey Grade A office building. Elland Steel Structures is fabricating, supplying and erecting the steelwork for the project.

Commenting on behalf of the JV partnership, John Hughes, Managing Director of Ask Real Estate said: "The second phase of the scheme is now well under way and we are looking forward to seeing 100 Embankment emerge alongside its sister building 101 Embankment." [see NSC June 2016].

Steel bending secures garden show award

Barnshaw Section Benders' steel bending expertise has helped a garden exhibit win a gold medal at this year's Royal Horticultural Society (RHS) Flower Show held at Tatton Park in Cheshire.

Manchester-based brewer JW Lees 190th Anniversary garden, which featured a number of fabrications from Barnshaws, won the 'Best Show Garden' award.

The theme of garden was 'From Hop to Glass' and combined grasses and powder-coated metal sheets in a circular arrangement to represent the company's 190th anniversary and the brewing industry in general.

The planting aimed to embody the head of a pint of beer, with a curved timber bench mirroring the comfortable layout of a bar.

A 'lazy river' encompassed the garden, providing a water feature. This section owed its existence to the fabrication expertise of Barnshaws, who fabricated the river channel.

Barnshaws had to deliver 14 x 80mm x 6mm steel channels, curved to suit the circular perimeter of the garden. The design also included seven 200mm x 6mm washer segments, which were sourced from a Barnshaw's profiling company.

Barnshaws' Manchester Regional Director Wayne Salkeld said: "Metal bending offers huge opportunities to designers, and we were very excited to work on this particular element of the garden.

"We've completed fabrication jobs for RHS show gardens before, but to see this recognition from gardening experts shows how far structural metal experience can promote artistic flair."

Work to start on Farringdon office scheme

International workspace provider HB Reavis has reaffirmed its commitment to London with the acquisition of the 12,800m² Crossrail Over-Site Development (OSD) at Farringdon West, located in the heart of Clerkenwell in Central London.

Designed by award-winning British architecture practice John Robertson Architects, the project comprises office, retail and amenity space.

The development has been designed to focus on delivering the highest quality of office accommodation. Wellbeing has been introduced as a main theme running through the entire development to ensure a creative, content and motivated community of users in the building.

The scheme's office floors have been reconfigured to provide a single core, creating open, flexible floorplates of up to 2,700m². Designed by StudioShaw, the ground floor intends to be enjoyed by both the public and occupiers: offering a lively mix of food and beverage options, as well as a garden area positioned both within and outside the building.

Construction of the seven-storey commercial scheme is expected to commence this year and complete in 2020.

Cheesegrater 2 gets the green light

Plans to build a tower block dubbed Cheesegrater 2 have been given the green light. The 56-storey development will on completion be the third tallest building in the City of London.

The City's planning committee has approved plans submitted by Hong Kong-listed real estate giant Lai Sun Development Company to develop the new commercial landmark at 100 Leadenhall Street, which is being called Cheesegrater 2 because of its similarity to the iconic skyscraper situated at 122 Leadenhall Street.

Situated in the eastern cluster of the financial district, the new 263m-tall building will include two podium terraces and a public viewing gallery on the top two floors.

Chris Hayward, Chairman of the City of London Corporation's Planning and Transportation Committee, said: "I'm delighted that we have approved the latest addition to the City's growing office district.

"Leading to a church dating back to the 12th Century, this development demonstrates the City's distinctive ability to house the old and new side-by-side, while becoming more accessible to creative workers and members of the public.

"More than ever we are seeing businesses make location decisions based on the quality of built environment and public realm that they can offer their employees."

The new skyscraper was designed by award-winning architects Skidmore, Owings & Merrill - the company behind the Broadgate Tower, One World Trade Centre and the Burj Khalifa.

Sports centre approved for south coast university

University of Portsmouth has been given planning permission by Portsmouth City Council to build a £53M sports facility, available for student, staff and community use.

Facilities at the centre will include an eight-court sports hall, eight-lane 25m swimming pool, fitness suite, multi-purpose studios, squash courts, climbing wall and a ski simulator. The building will also have teaching facilities, office space and an underground car park.

Located by the junction of Cambridge Road and Museum Road, the building is said to have been sensitively designed to appear as a pavilion within Ravelin Park. With a predominantly glazed ground floor, users of the pool will feel as if they are swimming in the park. Inside the building there will be views of the wide range of sporting activities with the climbing wall rising.

Irina Korneychuk, Project Leader at architects FaulknerBrowns, said: "We are delighted to have secured the support of the City Council for this scheme which will bring a new sports facility into Portsmouth. The development is not only looking to promote integration of the University campus with its surroundings, but to deliver wider benefits to the students and local communities."

Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com* web: *www.steel-sci.com/courses*

Tuesday 25 September 2018
Fatigue Design to EC3 - Webinar
The webinar will cover the fatigue phenomenon and the assessment of fatigue life. Fatigue loading and Miner's summation of fatigue damage and how it is dealt with by EN 1993-1-9 will be addressed.

Thursday 27 September 2018
Fire resistant design of steel structures
This one day course will give an introduction to structural engineers on how to design a steel structure to withstand a fire.
London.

Thursday 11 October 2018
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.
Nottingham.

Tuesday 16 October 2018
Brittle Fracture in Steel Design - Webinar
The choice of a suitable steel sub-grade is an essential part of steel specification. This presentation describes the approach in BS EN 1993-1-10 and the simple method in PD 6695-1-10.

Thursday 8 November 2018
UK Steel Construction Day 2018: Transforming Construction: Using steel to deliver greater productivity.
SCI's annual event will showcase how steel is already ideally placed to meet the UK Governments objective to transform construction techniques to dramatically improve efficiency in the future construction and operation of buildings and infrastructure.
London.

The 2012 Olympic stadium is now home to West Ham United FC

SSDA celebrates 50 years

Having started in 1969, the Structural Steel Design Awards are this year celebrating their 50th anniversary. In the fifth and final article, NSC looks back at the past decade, the 2010s.

Since the Structural Steel Design Awards (SSDA) were initiated in 1969 by the British Constructional Steelwork Association (BCSA) and the British Steel Corporation there have been many changes in the construction and the steel sectors, but one constant asset is the way that steel not only confers efficiency and economy but also has an aesthetic which designers are able to exploit to the benefit of the built environment.

The qualities of engineering excellence, innovation, attention to detail, economy and speed of construction have been brought together in each of the structures that have been given awards during the past 49 years.

Following on from last month's look back at the 2000s, in this issue we highlight the 2010s. Two examples of this decade's Award winners are the Olympic Stadium (a winner in 2012) and The Kelpies (a winner in 2014).

Now known as the London Stadium and the home of West Ham United FC, a number of structural alterations have been made to the former Olympic Stadium since it was the centrepiece of the London 2012 Games.

Flexibility was built into the design of the 80,000-seat stadium, as originally it was envisaged that after the Olympics it would be transformed into a 25,000-capacity legacy venue by demounting the upper tier.

However, these plans changed and after the Olympics a second construction phase was undertaken that included the strengthening of the main steel frame. This facilitated the installation of retractable seating and a new roof, that is claimed to be largest spanning tensile roof in the world. This second phase of steel construction work was carried out by William Hare.

The London Stadium is now a multi-purpose venue with the potential to accommodate up to 60,000 spectators, not just for football, but also athletics and concerts.

To provide flexibility in both construction, dismantling and possible legacy uses the original roof was structurally independent from the terrace structure. The roof consisted of a 900m-long ring truss supported on a series of inclined tubular columns.

The terrace superstructure consists of precast concrete units resting on large raking lattice girders, which were supported on concrete shear walls at the front and by raking steel columns along the span.

The original roof covering consisted of a PVC fabric supported on a cable net with an inner tension cable ring and an outer steel compression truss that was approximately 900m-long and 12m-deep.

Working on behalf of the main contractor Sir Robert McAlpine, Severfield fabricated, supplied and erected 10,000t of steel for the original scheme, making it the lightest Olympic Stadium to date.

Motorists driving along the M9 near Falkirk are today greeted with the view of two 30m-high equine sculptures known as The Kelpies.

The steel structures sit either side of a recently constructed lock on the Forth & Clyde Canal forming the centrepiece of The Helix park in Falkirk.

Known as 'head up' and 'head down', because of their different postures, The Kelpies have become a major Scottish tourist attraction and a highly visible signpost for a large regeneration scheme.

Conceived by sculptor Andy Scott and fabricated and erected by S H Structures,

Dom Fellowes/Flickr

The Kelpies are based around two braced triangular trusses, which were inter-connected by braced in-plane CHS frames to form an efficient and stiff primary structure. A secondary frame of smaller CHS rails carry the brackets that provide the thousands of fixing points for the external skin.

The sculpture's skin is formed from stainless steel panels, which were cold formed onto the thousands of individual brackets of the structure insitu.

The judges commented that two shimmering steel horse heads, fully 30m high, required considerable engineering finesse to realise the sculptor's vision. A tubular steel frame supports this most complex and delicate sculptural form.

A full list and description of all Award winners can be found at: *https://www.steelconstruction.info/SSDA_2018_-_50th_Anniversary_Year*

The 2018 Awards, which are jointly sponsored by the BCSA and Trimble Solutions (UK) Ltd, will be announced in early October.

The Kelpies are now one of Scotland's most visited attractions

Long established supplier

As a key partner to the constructional steelwork sector across the UK, Barrett Steel prides itself on possessing not only the size and scope but also the reliability and innovation required to make it a versatile provider to the industry.

Barrett Steel are one of the UK's largest steel stockholders

Holding over 110,000t of stock in situ across 27 depots around the UK allows for continued excellence in customer service and support. Barrett Steel's extensive depot network not only makes them one of the UK's largest independent steel stockholders but, according to Barrett's construction customers, also provides them with supply security due to the range and depth of Barrett's stock at a time when forward availability can be uncertain.

As a key market to Barrett Steel, the construction sector is mainly supplied from the group's largest division, General Steels. The group itself is divided into four divisions: General Steels, Engineering Steels, Tubes, as well as the International division, which all satisfy a range of markets.

As part of the General Steels division, Barrett Constructional Steel (based out of Barrett's Bradford head office) focuses exclusively on larger steelwork contractors, who are likely to have unique and challenging requirements due to the large size and complexity of the projects they work on. The General Steels division provides all the steel elements needed to create modern structures, including heavy structural sections, steel plate, tubular sections, light sections, flats and angles.

Continuous investment in quality and productivity enhancing state-of-the-art equipment continues for the group in 2018/2019 with long-term plans for the installation of new lasers, saws and a new shot blast, prime and painter, which are traditionally the services delivered by steelwork contractors.

But far from this creating a conflict of interest, steelwork contractors now value the option of having routine operations using this equipment carried out by stockholders. This investment in processing within stockholding allows contractors to focus on the design, more challenging fabrication operations and the erection processes.

An example of Barrett's continuous investment to support its construction customers' ever changing needs is demonstrated clearly at one of Barrett's key processing depots in the West Midlands, CMT Steel Services, which will see investment in a new automated saw. The investment in this project alone is projected to reach around a quarter of a million pounds allowing Barrett's to reduce lead times further and increase capacity for their ever-growing customer base across the UK - with all these considered it's easy to see why this is such an important step forward for the company.

Similarly, 2019 will see further investment in a new shot blast, prime and paint line for Barrett's headquarters in Bradford, home to Barrett Steel Services (the group's founding depot) as well as its Barrett Construction team.

Continuous investment means fast and efficient supply is guaranteed

Aside from Barrett's investment in the latest processing technology, operationally it has begun a roll-out of electric side loaders across many of the group's processing depots. An investment of over half a million pounds has proven a great success, with the new environmentally-friendly fleet now being able to operate without noise or emissions.

The breadth of Barrett Steel's processing capabilities also helps the company to stand out from the crowd. Its sites in Bradford, Scunthorpe (Omega) and Cradley Heath (CMT) all carry an advanced range of processing capabilities, and this is backed up by its modern Maghaberry processing centre in Northern Ireland which already boasts a state-of-the-art shot blast prime and paint line alongside a new Voortman cut and drill line.

Barrett's investment in service continues across all its divisions and its Tubes division has acquired a new Adije laser, soon to be installed in its Dudley facility. It has also further enhanced its range of processing capabilities with the purchase of a new profile library for its range of 11 tube laser machines. These additions will allow Barretts to laser a wider range of hollow section for a variety of construction industry applications more efficiently, ensuring customers can maintain throughput production speeds and critical site dates.

Tony Corrie, Sales Director for Barrett Constructional Steel Scotland, came across a prime example of these benefits with a customer just the other day: "We are consistently seeing examples of where our investment in processing has meant that our customers can increase the volumes they fabricate through their workshops each week.

"Customers can simultaneously take advantage of our processing and our technical expertise to reduce their overall project costs by using processing technology such as the lasers in the production process."

Group Managing Director James Barrett comments: "Over 150 years working hand-in-hand with the construction industry has enabled Barretts to be in tune with the challenges our customers are facing daily. Recently, we have noticed that site dates are finalised but then, due to hold ups with drawing release, our customers are often faced with increasingly shortening lead times for fabrication and supply. At Barretts we work seamlessly with our customers to not only ensure stock availability at short notice but to ensure, where we can, that our investments in advanced processing can assist our customers to hit ever tightened schedules."

