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# NSC

Steel first on First Street


Nov/Dec 2016
Vol 24 No 10

Completing Manchester's business district

Framing features at SSSI

Steel suits Newcastle students

Rethinking Croydon with Boxpark

# HIGH SPEED PLATE PRODUCTION

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**Cover Image**
No. 1 Spinningfields, Manchester
Main client: Allied London Properties
Delivery architect: Axis Architects
Main contractor: BAM Construction
Structural engineer: RoC Consulting
Steelwork contractor: William Hare
Steel tonnage: 3,500t

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These and other steelwork articles can be downloaded from the New Steel Construction Website at *www.newsteelconstruction.com*

# Is this one of the fastest ever and most productive automatic CNC machines for drilling, milling and scribing beams, channels and flats?

## *Don't just take our word for it...*


**Robert Savage, Director of G R Contracts**
"We are seeing an overall 50-60% increase in piece productivity from our new Endeavour."

**Steve Wickens, Managing Director of Wickens**
"Endeavour is the foundation for our drive to double productivity throughout the business."

**Andrew Hirst, Managing Director Barrett Steel**
"Endeavour has been instrumental in helping us to increase our processing volumes and to meet our customers requirements."

**Tomas Twomey, General Manager of IPW Fabricators**
"The ability of the new Endeavour to drill, cut out slots and notches and produce parts from 76x38 channel right up to 610 Beams and large section plates up to 60mm thick is truly impressive."

**Courtney Bell , Finance Director of AJN**
"The Endeavour proved to be the ultimate solution for drilling and we have now purchased 3 of these impressive machines."

**Chris Scott, Director of Hescott Engineering**
"With its power and innovative features, the new Endeavour line has been a game changer for us in terms of capacity."

## *Enough said...?*

*For more information on one of the most innovative CNC drilling, milling and marking lines - featuring 3 new direct drives, 31kw 5,000 rpm spindles with additional auxiliary axis movement, high speed positioning, 4 sides scribing and hard stamping marking unit - call* ***01924 223530*** *or* ***e-mail info@ficep.co.uk***

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# Steel supply chain's skills on show

Nick Barrett - Editor

The Steel for Life sector articles which we launched this year are proving to be a popular feature with readers, throwing the spotlight on sectors and companies throughout the supply chain whose achievements and abilities, although crucial to the success of steel construction, can sometimes be taken for granted.

We have featured articles on Steel for Life Headline Sponsors as well as articles on key sectors, all of which provided new information about the variety of steel supply chain specialisms. In particular, how they work, recent advances in process and technology, and what the future might bring.

In this issue we profile a Steel for Life Headline Sponsor, family owned stockholder Barrett Steel, a leading force in its sector with a 150 year history and an ambitious investment led development programme. This profile along with July's sector article shows how sophisticated steel processing services offered by stockholders are today, a far cry from the past when the main role of the stockholder was to break bulk.

Fabrication equipment manufacturing is the subject of one of our Steel for Life Sector Focus articles this month, and we can clearly see the benefits of investment led development there. Computer Numerically Controlled machinery has long been the industry standard, and its early adoption by steelwork contractors is today helping with a seamless move to Building Information Modelling.

Upgrading or expanding fabrication workshops isn't just a matter of purchasing new machines, but involves close cooperation – often using simulation software – between equipment manufacturers and steelwork contractors to plan optimal workshop layouts that promote efficient working. The next stage in development could lead to even more automated workshops, perhaps even managed remotely. And the workshop of the near future could certainly involve robots as well as cobots, which involve human and machines working together.

There wouldn't be a steel sector of course if steel itself wasn't manufactured, one of the original foundation industries which involves sourcing raw materials worldwide and combining them with world class manufacturing expertise. Our Sector Focus is written as the steelmaking sector continues to focus on improving the efficiency of steel production to drive down costs and further reduce its environmental impact, as well as creating new steel grades with enhanced properties.

The bulk of NSC still focuses on the projects where all of this expertise comes together, and we have some excellent examples in this issue including major commercial schemes, sensitive development on a Site of Special Scientific Interest and a student accommodation project. We look forward to keeping readers up to date with the achievements of the steel sector's world leading specialists in 2017.

# New metal decking guides will aid onsite safety


Metal Decking Good Practice Guide
MDG03 - Propping Guide

The British Constructional Steelwork Association's [BCSA] Metal Decking Group has developed four short guidance documents for those involved in the planning and preparation of metal decking installation.

BCSA Director of Health, Safety & Training Peter Walker said: "The documents will help to communicate the relevant information to main contractors which will help assist in the coordination necessary to help maintain good safety practices on-site."

The guidance documents are: Loading and Positioning of Packs; System Edge Protection Installation; Propping Guide, and Concrete Pouring.