The experience entwined in the Barrett Steel operation means not only does the group have the scope to supply a wide variety of stock and processed products, but additionally its long-established supply chain relationships pass on an enormous amount of benefits to the customer. Whether it's sourcing different types of stock, such as non-standard specification for the nuclear construction sector, or by reducing costs for end-users thanks to single-source operation, its supply chain allows reduction in costs and transport requirements across the board.

The UK construction industry has experienced some uncertain times recently as construction output fell by 0.8% in the first quarter of 2018, but thankfully this is now showing an output increase of 0.9% in the second quarter according to the latest data from the Office for National Statistics. What is for certain though is Barrett Steel's team of experts can boast significant levels of technical knowledge. This level of knowledge and understanding of the sectors they are servicing allows them not only to create tailored solution-based offerings to assist their customers with the ever-changing challenges they face, but backs that up with the investment in stock, transport and the processing capabilities required to cater perfectly to the construction industry for many generations to come.

Barrett Steel has always invested in state-of-the-art processing equipment

Barrett Steel is a headline sponsor of *Steel for Life*

For more information about Barrett Steel go to *www.barrettsteel.com*

The company has a nationwide network of depots serving the entire UK and Ireland

Bespoke structural components

NSC reports on fabricated structural components used in buildings and the capability and capacity required by producers of these items.

Using a trusted fabricator for structural components is always advisable

Readers of NSC will be very familiar with projects that comprise conventional structural steelwork. Many of the monthly featured articles include interesting photos of steel-framed structures being erected. The main steel components involved are universal beams (UBs) and universal columns (UCs), hollow sections - circular (CHS), rectangular (RHS) or square (SHS) - and other typical sections.

Generally, these buildings are straightforward in layout and in loading characteristics. In situations where the building is not straightforward, and where the engineer's requirements are not so standard, it is likely there will be a requirement for non-standard structural members.

In these cases, there may be a need for the engineer to specify items such as plate girders, cellular beams, fabricated box girders, or specific node / joint pieces. It has become increasingly routine that engineers need to adopt some of these items to meet a specific design requirement within a structure.

Equally, it can be the case that, because of section availability and range, floor depth criteria or aesthetic requirements, all the steel components used to construct the frame are fabricated structural components.

Steelwork contractors who supply conventional beam and column work are well geared up for that purpose and have invested heavily in the appropriate automatic sawing, drilling and handling systems to facilitate this type of work. However, for fabricated structural components, the equipment needed and the skills involved are entirely different. Therefore, when fabricated structural components are specified it is important to choose the right supplier with the experience, skills, capacity and equipment to deliver the pieces efficiently and economically, as in many cases these can be the most critical items on the path towards successful project delivery.

For example, where an engineer specifies a series of very heavy box girders, these may be, as an example, pieces weighing 1.5t/m comprising 85mm thick top and bottom flanges, 50mm thick web sections and a web-to-flange joint using 15mm continuous fillet welds. There may also be drilled holes required for lifting points to be attached, couplers welded to receive threaded rebar strands, and 'Z' tested (through thickness) plate specified for certain fittings. There could be a host of specific features required and the project inspection and testing plan (ITP) may specifically detail hold points and testing criteria which will not apply to any other element in the project.

In this case the conventional steelwork contractor may be able to make the pieces, but may not have the lifting capability for the 85mm plate or the profiling capacity to cut such heavy plate, and may not be familiar with the specific quality requirements. It may be possible to buy-in the webs and flanges from a subcontract profiler, but there will still be difficulties ahead with the lifting, manipulation and welding of such heavy plate. The more appropriate option may be to source a suitably qualified and experienced supplier of such complex items.

Another example may be heavy plate girders or cellular beams. The more accepted practice nowadays is for these beams to be made on special purpose welding machines where the machine ensures alignment of the manufactured pieces and helps to limit and control weld induced distortion. A conventional steelwork contractor using only manual means with jigs and fixtures could certainly make plate girders, but it's not viable to do this efficiently in any volume, without the right equipment.

Aside from the need for equipment, the likelihood is that a specialist producer of complex structural components will have the required expertise and experience and also have a relationship with an IWE (International Welding Engineer) which can be vitally important where there are very complex welding issues involved.

Given that specifically designed structural components are likely to be more scrutinised than the conventional elements of a steelwork project, it is sometimes the case that an engineer will specify a higher Execution Class for these items. This is another reason why a conventional steelwork contractor may choose to engage a specialist structural component manufacturer for the supply of such items.

"Bespoke structural components are becoming more common in large structures nowadays. The manufacturing and quality issues which arise when considering such heavy structural components are generally far more onerous than for conventional steelwork. Therefore, it's critical that fabricators choose a trusted supplier who has the expertise, experience and capability to deliver these items."

Jamestown's Managing Director Fiacre Creegan

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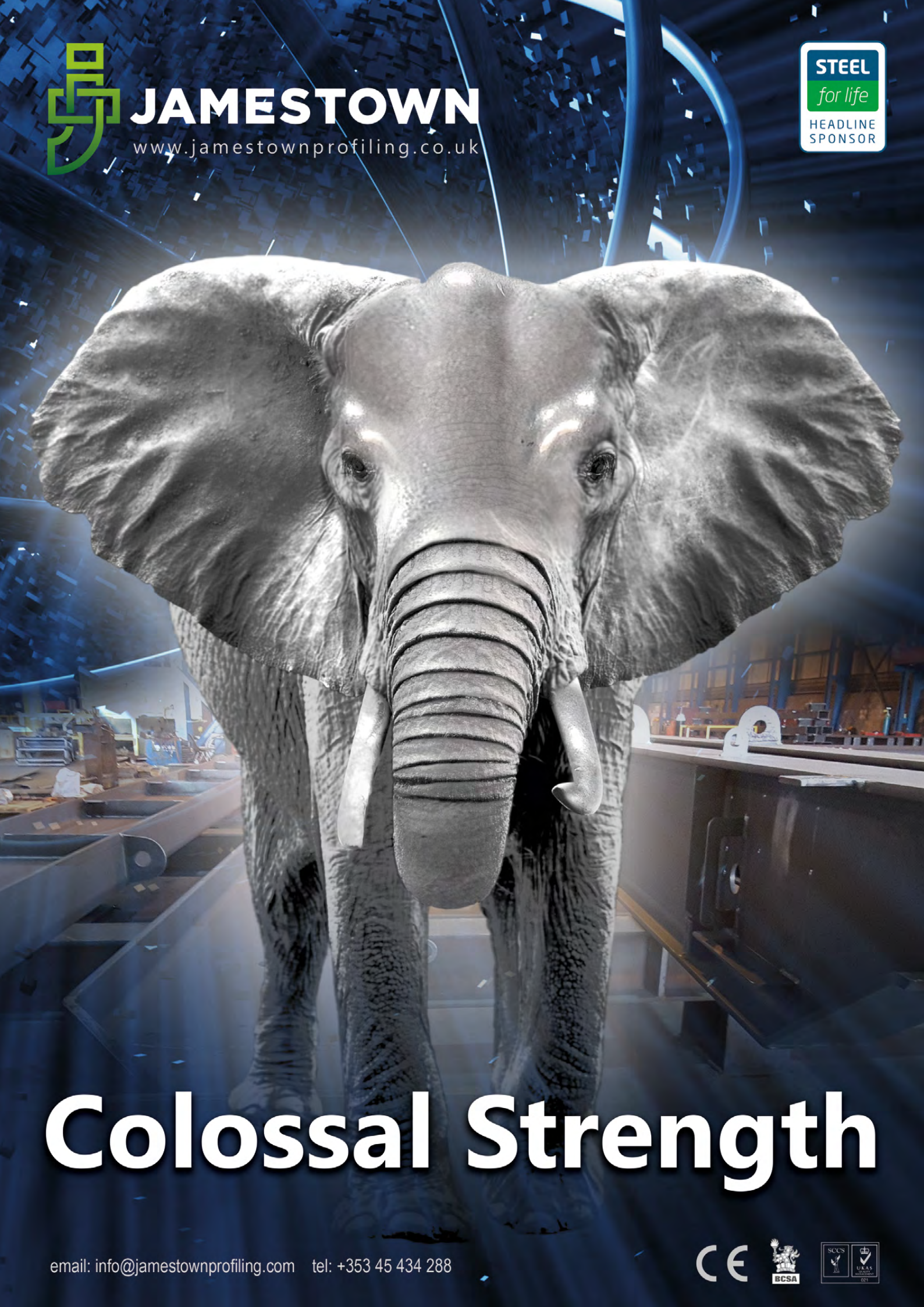
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Drake leisure scheme sails into port

Offering 12 cinema screens and a host of retail and restaurant outlets, the Drake Circus leisure development is set to transform the site of a previously outdated bus station. Martin Cooper reports from Plymouth.

How the cinema block will look

FACT FILE
Drake Circus development, Plymouth
Main Client: British Land
Architect: Corstorphine + Wright
Main contractor: McLaren Construction
Structural engineer: Evolve Consulting Engineers
Steelwork contractor: BHC
Steel tonnage: 2,700t

Big changes are afoot in Plymouth as the city is in the midst of a multi-million pound revamp of its central shopping districts

The five-year scheme aims to transform this key location to make sure it looks its best in time for the Mayflower 400 celebrations, which will see thousands of tourists descend on the city in 2020 to commemorate the sailing of the Pilgrim Fathers to America in 1620.

A number of schemes are currently under way and one of the largest is the £35M Drake Circus leisure development, which is set to transform a former bus station site into a key gateway entrance to Plymouth City centre.

Named in honour of the city's most famous seafarer and explorer Sir Francis Drake, the Circus is already the location for a large shopping centre and the new development will complement these existing facilities.

Construction work is being carried out by McLaren Construction, with BHC fabricating, supplying and erecting 2,700t of structural steelwork for the main frame of the scheme.

The development, which is set to open in Autumn 2019, will be 9,200m^2 and comprises a 12-screen Cineworld cinema, 15 restaurants and bars, including a sky bar above the cinema to capture stunning views of the city and its coastline, retail units as well as 420 car park spaces.

The scheme is one large steel frame, measuring 130m-long × 50m-wide at its largest point. The frame is braced and typically makes use of crossed flat vertical bracings to provide lateral stability in conjunction with composite floor decks and roof bracing.

"In some locations, we have utilised struts in place of crossed flats to accommodate circulation routes. At ground floor retail level, we were very limited in locations for bracing. As a result, we agreed with the architect and the client that a bay of feature bracing would be located within the walkway at podium level," says Evolve Consulting Engineers Project Engineer Margaret Hanway.

"BHC has worked with the architect to produce some bespoke connection details for this braced bay which makes a real feature of this part of the structure that will be exposed in the final scheme."

The project's footprint sits below an existing viaduct that supports Exeter Street along the site's northern elevation. Access to the development along this street will be at podium level, while to the south along Bretonside access is gained at lower ground level.

Below the podium three levels of car parking are accommodated at lower ground floor and upper ground. In between these two steel-framed levels, a middle car parking level has been introduced into the scheme by converting an area under the viaduct which previously housed shops and spaces associated with the bus station.

The podium deck supports a five-storey cinema block, which also accommodates retail outlets, a separate two-storey restaurant block and a pedestrian public realm.

Because of the mixed-use nature of the development there is no regular grid pattern to the steelwork. As well as incorporating the varying columns lines, one of the main design challenges was to minimise transfer structures without compromising the quality of the retail or car parking spaces.

Within the car parking levels, the grid is based on 7.7m by 7.2m or 9.6m in order to suit a three or four-bay car parking configuration. At retail level the grid is loosely based on a 7m or 8m square grid, while at cinema level the grid is driven by the shape of the auditoria with columns placed at the corners and around the perimeter of the auditoria at locations to suit the retail and car parking below.

Although the design team worked hard to minimise the amount transfer structures, some were required.

"We have located the majority of transfer beams at podium level where there is suitable structural depth. Due to the presence of a deep build-up of insulation and finishes to the podium, we have been able to raise the top of the steelwork of many of the transfer beams to suit the structural level, which has allowed us to maximise the structural zone available," adds Ms Hanway.

In places, plate girders as opposed to standard UB sections have been used to maintain the clear heights required below.

By working closely with BHC, Evolve says it was able to utilise some wide flange European Sections which allowed it to minimise the number of bespoke steel sections, which also benefitted costs and programme.

Demolition work on the site was completed by the end of December 2017, and this then allowed the erection of the steel frame to commence early this year.

BHC began its steel programme by erecting the cinema block and the lower levels directly beneath it. This is the tallest part of the scheme, rising to a maximum height of 35m above the Bretonside street level.

"Starting with this part of the frame allowed our cladding contractor to get started as soon as possible, by following on directly

Steelwork progesses on the cinema

behind the steel erectors once parts of the frame had reached full height," says McLaren Construction Project Manager Richard Gray.

The cinema block part of the frame also contains the largest and heaviest single steel element - a 25m-long × 4.5m-deep truss weighing 26t.