"A contractor has a key role to play in cooperating with other contractors where the work could affect the health and safety of workers," said Mr Walker.

One of the key areas for on-site safety is the positioning of metal decking packs onto the steel frame. These should be positioned in a planned sequence so as to provide easy access, and to allow the installers to fit them while making a safe working platform for themselves.

"The key to this is proper coordination of the work, underpinned by good communication and cooperation between all those involved in the installation of metal decking," said Mr Walker.

The guidance documents are available for free at: *www.steelconstruction.info/Construction#Resources*

# Steelwork contractor confirmed for City's tallest tower

Severfield has confirmed that it has won the contract to fabricate, supply and erect the steel frame for 22 Bishopsgate, a structure that will on completion be the City of London's tallest tower.

The 62-storey building – on the site of the previously planned Pinnacle – is being developed by AXA Investment Managers Real Assets with Multiplex working as the main contractor.

Severfield Chief Executive Officer Ian Lawson said: "We are delighted to be working with Multiplex on such a high profile development as 22 Bishopsgate. This further demonstrates the breadth of the Group's capabilities and the quality of our order book.

"The Group has a longstanding history of working on iconic London buildings such as The Shard, London Bridge Station and Wimbledon No 1 Court."

Designed by PLP Architecture, 22 Bishopsgate has been described as an exceptional office tower with art and amenities, shaped to respect views of the City.

More than just an office building, it will offer a curated programme of social and activity-based spaces, as well as restaurants, bars and retail units, as a new vertical campus for the City.

# Met Office supercomputer hub handed-over


© Willmott Dixon/Michael Whitestone

Main contractor Willmott Dixon has completed construction work on the Met Office's supercomputer facility at the Exeter Science Park.

Fit-out and installation of the computer, which is said to be one of the most powerful in the world, is now under way and the facility is due to be fully operational by Spring 2017.

As well as helping the Met Office to improve its weather predictions, the computer will also be a catalyst for regional growth in the South West, supporting collaboration and partnerships between science, business and academia.

Located a short distance from the Met Office's current headquarters, the computer will be housed in a purpose-built steel-framed IT Hall, which stands adjacent to another steel structure known as the Collaboration Space (pictured).

The IT Hall is a single storey steel portal-framed structure measuring approximately 90m-long and 25m-wide, offering a central 15m-wide column-free span for the computer hall.

The Collaboration Space office building is a far more complex steel structure leaning in two directions, which has required enhanced stability systems to resist the forces generated by the complex and eccentric geometry.

William Haley Engineering fabricated, supplied and erected 230t of structural steelwork for the project.

The supercomputer will be 11 times more powerful than the current system used by the Met Office and will have 120,000 times more memory than a top-end smartphone.

It will be able to perform more than 16,000 trillion calculations per second, and at 140t it will weigh the equivalent of 11 double-decker buses.

The supercomputer's sophisticated forecasts are anticipated to deliver £2bn of socio-economic benefits to the UK by enabling better advance preparation and contingency plans to protect people's homes and businesses.

# Government commits to HS2

Transport Secretary Chris Grayling has confirmed that the government is committed to pressing ahead with HS2 to tackle the looming capacity crisis the rail network faces and to help boost jobs and regeneration along the route and across the country.

Construction is due to begin on the scheme in the first half of next year. The project go ahead is good news for the steel construction sector as it has been estimated that more than 200 bridges will be needed for the scheme, many of which will be steel.

Chris Grayling said: "We need HS2 now more than ever. We're facing a rapidly approaching crunch-point. In the last 20 years alone, the number of people travelling on our railways has more than doubled and our rail network is the most intensively used of any in Europe.

"We need HS2 for the capacity it will bring on the routes between London, the West Midlands, Crewe, Leeds and Manchester as well as the space it'll create elsewhere on our transport network. We need it for the boost it will give to our regional and national economies. And we need it for the jobs it will create, and for the way it will link our country together."

# Student accommodation opts for Metframe

Student accommodation provider Unite's latest development in Coventry has made use of voestalpine Metsec's light gauge steel Metframe system to meet the project's specific design and performance requirements.

Unite operates over 125 sites across 25 key university cities and towns in the UK. The latest development on Far Gosford Street, known as Gosford Gate, will be home to 286 students and is a key part of a long-term regeneration programme in the Coventry area.

Led by main contractor Bowmer & Kirkland, the process of constructing a facility to host a large number of students within a restricted urban area was said to require the full design and engineering capabilities of Metsec.

In addition to the logistical issues of working in a congested location, the complex design required a number of bespoke elements, to ensure that the framing solution accommodated the number of curves on the building.

Metframe is a lightweight panelised solution, said to be ideal for medium-rise buildings. The panels are manufactured offsite and faceted around the curves on the building. The contractor said this precision engineering helped to avoid waste on-site, limit the cost to the customer as well as help to reduce the project's overall environmental impact.


Ryan Simmonds at Metsec commented: "When designing the framework, we had to consider both pitched and flat areas of the roof. Areas of the framework also needed to be faceted to accommodate the building's curved corners. The use of BIM was crucial to ensure we could visualise the interfaces and ensure our teams would not face any issues on-site when it came to installation.

"From the design and planning phase, we worked collaboratively with the architect, integrating our BIM model into theirs, allowing them to coordinate their own model and other following trades."

# Steelwork contractor expands structures team

Cleveland Bridge UK said it has expanded its structures team to increase support of developments in the civil and commercial building markets in the UK and internationally.

With experience in the sector, having been involved in a wide range of projects including Canary Wharf in London and the Emirates Towers in Dubai, Cleveland Bridge has recruited an additional five technical specialists.

It will increase the capabilities of the team, which manages the design, fabrication and installation of structural steelwork for large buildings.

The group join International Sales Director, Tim Outteridge, who leads the team, and existing Technical Director Gursharan Thind.

Mr Outteridge, who has a 25-year background in civil engineering and construction, is also Deputy President of the British Constructional Steelwork Association.

*Left to right: Tim Outteridge; Engineering Manager Patrick Jackson; Construction Manager Guy Laws; Gursharun Thind; Senior Projects Manager Andy Limbert; Proposals Manager Steve Quinny, and Production Manager Gary Kipling*

He said: "Alongside our broad experience in the design and production of bridge structures, Cleveland Bridge has extensive experience in building structure and infrastructure developments.

"Expanding our Building Structures Team with experienced engineering professionals will enable us to increase our presence in this growing marketplace.

"Through the end-to-end design, fabrication, project management and delivery service, we have the capabilities and experience to meet the steel structure requirements across the construction industry."

## NEWS IN BRIEF

**ArcelorMittal** has announced that its TRUSSES+ v 1.1 software is now available at the Appstore for iOS devices. TRUSSES+ software is said to assist with the preliminary design of large span trusses to the Eurocodes. In verification mode it carries out the design checks for the specified bracing, upper and lower chord sections. In optimization mode it estimates the cross-sectional dimensions of the truss elements for a given geometry, loading and arrangement of lateral restraints.

Distribution centre construction specialist **Winvic** has more than doubled its pre-tax profit from £9.6M to £22.8M. The Northampton firm, which was set up in 2001, has grown rapidly in the last two years on surging demand for steel-framed industrial and distribution warehouse construction.

**British Land** has been given the green light by the City of London for its 32-storey tower at 2-3 Finsbury Avenue, which is part of the 1980s built Broadgate re-development. Designed by Arup, the new tower will replace the building that housed Swiss bank UBS' London headquarters until they moved into the recently-completed 5 Broadgate next door.

The UK's **Green Investment Bank** [GIB] has invested £28M in a new energy from waste power plant at Millerhill near Edinburgh. The £142M facility will have the capacity to process up to 155,000t of non-recyclable waste from local residents into 94,000MW of electricity each year.

**ArcelorMittal** has announced a revised version of its Ozone software [Ozone v3.0.1], which calculates the gas temperature in the event of fire according to EN 1991-1-2 and corresponding steel temperature according to EN 1993-1-2.

## AROUND THE PRESS

**Construction News**
***28 October 2016***
**Steel drives Manchester City's ambition**
"The strength-to-weight ratio of steel made it the only choice for the long span roof, formed from steel box section girders 45m long," says BuroHappold Engineering Director Fergus McCormick. "Steel also provided an advantage over concrete for the bowl frame because it could be constructed rapidly."

**Construction News**
***28 October 2016***
**Steel revamps old block**
"Steel framing using composite floors provided a lightweight solution for the upwards extension, and made the project more cost-effective both in terms of a fast programme and avoiding the need for strengthening the existing foundations," explains Roderick Wilson, Engineer at Peter Brett Associates.

**Building Magazine**
***21 October 2016***
**Pooling resources**
[Poplar Baths] – Cathodic protection essentially runs a current through the steelwork, diverting any corrosion to a dedicated sacrificial cell and keeping it away from the structural frame. It is a solution that has been extensively used at other steel-framed heritage sites, most notably on London's Regent Street.

**Building Magazine**
***14 October 2016***
**London Bridge staircase**
The previous public stair that led down from its north eastern corner to the river walkway below was a grim exercise in civic mean-spiritedness. Not so today as bere:architects' elegantly pirouetting new steel staircase transforms the experience into a dramatic vertical catwalk suspended over the Thames.

**Construction News**
***7 October 2016***
**History in the making at the Ordsall Chord**
"Early on, we said that if we're going to succeed here, steelwork will be a big part of that," said Skanska Project Director Keith Gardner.