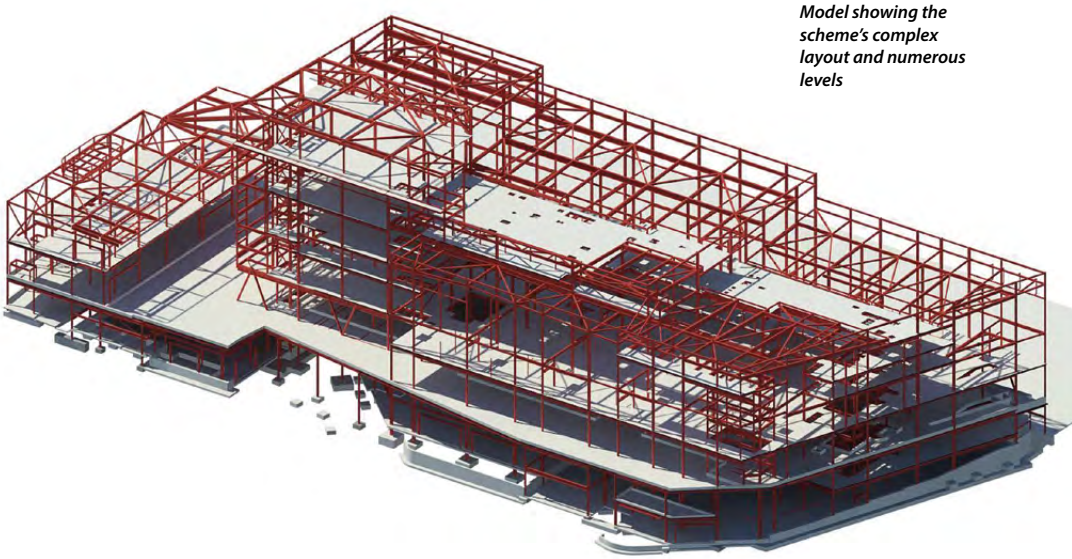
The truss sits within level five of the cinema block, directly on top of the largest IMAX screen. It will form the column-free sky bar, which will sit within its depth.

The new cinema will incorporate state-of-the-art audio and visual technology with screens ranging in size from an 80-seater up to a giant 450-seat IMAX auditoria.

There are very strict isolation criteria for the cinema block to adhere to in order to prevent noise transfer between auditoria and also from circulation spaces. The steel frame to each auditorium is a completely independent frame isolated on acoustic bearings within the steelwork connections. There are also isolation joints incorporated into the composite slabs to further prevent noise transfer.

Summing up, Plymouth City Council says: "We've all been watching with huge interest the progress of this scheme right here in the heart of Plymouth. It's going to transform this part of the city centre, create a modern and welcoming approach, as well as a great destination for people to watch a film, eat and enjoy everything Plymouth has to offer.

"The scheme will create 350 permanent jobs and will be a great benefit to the city's night-time economy."



Model showing the scheme's complex layout and numerous levels

The scheme will be a landmark addition to the Drake Circus area

On the water

A steel-framed structure, that sits above an east London dock, has benefitted from using a weathering steel base as its all-important lowest level.

FACT FILE
Heron Quays Pavilion, Canary Wharf, London
Main client: The Quay Club
Design architect: Jun Aoki Associates
Executive architect: Adamson Associates
Main contractor: Canary Wharf Contractors
Structural engineer: Arup
Steelwork contractor: Elland Steel Structures
Steel tonnage: 1,600t

Sat on weathering steel grillage, spanning over a portion of Middle Dock in London's Canary Wharf estate, a unique structure is under construction.

Measuring 63m-wide × 23m-deep, the five-storey steel-framed structure will accommodate exclusive guest rooms, restaurants and leisure space, such as a gym and roof terrace for its members.

Numerous high-profile projects have been completed at Canary Wharf over the last three decades, including One Canada Square, which at 236m-tall was the UK's tallest building until the Shard came along.

However, this job is unique and main contractor Canary Wharf Contractors (CWC) has never attempted any similar projects as Senior Project Manager Eamon McDermott explains: "Whilst we have carried out many successful projects, including the Elizabeth Line station at Canary Wharf in close proximity to water, we have never constructed a building directly over a dock sitting on existing marine piles."

The project is utilising a series of existing marine piles and pile caps, which were constructed in the early 1980s to support low-rise office buildings and a logistics dockside deck that were demolished in 2017. They consist of 44 × 800mm diameter piles, all of which are encased in steel.

"In order to re-use the existing marine piles, we had to survey and measure the corrosion rate of the steel casings to establish if the pile had sufficient bearing capacity," adds Mr McDermott.

The piles were originally designed for a minimum 100-year design life and, through various testing, CWC was able to confirm that they are still suitable for the projected life of the new structure.

The foundations are a major factor in the design of the building as they limit the size and weight of the new structure. Because of this, the choice of a steel framing solution for the building was an easy decision.

"A steel frame, with lightweight concrete composite slabs, ensured that the weight of the building would remain relatively light - a constraint brought about because of the re-use of existing piles. It also provided long spans, allowing flexibility for services through holes in the beams and ensuring that tight deflection criteria for the bespoke cladding would be met," explains Arup Structural Engineer Eloise Allsop.

"A steel frame also meant that we could optimise a structural grid that would spread the loads to the piles as evenly as possible."

The initial steelwork installation consisted of erecting the steel deck, which forms the lowest level of the structure. This is made up of plated weathering steel beams, which have been designed to spread

The structure sits over a dock and reuses existing piles

Steelwork's lightness was a key reason for its selection

the vertical loading as evenly as possible to the piles in order to maximise the occupancy space within the building.

This was achieved by using deep transfer beams under column locations to spread load from central columns to four piles and edge columns to two piles.

"We chose weathering steel for the deck because of its corrosion protection properties, and the fact that we are building the project in a marine environment," adds Mr McDermott.

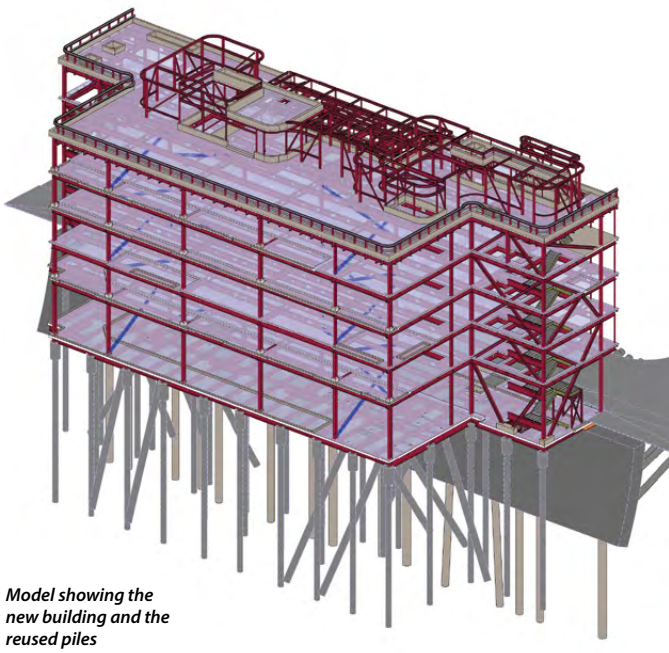
"Initially, we looked at using corrosion protection paint, however restricted access between the ground floor and the water for inspections and maintenance made us re-consider. Also, concrete beams and pre-cast slabs were considered but again, due to weight restrictions, we decided to go with steel."

Sat on the weathering steel deck, the Heron Quays Pavilion is a five-storey braced structure. Stability is provided by steel bracing in the corners of the building as this ensures maximum useable space and flexibility for the client.

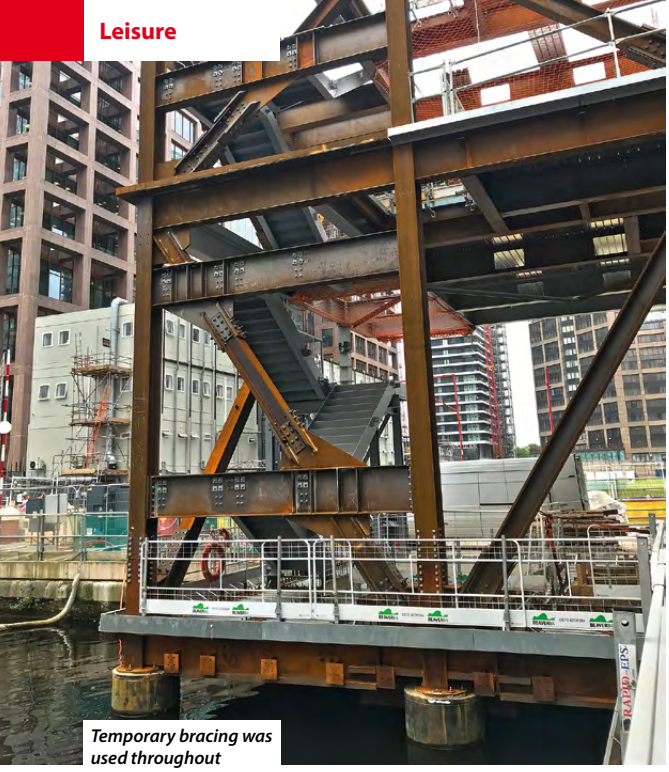
The geometry of the bracing has been set out to avoid balconies and windows. This arrangement has meant that the bracing members need to take both tension and compression and have long lengths for buckling. As a result, the members are stiff and attract vertical loading.

In order to reduce the amount of vertical loading that the bracing members attract a temporary bracing strategy was put in place. This strategy involved temporary bracing placed in the central portion of the building during construction, which meant that the self-weight of the concrete slabs was pushed into central columns and locked in place by the time that the permanent bracing structure was in place.

This reduced the loads on both the



Model showing the new building and the reused piles



Temporary bracing was used throughout

The Pavilion is the latest steel-framed project at Canary Wharf

bracing system itself and on the most critical piles. The bracing system was also stiffened using welded plates to reduce the sway deflections of the building.

Steelwork is based around an irregular grid pattern, with columns spaced at 7m, 8m, 9m and 10m, in order to suit the pile cap positions. One line of internal columns allows the building to have uninterrupted spans of up to 10m.

The upper floors are formed with steel beams supporting a concrete slab on metal decking. The slabs are generally 130mm thick lightweight concrete and the steel beams are generally 650mm-deep sections.

The steel beams are plated sections, which are designed as 650mm-deep to fulfil the deflection criteria and to allow services to pass through the beams. Holes run through the members on a regular grid to allow the tenant maximum flexibility.

Erecting a building over water poses its own challenges and during the steelwork and metal decking installation the entire footprint of the ground floor was decked with floating pontoons to enable access for workers and machinery.

"There were environmental challenges and we had to seal the deck to prevent grout loss into the dock, and while pouring of concrete we had to monitor operations from a boat to make sure there were no substantial leaks," adds Mr McDermott.

Steelwork contractor Elland Steel Structures fabricated, supplied and installed 400t of weathering steel for the deck and then a further 1,200t for the main structure.

"Most of the steelwork was installed using the site's 24t-capacity tower crane which is situated alongside the dock in a vacant plot," sums up Elland Steel Structures Contracts Manager Mark Williamson.

"Although the deck and frame consists of numerous heavy plate girders, none of the steel was beyond the crane's capacity."

The project is scheduled for completion in June 2019.

Redistributing loads

The structure at Heron Quays is arranged to limit the loads applied to some structural elements. Richard Henderson of the SCI discusses some of the details.

The structural arrangement of Heron Quays Pavilion has been influenced by the load carrying capacity of the existing piles. The arrangement of the beams in the transfer structure immediately above the water has been chosen to allow redistribution of loads in the event of settlement of certain critical piles. By providing continuous beams over these piles, any settlement will result in load being redistributed to the adjacent piles, thus relieving the load in the critical one. As an example, consider a beam with two equal spans continuous over its central support which carries a uniform load. The actions in the beam can be determined by equating the deflection δ_B of the beam without the central support to the deflection resulting from a central upward point load. Settlement of the central support by 20% of the downward deflection δ_B of the beam will result in 10% of the central support reaction being transferred to each support at the outer ends of the beam. It is likely that there is a high tolerance on any prediction of pile settlement. The magnitude of the load potentially transferred to the outer supports can be managed by adjusting the stiffness of the beam such that the magnitude of the potential settlement is a relatively small proportion of the beam deflection δ_B.

The sequence of construction has been modified to limit the permanent loads in the bracing provided in the end elevations of the building. To avoid openings in the façade, the floor beams interrupt the bracing element at first floor level and have a bracing node near mid-span at levels three and four. As a consequence, vertical loads applied to the beams after completion of the bracing system will result in axial loads in the bracing members. To limit this effect, temporary bracing was provided for stability during construction and the bracing member connections were detailed with preloaded bolts in slotted holes. The beams were allowed to deflect under the weight of concrete and the bracing joints were completed after concreting had finished. The loads in the permanent bracing resulting from vertical loads on the floor beams were thereby limited to the effects of permanent loads added after completion of the floors (eg floor finishes, services and ceilings) and of variable loads. The arrangement of bracing in the ends of the building is shown below.

Bracing arrangement

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The scheme was originally envisaged as twin residential and hotel towers

Three up in second city

The third of three steel-framed office blocks in Snowhill, Birmingham, is one of the UK's largest speculative office developments to be constructed outside of London. Martin Cooper reports.

Sat next to its sister buildings One and Two Snowhill [see NSC January 2008 and September 2012], Three Snowhill is a 19-storey office tower that forms a stunning gateway to the city's business district, completing the final phase of Ballymore's Snowhill Estate development.

Offering nearly 38,000m^2 of BREEAM 'Excellent' rated Grade A office floor space, together with retail and leisure units at podium and ground floor levels, the building sits atop four levels of concrete basement and podium substructure. Three Snowhill, like its sister buildings, has a composite design comprising a steel frame, with cellular beams supporting metal decking.

As well as accommodating the office block's services within the structural void, the Fabsec cellular beams have proven to be a cost-efficient option to create 10.5m-long internal spans.

This final plot of the Snowhill development has a long and varied history as initially twin residential and hotel towers, both constructed with reinforced concrete frames, were envisaged. In 2007 work began on this scheme and all of the basement and substructure work had been completed when the job was halted a year later.

Due to market conditions, a redesign was undertaken and the project was resurrected as a solitary commercial block, which in turn led the team to choose a steel framing solution.

WSP Associate Director James Bodicoat says: "A single tower on the site necessitated some substantial alterations to the substructure, most notably a much thicker raft to accommodate the different loads. This meant the five-storey basement became four storeys as the lowest level was in-filled."

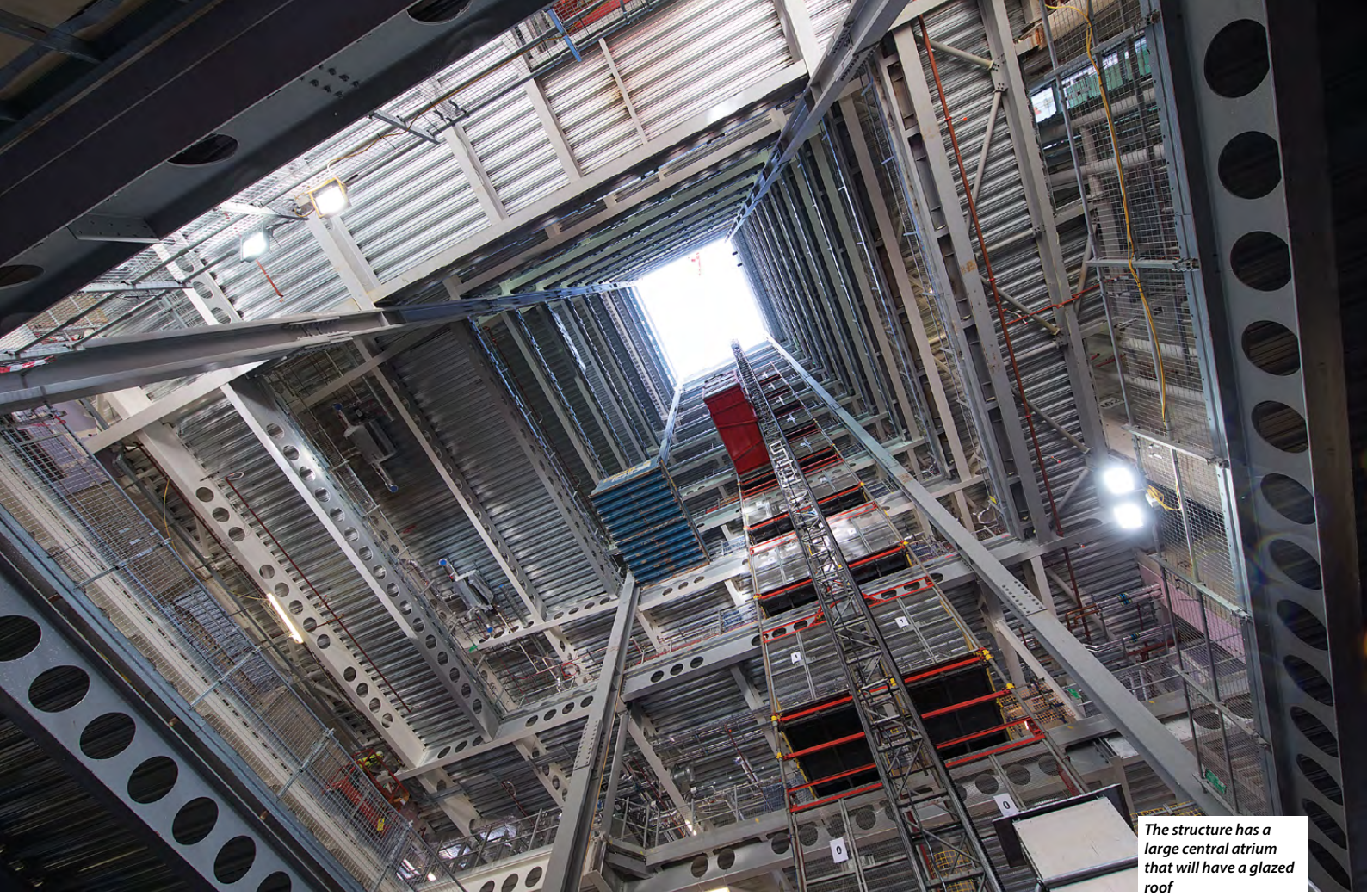
Instead of two main cores, one for each tower, the new scheme now has three concrete cores, which provide the stability for the single tower.

Two of the cores, situated along the north elevation have the functionality of one core but are structurally independent. They are however linked together by steelwork that forms a frame for scenic lifts and a large glazed façade.

Working on behalf of main contractor BAM Construction, Severfield has fabricated, supplied and erected some 4,500t of steel for this project. All of the steelwork has been erected via the site's three tower cranes, as none of the elements exceed 13t in weight.

Although the project sits on a busy inner-city area, it is well served with two material laydown areas, running along two main elevations, which have allowed steelwork to be delivered on a regular daily basis.

While the city centre location has provided challenges with logistics, Severfield worked very closely with the site team to co-



The structure has a large central atrium that will have a glazed roof

ordinate deliveries. Using its offload system has proved particularly useful, allowing the unloading of two steel deliveries at one time despite the tight conditions on site.

The building wraps around a large central atrium, which allows plenty of natural light to penetrate the building's inner areas as it is topped with a glazed roof. This glazing also spans over the double-height upper floor, creating a large light-filled breakout space.

A series of steel CHS trees, each with either two or three branches, along with CHS rafters support the glazed roof on this upper level.

Large parts of the building's roof support plant areas and, in order to create a visual screen to hide the equipment, two elevations have a 5m over sail. This high-level element is formed by a series of cantilevering trusses.

Possibly the most standout feature of the scheme are the raking façades which, as well as providing the building with some architectural highlights, help the project to maximise the available floor space as the building's floorplates gradually increase as one ascends towards the uppermost floor.

The building's north west and north east corners both feature raking façades, formed by a series of CHS columns, founded at basement level on large 5m-high steel nodes.

The nodes have bolted connections to the raking columns, which merge at the ground floor level, and to perimeter perpendicular columns. Weighing approximately 9t each, the nodes are either connected to two or three columns, depending on their location.

Another sloping façade is located on the south east corner, where a portion of the building, extending from level three to eight, is suspended from three large raking columns.

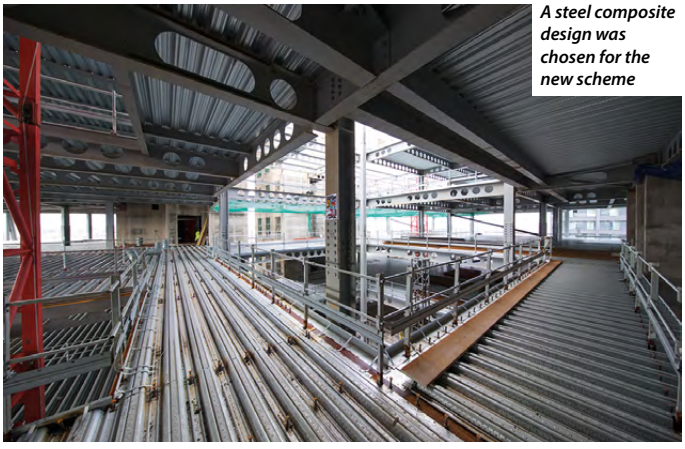
"Severfield's design department has been key in developing solutions to issues such as the hung steelwork on the south east elevation, which had to be temporarily propped before it was fully suspended," says BAM Senior Site Manager Charlotte Owen.

Summing up the benefits of the steel-framed design, Ms Owen adds: "The steelwork frame installation sequence has allowed us to maximise programme benefits for following trades. For example, the floorplates being split in to four areas allows us to concrete the floors in two halves and then start installing the curtain walling, while still ensuring exclusion zones are maintained for the steelwork erectors.

"By using steelwork, we have been able to monitor progress closely and forecast key milestone completion dates as the piece count is easy to measure on a weekly basis."

Three Snowhill is due to complete by Spring 2019.

FACT FILE
Three Snowhill, Birmingham
Main Client: Ballymore Properties
Architect: Weedon Architects
Main contractor: BAM Construction
Structural engineer: WSP
Steelwork contractor: Severfield
Steel tonnage: 4,500t



A steel composite design was chosen for the new scheme

The raking façade's columns are founded at basement level on large nodes

High-rise and column-free

Manchester's latest commercial development is a 12-storey, column-free London-spec office block at 125 Deansgate. Martin Cooper reports.

FACT FILE
125 Deansgate, Manchester
Main client: Mancap (joint venture between Worthington Properties and Revcap
Architect: Glenn Howells Architects
Main contractor: Marcus Worthington
Structural engineer: Fairhurst
Steel contractor: Billington Structures
Steel tonnage: 2,000t

The twin cities of Manchester and Salford are currently experiencing a commercial sector boom as a number of high-rise office blocks are either being built or have recently been completed.

Some of the commercial projects previously reported on in New Steel Construction, which highlight the city's buoyant sector, include No.1 Spinningfields (See *NSC Nov/Dec 2016*), the Embankment (See *NSC June 2016*) and 8 First Street (See *NSC Nov/Dec 2016*).

Another development, which is under construction, is 125 Deansgate, a £70M 12-storey scheme comprising 10,500m² of Grade A office space and 1,100m² of flexible retail space spread over ground and first floor.

Main contractor for the job is Marcus Worthington, working on its biggest ever scheme in terms of value. Meanwhile, its sister company, Worthington Properties, forms part of the joint venture main client.

Aiming to achieve a BREEAM 'Excellent' rating, the building will feature a double-height reception foyer along its main Deansgate elevation, while the upper levels will provide column-free, flexible and adaptable office accommodation for either sole occupiers or multiple tenants.

Paying homage to the industrial characteristic of Deansgate with its red-brick Victorian architecture, the contemporary building will be clad in deep, crafted terracota piers to help shade the building and articulate its tripartite proportions.

According to Glenn Howells Architects, the delicate language of the red clay tiles and a strong vertical expression creates a striking, yet complementary, addition to the family of buildings at this important intersection, including the centerpiece Grade I Listed John Rylands Library.

The building will also act as a catalyst for the transformation of the surrounding public realm including Lincoln Square and the adjacent Brazennose Street.

Structural steelwork is the material of choice for most of the city's commercial developments, and 125 Deansgate is no exception as this scheme comprises a composite design incorporating steelwork supporting metal decking and a 150mm-deep concrete topping.

"We did look at other framing options, but we went with a steel frame as it is the best way of achieving the column-free long-span London-type specification we wanted," says Marcus Worthington Senior Project Manager Paul McCormick.

"Flexibility also played a role in our decision as the completed project may accommodate multiple tenants who may want to link floors with internal staircases. A steel frame with metal decking will allow us to cut and carve new openings if required."

The design of 125 Deansgate also includes cellular beams, the majority of which were designed and fabricated by Billington, as the team wanted to integrate all of the M&E services into the structural void in order to maximise the floor-to-ceiling heights.

Work on the project began in early 2017 with a six-month demolition programme of two buildings that previously occupied the site.

The construction team then installed the new building's foundations, concrete basement substructure and the main concrete core.

All of this preparatory work enabled Billington Structures to begin its steel erection programme in April this year, with a completion date set for next month (October).

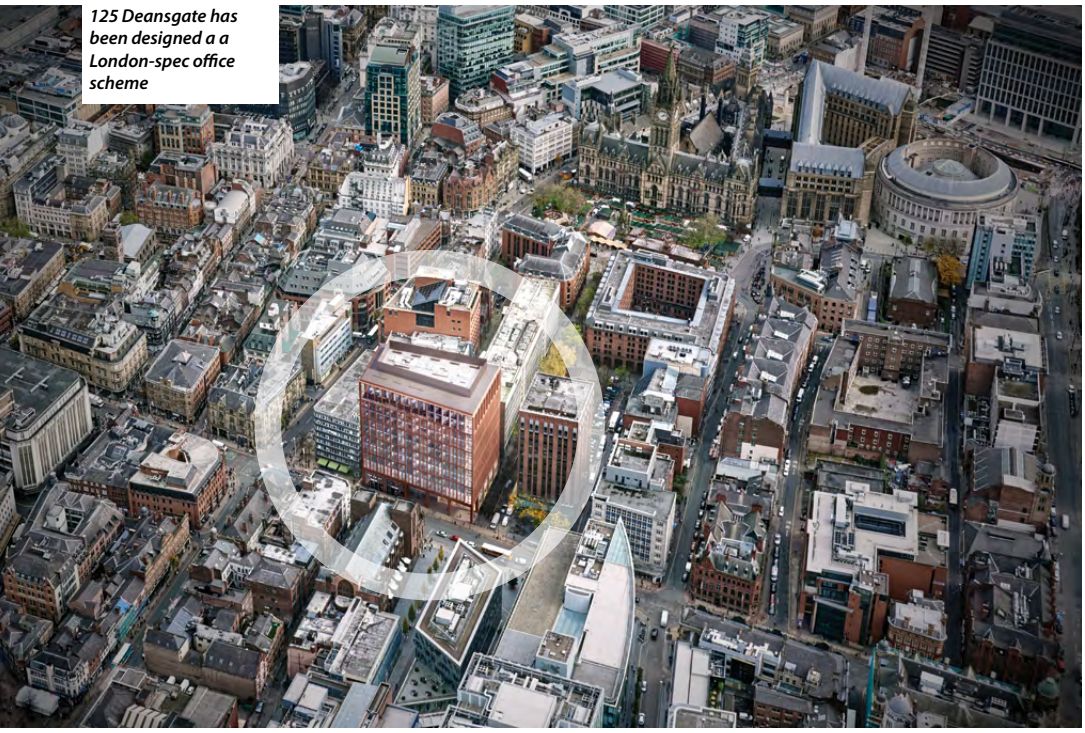
All of the steelwork is being erected via the site's one tower crane as no single member weighs more than 10t, which puts the entire steel piece count within this one crane's capacity.