# Steel raises the roof on M&S car park

Curved steelwork has played an important role in the construction of a car park for one of the largest Marks & Spencer stores in the UK.

Part of the £70M redevelopment of the former Longbridge car plant, the store and car park are situated within a new town centre.

Main steelwork contractor for the project was James Killelea and it subcontracted Barnshaw Section Benders to curve floor beams to ensure they had sufficient precamber to control water run-off.

Barnshaws Commercial Director Greg North said: 'The crucial aspect of this contract was the speed of supply. We have a long-standing relationship with the steelwork contractor and they appreciate our ability to deliver large tonnages of curved steel on time. In this case it was very nearly 500t of universal

beams that required a camber of between 50mm and 100mm."

The camber in each beam was carefully calculated to allow some deflection due to the weight of the roof section while still retaining enough of a curve to prevent any standing water on the car park surface.

The sections ranged from 533 x 210 x 101UB to 533 x 312 x 182UB and each batch of beams was ordered in a specific sequence to suit the construction programme.

In total, 210 universal beams were supplied – all of which were CE marked in line with the requirements of the Construction Products Regulation, which came into force in July 2014.

# Biomass provides Cheshire energy solution

Steel construction is progressing on schedule for a 21.5MW waste wood biomass plant at Ince, near Ellesmere Port in Cheshire.

Contained within a large 43m-high steel braced structure, the £100M biomass plant will harness 'Advanced Gasification Technology' to process up to 170,000t per year of recovered waste wood, enough to power around 40,000 homes per year.

All of the fuel will be sourced from the local economy and a timber processing plant is also being built on a nearby site in order to safeguard supply.

Construction is being undertaken by contractor MBV Energy – a joint venture between global engineering firm MWH Treatment and US-based Black & Veatch – while Finland-based technology firm Outotec Energy Products is the main technology subcontractor.

MBV has in turn engaged Ward & Burke on a design and build contract to undertake the civils works on the site. As well as extensive groundworks this programme also includes the construction of the project's large steel-framed structures; including the main process building and a portal-framed fuel reception building.

EvadX is fabricating, supplying and erecting 1,000t of steel for the project.

# Jaguar expands Castle Bromwich site

Jaguar Land Rover has appointed BAM Construction to deliver a new multi-storey car park on Kingsbury Road in Castle Bromwich, Birmingham.

The 59,000m$^2$ structure will provide 2,764 spaces for staff and production vehicle parking and will replace an existing surface car park.

BAM said the car park will be handed over in multiple phases matching car production requirements in the adjacent facilities.

The scheme will require piled foundations, with Bourne Parking [part of Bourne Construction Engineering] providing the steel frame with concrete planks, pre-cast stair cores and cladding.

# Coatings restore historic airship hangar

Paint supplied by Hempel has been used for the restoration of a historic hangar once used to house airships at RAF Cardington in Bedfordshire.

The structure is one of only three hangars in the UK to have survived from the period up to 1918. It was originally built in 1907 by AJ Mann and Company of Glasgow for the Admiralty.

Since the days of airships the hangar has subsequently had many uses and it is now a National Heritage listed building.

Having been identified as being in need of restoration a major project on the iron and steel-framed structure has been carried out. Many of the original steel members had to be replaced and the entire structure was repainted using Hempel's products.

The specification for both the external and internal steelwork called for oil and grease to be removed by emulsion cleaning, followed by high-pressure fresh water washing.

For the exposed external supporting members, two coats of Hempel's Hempadur 45143, a self-priming, two pack, polyamide cured-epoxy were applied at 75 micron each, followed by a 50 micron glossy topcoat of Hempathane 55210.

# Colour coding introduced to framing solutions

Kingspan Steel Building Solutions has introduced colour-coding to its steel framing systems (SFS) to simplify site installation for contractors.

Available nationwide, the company said the new coding will reduce time on-site and the potential for errors, making costly remediation work less likely.

All studs and tracks are now colour-coded according to their gauge, with the colours matching those used in Kingspan's detailed design drawings.

When Kingspan Infinity software is being used, or if the company's engineers determine that a stud or track needs to be supplied in 2mm gauge steel, the design drawings will confirm the stud or track gauge in red ink. A lintel in 1.8mm gauge will be shown in blue ink.

In turn, the stud or track supplied to site will be inkjet marked with the same colour, enabling it to be quickly identified and installed in the correct location.

Kingspan Steel Building Solutions Business Unit Director Phil Jasper said: "We're committed to continuously improving our products, and ensuring our customers get the full benefit of working with Kingspan. This new coding is a simple but effective way for us to support contractors on-site, and make it easier than ever before for them to use Kingspan Steel Framing Systems."