"This is a typical city centre site with very little room for material storage as the entire footprint is being utilised. Logistically, steelwork has proven to be the best option because it can be delivered to site and then erected almost immediately," adds Mr McCormick.

The largest steel elements are located near the bottom of the building, as a row of continuous transfer beams form a ring around the building at second floor.

This series of plate girders, each up to 12m long and weighing 9.5t, forms the building's feature two-storey high pedestrian colonnade that runs along the majority of the Deansgate elevation. It also forms the larger column-free façades on the other three sides of the building.

"The upper perimeter columns are typically spaced at approximately 3m intervals, but below second floor we only have columns every 9m in order to create large open spaces. Consequently, the plate girders are acting as transfer structures, supporting up to two column lines that end at second floor," explains Fairhurst



125 Deansgate has been designed a a London-spec office scheme

Cellular beams have offered an efficient long-span option

Technical Director Stephen Southwick.

The colonnade gives access to the building's two-storey retail unit, which has a first floor space that wraps around the main office reception area which is a large double-height space.

A second retail unit, which is single-storey, opens out directly onto Deansgate.

From second floor upwards the steelwork is fairly regimented, as the office levels are all column-free spaces with long span cellular beams radiating out from the stability-giving core on three sides to create spans of up 16m-long. The core is positioned along the eastern elevation – towards the back of the building, and so this fourth side of the building behind the core only accommodates toilet facilities and a corridor.

Each floor has primary beams that have considerable spans of up to 14m in places. The longest of these members are supported by two columns positioned just in front of the core.

In order to keep the office spaces column-free these two columns will be concealed within service risers.

Further transfer structures are located at level 8, to create a step along the north elevation, and at level 10 to create an outdoor terrace overlooking Deansgate.

125 Deansgate is scheduled to complete in mid-2019.

Transfer beams form a ring at second floor level to allow fewer columns on the lower levels

The building is the latest addition to the fast-changing city centre

Steel crosses the try line

One of the UK's most iconic sporting venues, and the only one with a back-to-back grandstand, is being redeveloped with the aid of steel construction. Martin Cooper reports.

FACT FILE
Emerald Headingley Stadium redevelopment
Main client: Leeds Rhinos, Yorkshire County Cricket Club
Architect: DLA Design
Main contractor: Caddick Construction
Structural engineer: TRP Consulting
Steelwork contractor: Hambleton Steel
Steel tonnage: 1,800t

Probably best-known among sports fans for the Ian Botham-led Ashes Test win in 1981, Headingley first hosted an international cricket match in 1899 and is one of the world's most well-known sports venues.

However, Headingley is not just a cricket venue, what marks it out as a unique sporting arena is the fact that it also contains an adjacent rugby stadium.

Home to Leeds Rhinos rugby league side since 1889, this part of Headingley is also steeped in history and hosted the first-ever rugby league Challenge Cup Final in 1897.

The proximity of the two grounds means Headingley has a unique north/south stand (north at the rugby ground and south on the cricket side), containing back-to-back seating that overlook both sporting venues.

Built in the 1930s, this stand was no longer fit-for-purpose and was recently demolished at part of Headingley Rugby Stadium's ongoing redevelopment programme. As well as building a new similarly configured stand, the overall works also involve the simultaneous construction of a new rugby south stand. This work on the rugby stadium is also progressing alongside a programme to upgrade the cricket ground.

Main contractor for the rugby stadium redevelopment is Yorkshire-based Caddick Construction, the company that previously built the rugby ground's east stand nine years ago.

Work on this phase began with the demolition of the existing south stand and the construction of its replacement structure, which will accommodate a total of 7,721 rugby spectators. This will consist of 2,233 seated spectators on the upper tier with the remainder standing on the lower paddock.

"The main challenge for us is working around the cricket and rugby fixtures which are ongoing throughout our programme," explains Caddick Construction Senior Contracts Manager Paul Hunter.

"During the current rugby league season, we have had to hand over the entire site approximately every two weeks for Leeds Rhinos home game. That means decamping from the stadium and turning a construction site into a sports ground, by clearing away machinery, making everything safe and installing items such as barriers, PA systems and fire alarms."

To help accommodate as many spectators as possible during the construction period, Caddick managed to open up a portion of the lower standing tier in the new south stand, while the upper areas were still being completed.

"By getting the precast terracing installed on the steel rakers as quickly as possible, we were able to cordon this completed area off during match days to allow fans to use it,

The unique back-to-back stand will open next year

even though the rest of the stand was not yet useable," says Mr Hunter.

At ground floor level the new south stand will provide home and away team changing rooms, as well as the referees' changing room.

Off the main concourse male, female and accessible toilet provision and concessions are all publicly accessible. Access to upper levels is provided by a central stair and lift. From the main ground floor concourse standing spectators can access the lower tier terraces.

Above this an upper concourse provides access to the upper seating tier via the stair and lift core. The stair and lift core then rises up to a television gantry suspended above the lower terrace level with a viewing position agreed by the television operators.

Hambleton Steel has fabricated, supplied and erected approximately 600t of structural steel for the south stand. The largest steel elements are a series of 29m-long fully galvanized rafters that create the cantilevering roof of the stand.

The roof rafters are supported by a series of four feature CHS backstays, with one connecting to the roof beam at midpoint and the others attached to the rear of the cantilever and the back of the stand. ▶28

The rugby side of the stand takes shape

How cricket fans will view the completed north/south stand

The rugby stadium's new south stand nears completion

▶27

The south stand will complete this month (September), just in time to host the last few rugby league fixtures of the current season. Meanwhile, on the opposite side of the pitch, the north/south stand is still ongoing and is due to be complete in May next year.

The new north/south stand provides seated terraces for both rugby and cricket spectators in a back-to-back configuration with various levels of accommodation and circulation areas.

The stand will accommodate a total of 8,048 spectators. This will comprise 4,223 all seated cricket capacity and 3,825 all seated rugby capacity.

The stand will provide high quality new facilities for both grounds and has been designed to complement the two sporting arenas with varying and distinctive roofscapes to the north and south respectively.

"The stand's appearance from the cricket side is a bit more related to the cricket vernacular, with quite a nice barrel-vaulted fabric roof on quite nimble galvanized trusses which span about 26m over four tiers of seating," explains TRP Engineer Geoff Wilks.

"The roof overlooking the rugby side is a bit more traditional. It is a tied roof with traditional rafters. The interesting elements are the interaction of the crowd loading on this frame which is loaded on both sides, which is not what you normally see on a sports stadium. That is an interesting design and an interesting approach."

On the rugby side, a temporary seating grandstand has been put in to replace the stand during construction. This has presented the project team with some safety challenges concerning safe access and safe egress, having the crowd support systems in place during match days and then actually constructing a stand behind and over it.

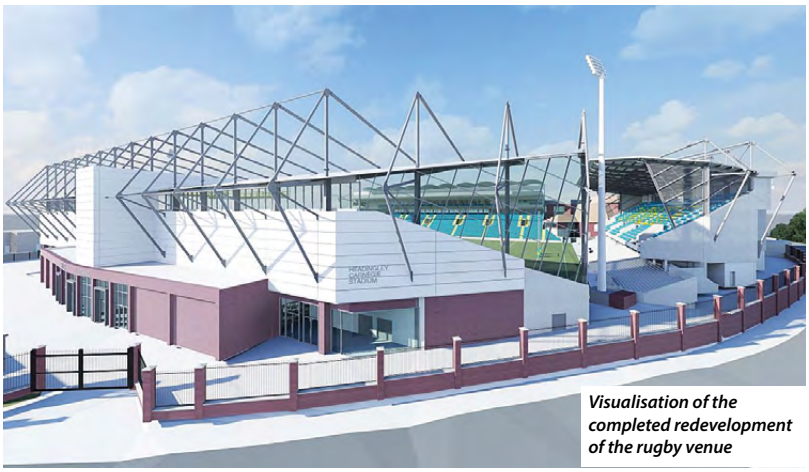
Once the rugby season is over, the temporary seating will be dismantled, leaving a space for the new stand's lower tier steel rakers and precast terracing to be installed.

Mr Wilks says that ordinarily the terracing units would be installed along with the roof and main steelwork but, in this particular case, there has been a need to think about the stand in a partially complete state.

"With construction work more advanced on one side than it is on the other, it's been necessary to introduce temporary bracing into the frame to give it some temporary stability during construction.

"The challenges are unique both from an operational point of view as far as the club is concerned, from a construction point of view as far as the contractor is concerned and from a design point of view from our side. It's an interesting and complex scheme, and the stand is probably the only one in the world with back-to-back tiers."

How the rugby stadium's south stand will look



Visualisation of the completed redevelopment of the rugby venue

Introduction to fatigue design to BS EN 1993-1-9

The assessment of fatigue performance is routine in bridge design but is only relevant to specific elements in buildings which may suffer from fatigue damage. One example of these is crane runway beams. Richard Henderson of the SCI introduces some of the background.

Introduction

The phenomenon of metal fatigue involves the development of cracks in elements that are subject to many repeated applications of loads which are lower than the maximum loads to which the element is subjected. If fatigue cracks develop unnoticed, they will eventually result in complete failure of the element with potentially catastrophic consequences.

History

Research into fatigue in metal structures began as early as 1837 with tests on conveyor chains. A locomotive axle failure due to fatigue was recognized as the cause of a train accident at Meudon, near Versailles in 1842. F Braithwaite coined the term fatigue in his report "On the fatigue and consequent fracture of metals" published in the ICE minutes of proceedings in 1854. August Wohler conducted systematic investigations into metal fatigue of railway axles over a 20 year period from 1852, produced S-N curves illustrating fatigue behaviour and introduced the idea of an endurance limit. In 1945, A M Miner developed a design tool based on the Palmgren linear damage hypothesis. The stress raising effect of small-radius corners and the consequent effect on fatigue behaviour was established following investigation into the Comet air disasters of 1953 and 1954.

Basic Concepts

Fatigue cracks usually initiate at a surface defect such as a sharp corner or a weld toe and develop when subject to fluctuating stresses above a certain threshold level. The endurance of a detail or component is the number of cycles to failure under a fluctuating stress of a constant amplitude. A point can be plotted on a graph with the number of cycles to failure (N) as abscissa and the constant amplitude stress (S) as ordinate. Stress range is defined as the algebraic difference between the two extremes of a stress cycle so the constant amplitude fluctuating stress is a constant stress range. By plotting the endurance for each constant stress range, a curve called an S-N curve can be drawn, the typical form of which is shown in Figure 1 on a semi-log plot.

The S-N curve exhibits a negative gradient such that a longer endurance corresponds to a lower stress range. Stresses below a stress range magnitude called the cut-off limit do not cause fatigue damage. According to Miner's rule, fatigue damage can be summed linearly for a given detail using the S-N curve to determine the number of cycles to failure N_i for stress range $\Delta\sigma_i$. If the detail is subject to a number of cycles n_i for the corresponding stress range, the fatigue damage can summed for k stress ranges and must be no greater than 1.0. The relevant expression is:

$$\sum_{i=1}^{k} \frac{n_1}{N_1} \leq 1.0$$

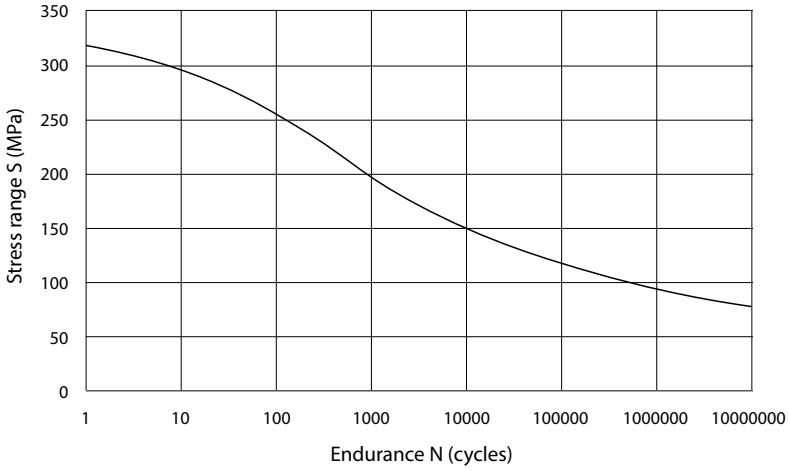


Figure 1: Example S-N Curve

Defects in plain steel, welded joints and welded attachments all affect the fatigue life of a detail. As a result, many fatigue tests have been carried out on different details to develop S-N curves that can be used for fatigue damage calculations. Details are tabulated in BS EN 1993-1-9 (hereinafter denoted EC3-1-9) and are separated into the following headings.

Table No.	Heading
8.1	Plain members and mechanically fastened joints
8.2	Welded built-up sections
8.3	Transverse butt welds
8.4	Weld attachments and stiffeners
8.5	Load carrying welded joints
8.6	Hollow sections (t ≤ 12.5 mm)
8.7	Lattice girder node joints
8.8	Orthotropic decks – closed stringers
8.9	Orthotropic decks – open stringers
8.10	Top flange to web junction of runway beams

Within each table, details are identified and provided with an identifying number which corresponds to the relevant S-N curve.

The S-N curves for various classes of detail have been idealized in EC3-1-9 into a set of parallel lines with straight segments, plotted on a logarithmic scale on both axes and those for direct stress are shown in Figure 7.1 of the standard. The S-N curves are identified by a detail category number $\Delta\sigma_c$ which corresponds to the reference fatigue strength in MPa for the detail which is equal to the constant amplitude stress range for an endurance of 2 × 10^6 cycles. The curves are shown in Figure 2. ▶30

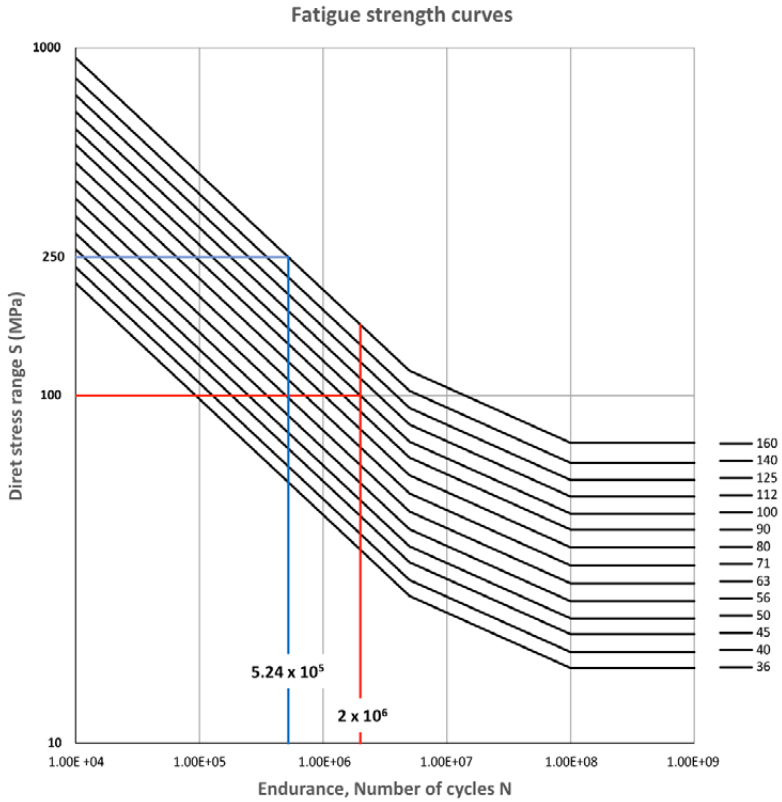


Figure 2: Fatigue strength curves for direct stress ranges

▶29 The equation for the sloping part of the curves is of the form:

$$\Delta\sigma_R{}^m N_R = \Delta\sigma_C{}^m 2 \times 10^6$$

with m = 3 for $N \le 5 \times 10^6$ and:

$$\Delta\sigma_R{}^m N_R = \Delta\sigma_C{}^m 5 \times 10^6$$

with m = 5 for $5 \times 10^6 \le N \le 10^8$.

The first equation can be expressed as:

$$3 \times \log_{10}\Delta\sigma_R + \log_{10} N_R = 3 \times \log_{10}\Delta\sigma_C + \log_{10} 2 \times 10^6$$

This is a straight line on a log-log plot with gradient -1/3. As an example of their use, for detail category 160 (plates and flats with as-rolled edges, with sharp edges, surface and rolling flaws removed by grinding until a smooth transition is achieved; $\Delta\sigma_C$ = 160 MPa – see Table 8.1 of EC3 1 9), the endurance for a nominal direct stress range of 250 MPa is given by:

$$3 \times \log_{10}250 + \log_{10} N_R = 3 \times \log_{10}160 + \log_{10} 2 \times 10^6$$

$$N_R = 5.243 \times 10^5$$

ie the endurance at a constant amplitude stress range of 250 MPa is about 524,000 cycles.

Fatigue loading

Fatigue loading usually involves a spectrum of loads of different magnitudes. A spectrum can be built up for a particular structural action which can then be converted into a stress history.
A method for determining the magnitude of stress ranges from a stress history is known as the reservoir counting method and is described in Published Document PD 6695-1-9:2008.
The reservoir counting method is illustrated in Figure 3.

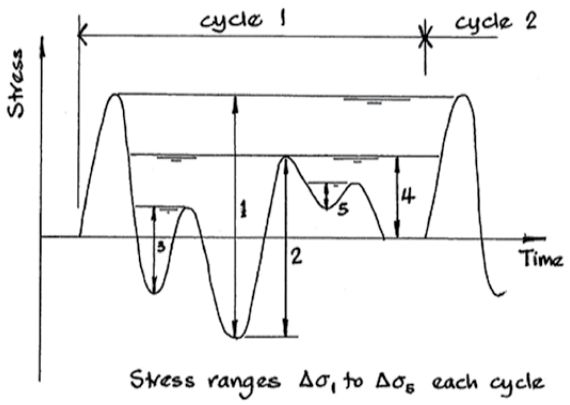


Figure 3: Reservoir counting method

The load spectrum may be continuous (such as for wave loading) and be describable by fitting a probability distribution to measured data. The data can then be discretized and a histogram of the number of loads of different magnitudes produced. The stress ranges corresponding to each load magnitude can then be determined.

Fatigue Assessment and Verification

Two methods of fatigue assessment are described in EC3-1-9: the

safe life method and the damage tolerant method. The safe life method of assessment is considered in what follows. For some circumstances, a simple method of fatigue assessment can be used which does not refer to a load spectrum. The method is set out in EC3-1-9 and involves verification in the stress domain; it is described below.

Sections 5 and 6 of the standard provide details of how to calculate the stresses for assessing the fatigue performance of a detail. Nominal values of stresses should be calculated at the serviceability limit state according to elastic theory, excluding stress concentration effects. The nominal direct and shear stresses should be calculated at the site of potential initiation of a fatigue crack. The nominal stresses are modified by a stress concentration factor if the relevant nominal stress is affected by a local geometric feature, such as an opening with radiused corners. Stress concentration factors are provided in Figure 4 of PD6695-1-9:2008. Stresses in welds are calculated using a different formula from that given in BS EN 1993-1-8 for weld design, as indicated in Section 5(6). For certain details shown in Table B.1 of EC3-1-9, fatigue resistance can be determined using the geometrical (hot spot) stress method. Stress ranges for fatigue design are based on nominal stresses, modified nominal stresses or geometrical (hot spot) stress ranges.

For the structure and loading under consideration, the relevant part of EN 1993 may provide parameters for calculating the design value of the nominal stress ranges for fatigue verification. Using this approach, the design value of the nominal, modified nominal or geometrical stress range factored for fatigue must be less than the reference fatigue strength at 2 million cycles for each detail identified in tables 8.1 to 8.10.

The design value of nominal stress ranges is given in Section 6.2 of EC3-1-9 as

$$\gamma_{Ff}\,\Delta\sigma_{E,2} = \lambda_1 \times \lambda_2 \times \lambda_3 \times \lambda_4 \ldots \times \lambda_n \times \Delta\sigma(\gamma_{Ff}\,Q_k)$$

for direct stresses where $\Delta\sigma(\gamma_{Ff}\,Q_k)$ is the stress range caused by the fatigue loads specified in EN 1991 and the λ_i are damage equivalent factors depending on the spectra in the relevant parts of EN 1993. The product of the damage equivalent factors λ_i adjusts the stress ranges caused by the fatigue loads into stress ranges corresponding to 2×10^6 cycles.

The fatigue verification involves checking that the nominal, modified nominal or geometrical stress ranges due to frequent loads $\Psi_1 Q_k$ do not exceed the following limits:

$$\Delta\sigma \le 1.5 f_y \quad \text{for direct stress ranges}$$

$$\Delta\tau \le (1.5 f_y)/\sqrt{3} \quad \text{for shear stress ranges}$$

Under fatigue loading, the following two inequalities should be verified:

$$\frac{\gamma_{Ff}\Delta\sigma_{E,2}}{\Delta\sigma_C/\gamma_{Mf}} \le 1.0$$

$$\frac{\gamma_{Ff}\Delta\sigma_{E,2}}{\Delta\tau_C/\gamma_{Mf}} \le 1.0$$

The design value of the nominal stress ranges should therefore be less than the reference fatigue strength at 2 million cycles for that particular detail.

In addition, for stress ranges of combined shear and direct stress a further inequality should be satisfied:

$$\left(\frac{\gamma_{Ff}\Delta\sigma_{E,2}}{\Delta\sigma_C/\gamma_{Mf}}\right)^3 + \left(\frac{\gamma_{Ff}\Delta\sigma_{E,2}}{\Delta\tau_C/\gamma_{Mf}}\right)^5 \le 1.0$$

Lambda values which allow this approach are given in BS EN 1991-3 for cranes and in BS EN 1993-2 for bridges.

UK National Annex

The UK National Annex to EC3-1-9 states that where no λ_i values are given the relevant parts of EC3, the verification should be based on the damage accumulation equation which is essentially the equation for Miner's rule:

$$D_d = \sum_{i=1}^{n} \frac{n_{Ei}}{N_{Ri}} \le 1.0$$

The most comprehensive load model available should be used to establish a spectrum of stress ranges. The spectrum consists of a series of bands of stress $\Delta\sigma_i$ which should be multiplied by the load factor γ_{Ff}. The reference fatigue strength values $\Delta\sigma_C$ divided by γ_{Mf} are used to obtain the endurance value N_{Ri} for each band.

In the equation for damage, n_{Ei} is the number of cycles associated with the stress range $\gamma_{Ff}\,\Delta\sigma_i$ for band i in the factored spectrum and N_{Ri} is the endurance in cycles obtained from the factored $\frac{\Delta\sigma_C}{\gamma_{Mf}} - N_R$ curve for a stress range of $\gamma_{Ff}\,\Delta\sigma_i$.

It is intended to give a more detailed discussion of a fatigue check in an example in a subsequent article.

AD 421: Design responsibility for welds in fabricated plate girders

In recent months the SCI has received a number of questions about responsibility for the design of the welds between the web and flanges of a plate girder. These longitudinal welds are an integral part of the member design – and should therefore be sized by the engineer responsible for the design of the beam.

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Tel: **01344 636534**
Email: **advisory@steel-sci.com**

AD 422: Punching shear check for fin plates in P358

This AD note relates to Check 10 for fin plates in P358 *Simple Joints to Eurocode 3* (the Eurocode "Green Book" on simple connections). Check 10 includes two checks for punching shear (conservative and rigorous), but the value of γ_{M2} is not specified in the text. Confusion is possible because γ_{M2} appears in both BS EN 1993-1-1 and BS EN 1993-1-8, but with different values (1.1 and 1.25 respectively, as given in the relevant UK National Annex).

Since the check does not concern the bolts or welds, but does concern the ultimate material strengths of the fin plate and supporting member, the value of γ_{M2} should be taken as 1.1 from the UK NA to BS EN 1993-1-1.