For further information visit: *http://www.kingspanpanels.co.uk/news/ksbs-colour-coded-tracks-studs/*

# Metal floor and roof deck guidance published

SMD (Structural Metal Decks) has launched its new Technical Guidance Notes that are said to answer numerous frequently asked questions received from clients and engineers over the past 10 years.

The technical document has been extended to answer all common (and not so common) queries raised giving the reader answers in an easy-to-read format.

Where the guidance touches upon subjects where more comprehensive information is available, an extensive reference library containing useful links is provided.

The new guidance is available either in pdf format from *www.smdltd.co.uk* or hard copy upon request. The new publication is said to have almost doubled in size from the less comprehensive offering previously contained at the back of the SMD technical manual.


SMD said the new publication marks the end of a busy year for its marketing team. They have been involved in a rebranding exercise at the beginning of the year and an overhaul of the company website, making the information on new products and services more accessible to the user whether they are using a PC in the office or a smartphone on-site.

To obtain a hard copy version of the guidance contact: *promotions@smdltd.co.uk*

# Diary

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

**Wednsday 30 November 2016**
**Steel and the circular economy - steel reuse and design for deconstruction**
Joint event with SCI and Cambridge University. The Building Centre, London.

**Tuersday 13 December 2016**
**Steel Truss Design**
This 1 hour webinar will cover all aspects of Steel Truss design

**Tuesday 17 January 2017**
**Steel Building Design to EC3**
This course will introduce experienced steel designers to the Eurocode provisions for steel design. London.

**Tuesday 24 January 2017**
**Light Steel Framing**
This 1 hour webinar will cover aspects of light steel framing.

**Tuesday 31 January 2017**
**Straight to the Point in Eurocode Design - half day course**
4 hour course - Hands on member design course. Leicester.


# Family firm invests for growth

Barrett Steel is a leading force among UK steel stockholders, celebrating 150 years of family ownership this year. NSC reports on the company's ambitious, five year, investment-led growth plan.

Bradford based Barrett Steel has grown from a one-man band founded by Henry Barrett into the prominent steel stockholding force it is known as today while proudly maintaining its family owned independence.

Construction is a key market for the company which is split into four broad divisions – General Steels, Engineering Steels, Tubes and International. Construction is served mostly by the largest division, General Steels, where a new operating company called Barrett Constructional Steel has recently been established to focus on larger steelwork contractor clients.

Barrett Steel holds a stock of around 100,000t of steel that can be delivered wherever a customer needs it by the company's own vehicle fleet, providing a just-in-time delivery service across the UK. The great breadth of this stock as well as the company's UK construction focus can be gleaned from its General Steels product brochure, illustrating virtually all of the steel elements needed to create modern structures including heavy structural sections, steel plate, tubular sections, light sections, flats and angles.

Over 65% of steel supplied in the UK comes via a steel stockholder; Barrett Steel is one of the largest of those specialising in the construction sector. Many of the iconic - as well as the smaller structures that we pass each day and seldom notice - might have used Barrett Steel supplied material.

Customers include the steel construction sector household names and Barrett Steel supplied steel is known to have been used on many diverse projects both in the UK and overseas, such as Rushden Lakes and Friars Walk shopping centres.

Stockholders like Barrett Steel are far from being simply the bulk breaking middle men of the past. The company maintains a cutting edge steel processing capability aimed specifically at the constructional steelwork sector thanks to continuous investment in quality and productivity

enhancing computer controlled equipment. State-of-the-art laser cutting machinery sits beside more traditional kit for sawing, shot blasting and priming.

Steelwork contractors value being able to have the routine operations possible on these machines carried out at the stockholders while they focus on design, more intricate fabricating operations and erection on site.

Processing capabilities have been boosted by recent investment in a new FICEP Endeavour three spindle drilling line for the processing of beams and shaped rolled sections with small and large dimensions.

This is leading edge technology that is directly geared to meeting the needs of UK construction customers and the company sees the investment as a significant step forward in beam processing.

Group Managing Director James Barrett said: "The construction sector continues to be extremely important to Barrett Steel and represents a significant portion of heavy section sales.

"We have always been forward thinking in our approach and over the years we have grown our business to support a wide array of market sectors. Construction will remain at the core of our business alongside the development of numerous other sectors.

"We continue to invest in our stock and service offering to ensure that we remain at the forefront of the steel stockholding sector. Our developments into the Scottish and Irish markets in recent years have opened opportunities for us and we are constantly looking to expand either organically or via acquisition."

The Barrett family has always taken a hands on approach to running the company. James Barrett began work with the company in 1973 by slinging steel in the Bradford warehouse. He gained experience in various roles before moving on to work in the accounts, purchasing and sales departments.

He and his fellow family shareholders are firmly committed to the company remaining a family business and being driven by the next generation of the Barrett family. The sixth generation, Tom and Guy, both currently hold roles within the Group.

James Barrett said: "We are proud of how far we have come in the past 150 years. Our success has been thanks to the hard work and dedication of every Barrett employee over the years and all of the customers and suppliers who have partnered with us.

"We look forward to continuing our success and developing further in the future."

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


# Investing for the future

Earlier this year the company secured £80m as part of a funding package to support a five year development plan that includes growing turnover to £300m by 2020 and expanding overseas trading, exactly the sort of manufacturing export strategy that the government is keen to promote to bolster the economy.

The £250 million turnover group now has 44 operating companies, employing 200 people at its Bradford head office,1,030 across the group's operations in the UK as well as overseas in the United States, Middle East and Europe.

The new financing will help it grow sales overseas in markets like Southeast Asia and the Middle East. Barrett Steel already supplies steel to cities like Dubai and Abu Dhabi in the United Arab Emirates.

The investment programme averages £6m per annum and will focus on the latest added value steel processing technology, ongoing replacement of the company's fleet of HGV's, upgrading IT systems and ensuring that staff have the skills needed to deliver on quality and productivity targets and compete against international competition.

Securing that level of funding involved scrutiny from lending institutions, who were happy enough with the company's commercial set up to comment that Barrett Steel had transformed its business in recent years, investing in the latest technology and employee training.

Group Managing Director James Barrett said: "With the new funding in place, we are able to invest in advanced steel processing technology that will drive growth, and focus on maximising commercial opportunities both in the UK and globally to ensure continued progress.

"We are very excited about developing our relationships in overseas markets like Dubai as well as uncovering future prospects for the business over the next few years."

# Full service offer

As well as supplying the full range of general steel products including universal beams, columns, channels, angles and flat products, Barrett Steel also offers full processing facilities including:

- Surface treatment – shot blasting to BS EN ISO 8501-1 SA2½.
- Primer painting using water based weldable holding primer to 25 micron dft (high build to 75 micron available).
- Square and bevel cutting on the full range of structural sections.
- Sawing and drilling using our close coupled saw drill lines with hard stamping facility – coordinates can be received electronically via StruCad or XSteel producing information in DSTV and/or CAM formats, or input from physical drawings.

- Punching and shearing for both flats and angles - ideal for the production of base plates, trusses, connection plates and braces.
- Full profiling facilities including laser plate cutting, plasma plate cutting and oxy-propane flame cutting.
- Laser tube cutting and plasma tube profiling up to 1500mm diameter.

Barrett Steel is CE approved to Execution Class 4.


# Innovations for fabrication

Manufacturers of steel fabrication equipment have invested heavily in research and development to deliver technological advances.

Today's fabrication equipment is easier to use offering increased productivity, closer integration and higher throughput.

Most notable has been the push towards fully automated equipment to reduce reliance on manual operations, improve output and reduce labour.

Manufacturers of steel fabrication equipment work closely with steelwork contractors planning the workshop design and layout with real time simulation to find the best flow of material and maximise production based on required output through the use of advanced simulation software.

Computer Numerically Controlled (CNC) machinery is the standard today and is integrated into each stage of the steel fabrication process. The process may vary between each steelwork contractor but will generally commence with the efficient and seamless transfer of 3D model information from the design office to the equipment in the workshop.

"Prior to CNC and automated advancements, manual methods were limiting, laborious, costly and less accurate. With the introduction of newer fabricating machinery, firms can now produce more with the same size workforce. Increased productivity, accuracy and versatility with lower overhead costs and labour make the investments in technology appealing to any size of fabricator," says Peddinghaus Corporation Marketing Communications Specialist Lindy Casey.

Once the 3D model and the steel are received in the workshop, if the steel hasn't already been shot blasted by the steel stockholder, the first process includes shot blasting for the clean preparation of steel. Manufacturers have refined this equipment to better manage the mix of particles for optimum surface preparation, increase speed and incorporate energy saving measures.

Next comes plate processing, followed by sawing and drilling.

Drilling machines are an essential item for the steel fabrication sector. Advancements have resulted in automated and semi-automated multi-function machines that cut, drill and mark the steelwork. This includes the automated scribing of fabrication layout marks and weld symbol information, and structural steel beam coping (a cut to allow beam-to-beam connection with the top flanges at the same level).

These processes were previously undertaken manually so advancements that allow many processes to be completed on the one machine deliver greater efficiency and speed to the fabrication process. These machines also reduce the number of people involved in the process and the need to handle the steel, which means manual operations such as turning and repositioning steel are reduced supporting increased workshop safety. These machines also reduce the risk of error and the need for re-work on-site.

Another major advance in drilling machines was the introduction of solid carbide drills which allow much faster cutting speeds and greater force. Solid carbide is also more economical as it enables numerous re-sharpening of the bit.