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New and revised codes & standards

From BSI Updates July & August 2018

BS EN PUBLICATIONS

BS EN ISO 683-1:2018
Heat-treatable steels, alloy steels and free-cutting steels. Non-alloy steels for quenching and tempering
Supersedes BS EN 10083-1:2006 and BS EN 10083-2:2006

BS EN ISO 683-2:2018
Heat-treatable steels, alloy steels and free-cutting steels. Alloy steels for quenching and tempering
Supersedes BS EN 10083-1:2006 and BS EN 10083-3:2006

BS EN ISO 683-3:2018
Heat-treatable steels, alloy steels and free-cutting steels. Case-hardening steels
Supersedes BS EN 10084:2008

BS EN ISO 683-4:2018
Heat-treatable steels, alloy steels and free-cutting steels. Free-cutting steels
Supersedes BS EN 10087:1999

BS EN ISO 898-3:2018
Mechanical properties of fasteners made of carbon steel and alloy steel. Flat washers with specified property classes
No current standard is superseded

BS EN ISO 6892-2:2018
Metallic materials. Tensile testing. Method of test at elevated temperature
Supersedes BS EN ISO 6892-2:2011

BS EN 14399-9:2018
High-strength structural bolting assemblies for preloading. System HR or HV. Direct tension indicators for bolt and nut assemblies
Supersedes BS EN 14399-9:2009

BS EN 15129:2018
Anti-seismic devices
Supersedes BS EN 15129:2009

BS EN IEC 60974-9:2018
Arc welding equipment. Installation and use
Supersedes BS EN 60974-9:2010

BS EN IEC 62046:2018
Safety of machinery. Application of protective equipment to detect the presence of persons
Supersedes DD CLC/TS 62046:2008

BS EN 1090-2:2018
Execution of steel structures and aluminium structures. Technical requirements for steel structures
Supersedes BS EN 1090-2:2008+A1:2011

BS EN ISO 1891-4:2018
Fasteners. Vocabulary. Control, inspection, delivery, acceptance and quality
No current standard is superseded

BS EN 10277:2018
Bright steel products. Technical delivery conditions
Supersedes BS EN 10277-1:2008, BS EN 10277-2:2008, BS EN 10277-3:2008, BS EN 10277-4:2008 and BS EN 10277-5:2008

BS EN 12285-1:2018
Workshop fabricated steel tanks. Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and non-flammable water polluting liquids other than for heating and cooling of buildings
Supersedes BS EN 12285-1:2003

BS EN ISO 19011:2018
Guidelines for auditing management systems
Supersedes BS EN ISO 19011:2011

BS IMPLEMENTATIONS

BS ISO 10005:2018
Quality management. Guidelines for quality plans
Supersedes BS ISO 10005:2005

BS ISO 19203:2018
Hot-dip galvanized and zinc-aluminium coated high tensile steel wire for bridge cables. Specifications
No current standard is superseded

BS ISO 19443:2018
Quality management systems. Specific requirements for the application of ISO 9001:2015 by organizations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS)
No current standard is superseded

BS ISO 19835:2018
Non-destructive testing. Acoustic emission testing. Steel structures of overhead travelling cranes and portal bridge cranes
No current standard is superseded

BS ISO 21511:2018
Work breakdown structures for project and programme management
No current standard is superseded

CORRIGENDA TO BRITISH STANDARDS

BS EN ISO 888:2018
Fasteners. Bolts, screws and studs. Nominal lengths and thread lengths
Corrigendum, July 2018

BS EN ISO 3581:2016
Welding consumables. Covered electrodes for manual metal arc welding of stainless and heat-resisting steels. Classification
Corrigendum, May 2018

BS EN 10028-7:2016
Flat products made of steels for pressure purposes. Stainless steels
Corrigendum, June 2018

BS EN 10056-1:2017
Structural steel equal and unequal leg angles. Dimensions
Corrigendum, June 2018

BS EN 10272:2016
Stainless steel bars for pressure purposes
Corrigendum, July 2018

UPDATED BRITISH STANDARDS

BS EN 15895:2011+A1:2018
Cartridge operated hand-held tools. Safety requirements. Fixing and hard marking tools
Amendment, June 2018

BS EN 1993-1-5:2006+A1:2017
Eurocode 3. Design of steel structures. Plated structural elements
Amendment, July 2018

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN 634-2:2007
Cement-bonded particleboards. Specifications. Requirements for OPC bonded particleboards for use in dry, humid and external conditions

BS EN 13411-6:2004+A1:2008
Termination for steel wire ropes. Safety. Asymmetric wedge socket

BS EN ISO 15609-6:2013
Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Laser-arc hybrid welding

BS EN 16016-1:2011
Non destructive testing. Radiation methods. Computed tomography. Terminology

BS ISO 404:2013
Steel and steel products. General technical delivery requirements

BS EN 12811-3:2002
Temporary works equipment. Load testing

BS ISO 12655:2013
Energy performance of buildings. Presentation of measured energy use of buildings

PD ISO/TR 21932:2013
Sustainability in buildings and civil engineering works. A review of terminology

BRITISH STANDARDS WITHDRAWN

BS 6200-3.26.3:1987 (EN 24829-1:1990 ISO 4289-1:198)
Sampling and analysis of iron, steel and other ferrous metals. Methods of analysis. Determination of silicon. Steel and cast iron: spectrophotometric method for silicon contents from 0.05% (m/m) to 1.0% (m/m)
Superseded by BS EN ISO 4829-1:2018

BS EN 287-6:2010
Qualification test of welders. Fusion welding. Cast iron
Superseded by BS EN 287-6:2018

BS EN 1011-8:2004
Welding. Recommendations for welding of metallic materials. Welding of cast irons
Superseded by BS EN 1011-8:2018

BS EN ISO 4885:2017
Ferrous materials. Heat treatments. Vocabulary
Superseded by BS EN ISO 4885:2018

BS EN ISO 6507-4:2005
Metallic materials. Vickers hardness test. Tables of hardness values
Superseded by BS EN ISO 6507-4:2018

BS 6043-3.3:2000 (ISO 12985-1:2000)
Methods of sampling and test for carbonaceous materials used in aluminium manufacture. Electrodes. Determination of the bulk density (apparent density) of cathode blocks and prebaked anodes using a dimensions method
Superseded by BS ISO 12985-1:2018

BS 6043-3.4:2000 (ISO 12985-2:2000)
Methods of sampling and test for carbonaceous materials used in aluminium manufacture. Electrodes. Determination of the open porosity and bulk density (apparent density) of cathode blocks and prebaked anodes by a hydrostatic method
Superseded by BS ISO 12985-2:2018

BUILDING WITH STEEL

Reprinted from Volume 5 No. 2
June 1968

A 'Grand Stand' at Lords

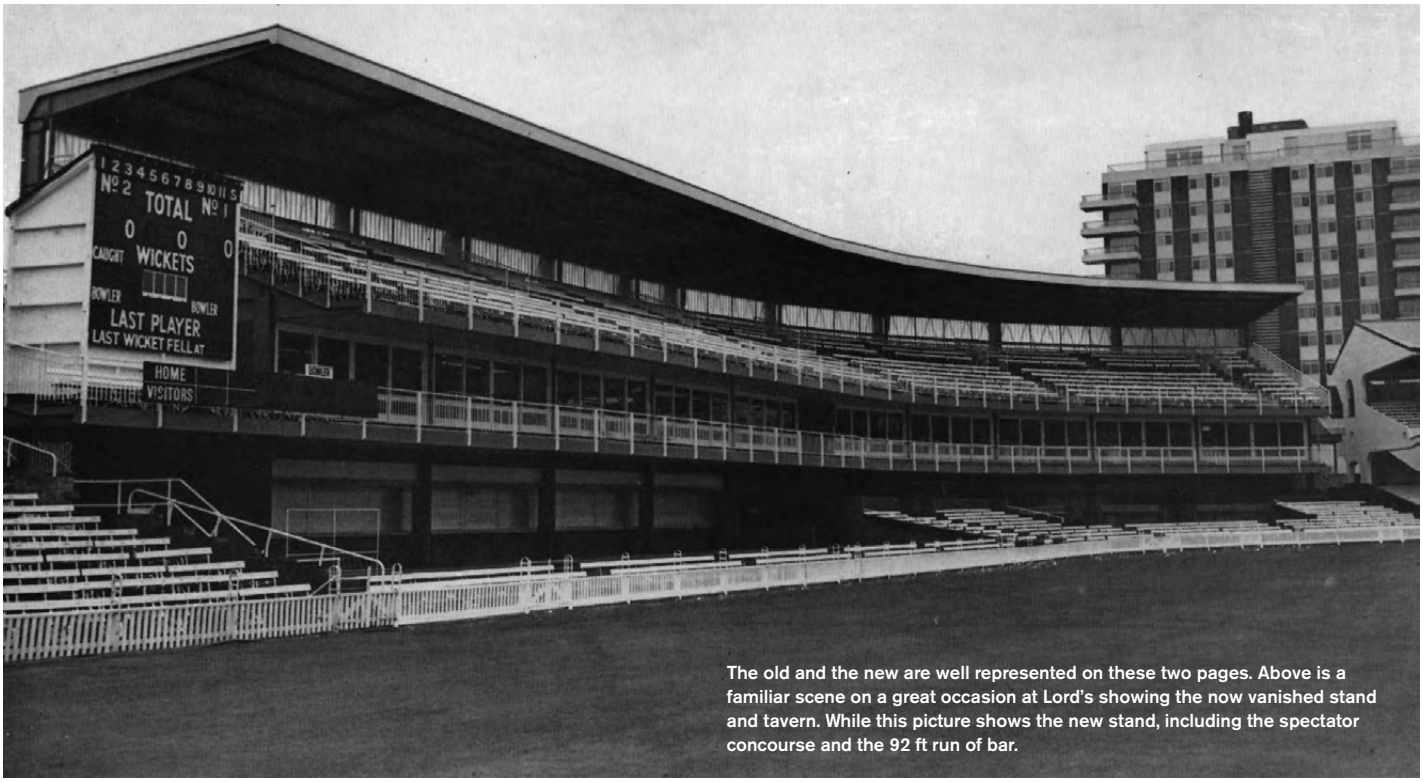
It was in 1814 that Mr T. Lord leased the now famous ground to the Marylebone Cricket Club and the story of Cricket made way for Wisden. This was not the first ground owned by Mr Lord and used by the Club. This was in Dorset Fields where Dorset Square now stands and was in regular use from 1787 until the ground was developed for building in 1808. Mr Lord then leased the ground at North Bank, Regents Park and took the club there in 1811. The decision of the authorities to cut part of the Regent Canal through the ground forced another move. Mr Lord, carefully removing the turf from the playing pitch, took it to the present Lord's which began its cricket life in the year mentioned above.

All cricket grounds are famous for some individual or team achievements: Lords, being as it were one of the cradles of the game claims more than most. Contemporary players need no introduction but living memory brings back in haphazard order, W. G. Grace, 'Plum' Warner, F. T. Mann, Hearne and Hendren, Don Bradman and his phenomenal scoring, Percy Holmes making 300 plus runs, and many others. The present writer enjoyed the unparalleled thrill of seeing for the first time Macdonald the Australian fast bowler just after he had joined Lancashire and was therefore in his prime. That smooth swift gazelle-like run up to the wicket and beautiful action made and makes any other bowler seem clumsy and laboured. A permanent imprint on the memory.

All of these have passed into history and their successors carry on the bright tradition of the game. As with the players so with the surroundings: it seemed to an older generation of cricket lovers that the Clock Tower – smacked heavily on one occasion by the F. T. Mann mentioned above – and the Tavern were indestructible. And yet today they have gone and it must be admitted that the replacements are better than the originals. Exciting though it may have been – and one was young and vigorous in those days – to be pushed and shoved around with a milling crowd all struggling to get into the small tavern for a ham sandwich and a half pint of bitter, the elegant atmosphere of the new Tavern is a marked improvement.

Dr Grace may squirm slightly in his grave at the moving farther down the road of his memorial gates to make room for the new tavern, but surely even his critical eye would approve of the grand new two-level stand which now stands on the site of the old tavern, members' dining room and Clock Tower. The stand holds a total of 2,462 spectators with 1,550 accommodated on the upper terrace and in addition contains twenty 12-seater boxes for private parties. The whole redevelopment is costing £1 m. which includes, as well as the new tavern and stand, a large 13-storey block of flats. The stand itself is of steel construction and covers an area of 9,150 sq ft: it makes available 11,500 sq ft of terraced decking. An interesting feature of the design is the use of $^{5}/_{16}$-in thick steel plate for this decking. This was made possible by using the steel fabricator's giant steel press and yielded useful savings on the original estimated cost.

The main support frames weigh nearly 9 tons each and are



The old and the new are well represented on these two pages. Above is a familiar scene on a great occasion at Lord's showing the now vanished stand and tavern. While this picture shows the new stand, including the spectator concourse and the 92 ft run of bar.

The elegance of the design at the rear of the new stand.

set at 23 ft 3 in centres, each frame being assembled from eight pieces. The floor support members, in the shape of deep channel sections, were also pressed from steel plate. The stand is of two-level layout, main floor levels being 14 ft and 25 ft rising to 36 ft above ground with the roof at a height of 49 ft, falling to 2 ft 5 in to a pressed steel gutter at the rear. A glazed screen protects spectators in the upper portion of the stand.

The main frames were designed with moment connections to transmit the wind loads and asymmetric vertical loading. All moment connections were made with high strength friction grip bolts.

Gutters at the front of the stand are in fact the front deck pressings, butt welded at all joints and with sumps connected to galvanized steel down pipes. Galvanized gutters at the rear are pressed out from ¼-in thick plate. In order to maintain the very popular spectator and refreshment facilities that existed in front of the old tavern, a large ramped spectator concourse served by a 92 ft run of bar is sited in its original position. A similar but smaller concourse and bar are also being provided for Members, all this accommodation being at ground level.

The very large spans over the first floor reception and dining rooms of the Tavern made it more economical to use steel for the roof construction though the main structure was of reinforced concrete.

This took the form of lattice girders spanning over 70 ft which cantilever 12 ft beyond the outer columns on one side of the building. The concrete first floor also projects 12 ft beyond the columns and is in fact suspended from the ends of the cantilever roof girders by ¾ in square solid steel roods. This unusual roof construction is expressed in the design with the large roof girders clad in ribbed metal sheeting.

Architects for the New Tavern, Stand and Flats – Louis de Soissons, Peacock, Hodges, Robertson & Fraser. Consulting Engineers for the Stand – R T James & Partners.