Like all manufacturing sectors, producers of steel fabricating machinery are not standing still, and new time-saving innovations are on their way as FICEP UK Managing Director Mark Jones explains:

"The next innovation is likely to be the full automation of all processes on the factory floor utilising robots or cobots (collaborative robots) where humans and robots work together with direct interaction in a defined workspace to reduce material handling and welding.

"We anticipate there will be a need to have the virtual factory, which could be managed remotely with any number of workshops under control from a single point."

If this prediction comes to fruition the skills of the future for steelwork contractors and stockholders alike will be in the programming, operation, development of solutions and integration with software as there will be fewer processes requiring manual intervention.

***CNC Machinery***

*To maximize the efficiency of CNC machinery it is best to specify: single end cuts, arranged square to the member length, eliminating set up time needed when changing to another angle or cut; one hole diameter on any one piece, which avoids the need for drill bit changes; and alignment of holes on an axis square to the member length, holes in webs and flanges aligned, reducing the need to move the member between drilling operations.*

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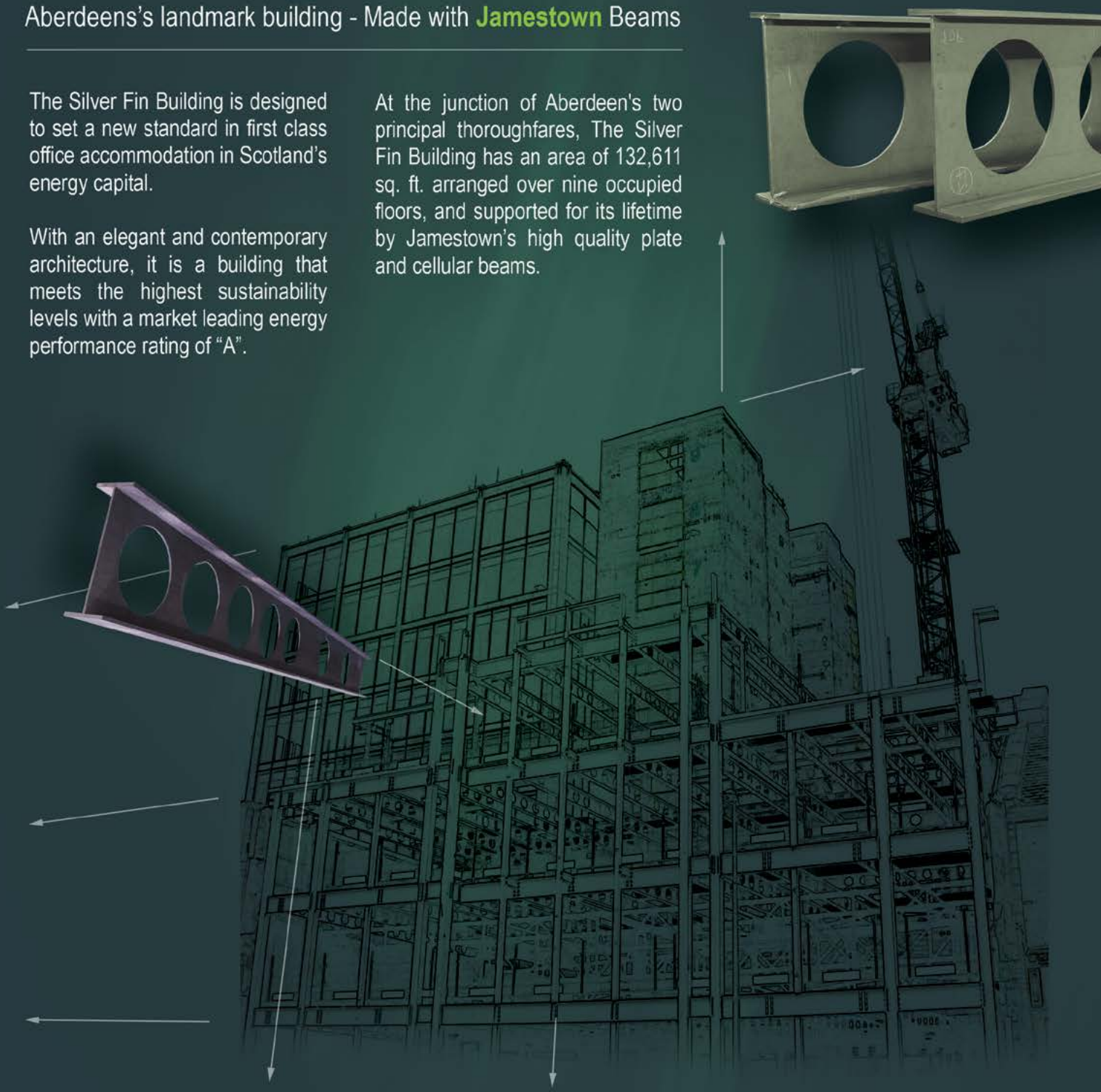

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# Steelmaking's sustainable future

As global supply and demand for raw steel moves into balance, steelmakers focus on a sustainable industry.