A close-up view of the new stand showing the interesting roof structure, also the terraced decking in course of construction. The use of $^{5}/_{16}$ in thick steel plate for the decking is an unusual feature.

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

Gillian Mitchell MBE, Deputy Director General, BCSA, 4 Whitehall Court, London SW1A 2ES
Tel: 020 7747 8121 Email: *gillian.mitchell@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 & J Stead Ltd	01653 693742			●	●					●	●			●	●		3			Up to £400,000
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●			2			Up to £3,000,000
A&J Fabtech Ltd	01924 439614	●					●		●	●	●		●	●		✔	3			Up to £400,000
Access Design & Engineering	01642 245151					●				●	●			●	●	✔	2			Up to £4,000,000
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*
Apex Steel Structures Ltd	01268 660828					●	●			●	●			●	●		2			Up to £2,000,000
Arc Fabrication Services Ltd	01709 557654			●	●	●	●	●	●	●	●			●	●		3			Up to £40,000
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2			Up to £800,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●	●	●	●		●	●		2			Up to £800,000
ASA Steel Structures Ltd	01782 566366			●	●	●	●			●	●			●	●	✔	4			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
Austin-Divall Fabrications Ltd	01903 721950				●	●	●	●		●	●			●	●	✔	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 Construction Engineering Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●		●	●	●	✔	4			Up to £6,000,000
Builders Beams Ltd	01227 863770			●	●	●	●			●	●			●	●	✔	3	✔		Up to £3,000,000*
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
ESL (GB) Ltd	01482 787986	●					●	●	●	●	●	●	●	●	●	✔	4			Up to £400,000
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
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)
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
Gregg & Patterson (Engineers) Ltd	028 9061 8131			●	●	●	●	●				●		●		✔	3			Up to £3,000,000
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
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●			●	●				●	✔	2			Up to £1,400,000
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*
John Reid & Sons (Strucsteel) Ltd	01202 483333		●	●	●	●	●	●	●	●	●	●		●	●	✔	4		●	Up to £6,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445			●	●	●	●	●	●	●	●	●		●	●	✔	4		●	Up to £6,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4			Up to £6,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●					✔	2		●	Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●		●		●	●	●			●	●		3			Up to £800,000
Luxtrade Ltd	01902 353182									●	●			●	●	✔	2			Up to £800,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✔	4		●	Up to £2,000,000
M J Patch Structures Ltd	01275 333431				●					●	●				●	✔	2			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
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
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●	●		●	●		●	●	✔	4		●	Up to £2,000,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	Up to £4,000,000
Overdale Construction Services Ltd	01656 729229			●	●		●	●			●				●		2			Up to £400,000
Painter Brothers Ltd	01432 374400	●			●				●	●	●				●	✔	3			Up to £6,000,000*
Pencro Structural Engineering Ltd	028 9335 2886			●	●	●	●	●	●		●			●	●	✔	2			Up to £2,000,000
Peter Marshall (Steel Stairs) Ltd	0113 307 6730									●					●	✔	2			Up to £800,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £1,400,000
Robinson Structures Ltd	01332 574711			●	●	●	●				●			●	●	✔	3			Up to £6,000,000
S H Structures Ltd	01977 681931	●			●		●	●	●	●	●	●			●	✔	4	✔	●	Up to £2,000,000
SAH Engineering Ltd	01582 584220			●	●	●				●	●			●	●		2			Up to £800,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●				●			●	●	✔	4			Up to £2,000,000
Sean Brady Construction Engineering Ltd	00 353 49 436 4144			●	●	●	●			●	●			●	●		2			Up to £800,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4		●	Above £6,000,000
SGC Steel Fabrication	01704 531286				●					●				●	●	✔	2			Up to £800,000
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 £1,400,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●		2			Up to £1,400,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £800,000
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
- **RF** 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	RF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
A&J Fabtech Ltd	01924 439614										●	✓	3					Up to £400,000
AJ Engineering & Construction Services Ltd	01309 671919	●			●	●	●	●	●	●	●	✓	4				●	Up to £3,000,000
Bourne Construction Engineering 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 Ltd	01773 860001	●			●	●	●		●		●	✓	3					Up to £3,000,000
ESL (GB) Ltd	01428 787986									●	●	✓	4			✓		Up to £400,000
Four-Tees Engineers Ltd	01489 885899	●			●	●	●		●	●		✓	3			✓	●	Up to £2,000,000
Had Fab Ltd	01875 611711									●	●	✓	4					Up to £3,000,000
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																		
Allerton Steel Ltd	01609 774471	●		●	●	●	●			●	●	✓	4			✓	●	Up to £4,000,000
Centregreat Engineering Ltd	029 2046 5683	●		●	●	●	●	●	●	●	●	✓	4					Up to £1,400,000
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
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●	●	●		●	●	✓	3					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
Interserve Construction Ltd	020 8311 5500									●		✓	N/A					Above £6,000,000*
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
Control Energy Costs Ltd	01737 556631
Gene Mathers	0115 974 7831
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	08457 504030

Company name	Tel
Kier Construction Ltd	01767 640111
McGee Group (Holdings) Ltd	020 8998 1101
PTS (TQM) Ltd	01785 250706
Sandberg LLP	020 7565 7000

Company name	Tel
Structural & Weld Testing Services Ltd	01795 420264
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.

1 Structural components
2 Computer software
3 Design services
4 Steel producers
5 Manufacturing equipment
6 Protective systems
7 Safety systems
8 Steel stockholders
9 Structural fasteners

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

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

Company name	Tel	1	2	3	4	5	6	7	8	9	CE	SCM	BIM
AJN Steelstock Ltd	01638 555500								●		M		
Albion Sections Ltd	0121 553 1877	●									M		
Arcelor Mittal Distribution - Scunthorpe	01724 810810								●		D/I		
AVEVA Solutions Ltd	01223 556655		●								N/A		
Ayrshire Metals Ltd	01327 300990	●									M		✓
BAPP Group Ltd	01226 383824									●	M		
Barrett Steel Services Limited	01274 682281								●		M		
Behringer Ltd	01296 668259					●					N/A		
British Steel Ltd	01724 404040				●						M		
British Steel Distribution	01642 405040								●		D/I		
BW Industries Ltd	01262 400088	●									M		
Cellbeam Ltd	01937 840600	●									M		
Cleveland Steel & Tubes Ltd	01845 577789								●		M		
Composite Metal Flooring Ltd	01495 761080	●									M		
Composite Profiles UK Ltd	01202 659237	●									D/I		
Cooper & Turner Ltd	0114 256 0057									●	M		
Cutmaster Machines (UK) Ltd	01226 707865					●					N/A		
Daver Steels Ltd	0114 261 1999	●									M		
Daver Steels (Bar & Cable Systems) Ltd	01709 880550	●									M		
Dent Steel Services (Yorkshire) Ltd	01274 607070								●		M		
Duggan Profiles & Steel Service Centre Ltd	00 353 56 7722485	●							●		M		
easi-edge Ltd	01777 870901							●			N/A	●	
Fabsec Ltd	01937 840641	●									N/A		
Ficep (UK) Ltd	01924 223530					●					N/A		
FLI Structures	01452 722200	●									M	●	
Forward Protective Coatings Ltd	01623 748323						●				N/A		
Hadley Industries Plc	0121 555 1342	●									M	●	
Hempel UK Ltd	01633 874024						●				N/A		
Highland Metals Ltd	01343 548855						●				N/A		
Hi-Span Ltd	01953 603081	●									M	●	
International Paint Ltd	0191 469 6111						●				N/A	●	

Company name	Tel	1	2	3	4	5	6	7	8	9	CE	SCM	BIM
Jack Tighe Ltd	01302 880360						●				N/A		
Jamestown Manufacturing Ltd	00 353 45 434288	●									M		
John Parker & Son Ltd	01227 783200								●	●	D/I		
Joseph Ash Galvanizing	01246 854650						●				N/A		
Jotun Paints (Europe) Ltd	01724 400000						●				N/A		
Kaltenbach Ltd	01234 213201					●					N/A		
Kingspan Structural Products	01944 712000	●									M	●	
Kloeckner Metals UK	0113 254 0711								●		D/I		
Lincoln Electric (UK) Ltd	0114 287 2401					●					N/A		
Lindapter International	01274 521444									●	M		
MSW UK Ltd	0115 946 2316	●									D/I		
Murray Plate Group Ltd	0161 866 0266								●		D/I		
National Tube Stockholders Ltd	01845 577440								●		D/I		
Peddinghaus Corporation UK Ltd	01952 200377					●					N/A		
Pipe and Piling Supplies Ltd	01592 770312	●									M		
PPG Architectural Coatings UK & Ireland	01924 354233						●				N/A		
Prodeck-Fixing Ltd	01278 780586	●									D/I		
Rainham Steel Co Ltd	01708 522311								●		D/I		
SDS/2 Ltd	07734 293573		●								N/A		
Sherwin-Williams Protective & Marine Coatings	01204 521771						●				N/A	●	
Structural Metal Decks Ltd	01202 718898	●									M		
StruMIS Ltd	01332 545800		●								N/A		
Stud-Deck Services Ltd	01335 390069	●									D/I		
Tata Steel – Tubes	01536 402121				●						M		
Tata Steel – ComFlor	01244 892199	●									M		
Tension Control Bolts Ltd	01948 667700						●			●	M		
Trimble Solutions (UK) Ltd	0113 887 9790		●								N/A		
voestalpine Metsec plc	0121 601 6000	●									M	●	
Wedge Group Galvanizing Ltd	01909 486384						●				N/A		
Yamazaki Mazak UK Ltd	01905 755755					●					N/A		

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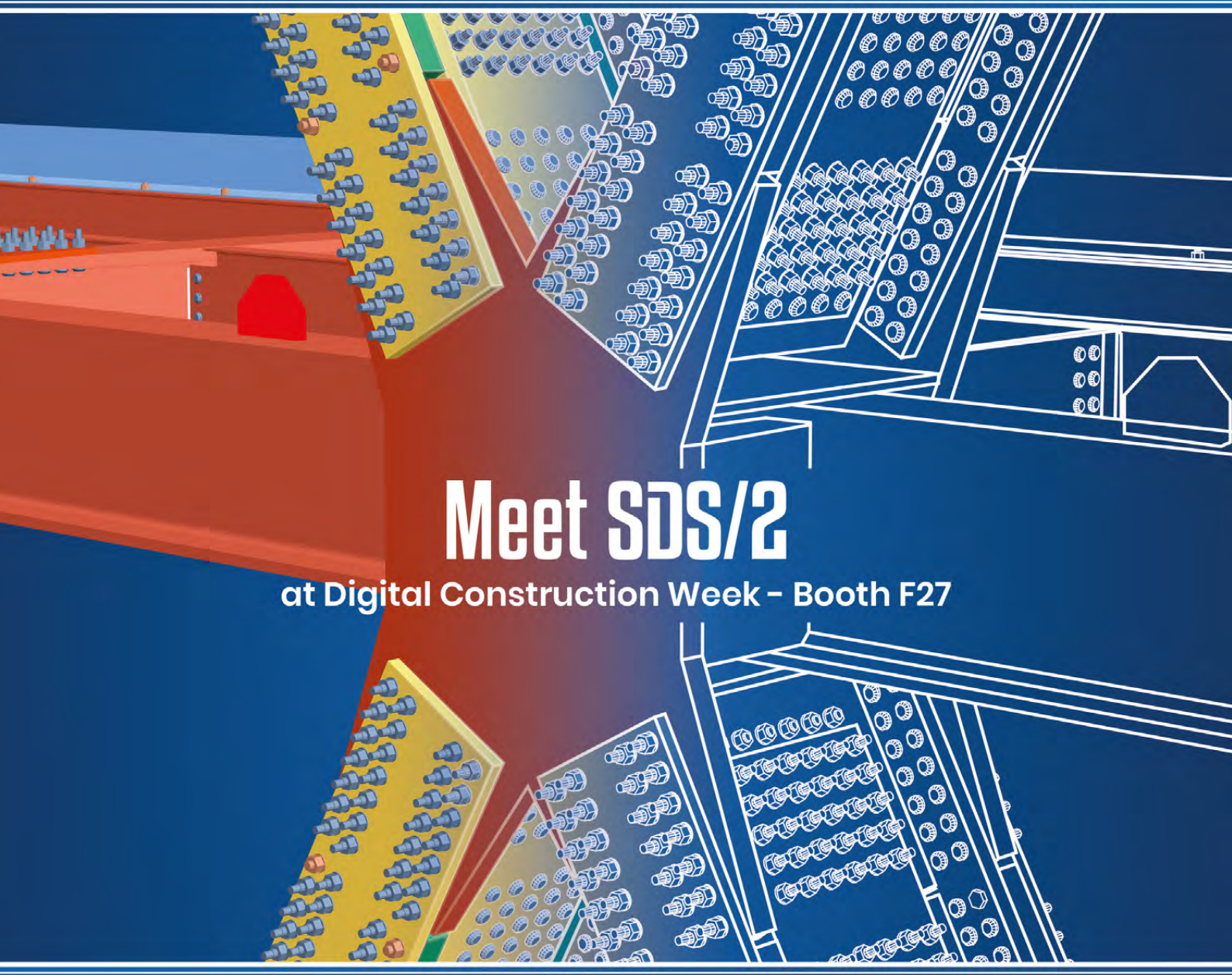

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