The World Steel Association estimates that global steel demand for this year will be up by 0.2% to 1,502 million tonnes. On the supply side, global crude steel production fell by almost 1% in the year to August according to the International Steel Statistics Bureau.

Against this more balanced backdrop, UK steelmakers have reorganised to ensure a sustainable supply of domestically produced steel. Tata Steel sold its Long Products Europe business, including the Scunthorpe steelworks and two mills in Teesside to Greybull Capital in early 2016, relaunching the business as British Steel. Tata Steel also sold its Scottish plate mills to Liberty Steel; production at the Dalzell plate mill recommenced at the end of September.

Over this period the supply of raw steel from both domestic and high quality European sources for the structural market has continued uninterrupted ensuring the steel supply chain remained competitive.

*"High quality European steelmakers including ArcelorMittal Europe continue to contribute to the competitiveness of the UK structural steelwork sector by ensuring a balanced supply of steel from multiple sources and by delivering innovative products to the market. One example is ArcelorMittal's S460 steel that can bring efficient and expressive design to everyday structures," says ArcelorMittal Commercial UK Senior Technical Sales Engineer & Business Development Neil Tilley.*

A study from KPMG showed that there is sufficient capacity in the UK structural steelwork sector to meet current and future demand, including for new infrastructure projects.

The steel industry and government have been working together to support UK steelmaking and maintain a competitive supply of high quality steel to downstream supply chains, including structural steelwork. The British Constructional Steelwork Association has been involved in these activities, including the Steel Council and its working groups.

Arising from this work, government announced a range of measures to support a sustainable supply of steel, including a ruling that Public Procurement Note 16/15 (PPN 16/15) will now be mandatory for all government projects including National Health Service and local authority projects.

The PPN which examines the sustainable sourcing of steel, security of supply, health and safety, and other community benefits among other factors, is already starting to flow through the construction supply chain.

British Steel, Tata Steel and ArcelorMittal Europe – Long Products have all been certified under the BRE Environmental & Sustainability Standard BES 6001. The BES 6001 standard requires manufacturers for the construction industry to demonstrate that their products are made with responsibly sourced materials.

Steel's environmental properties are already well known, and in the built environment, 99% of hot-rolled steel sections can be re-used or recycled at their end of life.

UK and European steelmakers are continuing to focus on improving the efficiency of steel production to drive down costs and further reduce its environmental impact. They are also progressing research and development to create new steel grades with enhanced properties to meet the ever increasing demands of clients.

Advancements in technology have allowed steelmakers to roll heavier and thicker sections in higher grades while maintaining the ductility and weldability required for structural sections. Over the past years there has been a trend to move from S275 to S355 grade steel which has been driven significantly by the increasing needs of sustainable construction to use less material.

Recently, the Ultra-Low Carbon Dioxide Steelmaking (ULCOS) consortium was established to reduce the $CO_2$ emissions from the most efficient steelmaking routes by at least 50%. The consortium which includes all the major EU steelmaking companies has completed phase 1 of its work programme.

With this support, investment and development, steel's future is sustainable.

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# Design first for commercial scheme

Standout architectural features have driven the steel design for an anchor commercial block at Manchester's First Street development. Martin Cooper reports.

**FACT FILE**
**8 First Street, Manchester**
**Main client:** Greater Manchester Property Venture Fund/ Patrizia UK
**Architect:** Fletcher Priest Architects
**Main contractor:** Carillion
**Structural engineer:** Ramboll
**Steelwork contractor:** Elland Steel Structures
**Steel tonnage:** 1,000t

Located alongside Medlock Street, one of Manchester's main routes into the city centre from the south, the First Street Development will ultimately provide commercial, residential and cultural facilities all built on the remediated former Gaythorn Gas Works site.

A number of these facilities have already been completed on the scheme, including a cultural centre, hotel, 700-space car park as well as retail and student accommodation blocks.

With much more to come, the 8 First Street commercial building is seen as the anchor office development, completing the northern zone of the development, while enhancing a new public realm and extending interest along the scheme's main pedestrian route [First Street].

The building will provide 14,600m² of Grade A office accommodation within a seven-storey building that will also include 1,300m² of retail space at ground floor level.

Structurally the building is a steel frame, formed around a central braced stability core. Perimeter columns are at 6m centres, while minimal internal columns create the clear spans of 12m and 13m that agents and tenants nowadays demand.

The scheme comprises clear span Westok secondary and primary cellular beams, acting compositely with the metal deck and in-situ concrete slab.

"The Westoks were pre-cambered to take out the wet concrete deflection of the floor plate," says Kloeckner Westok's Design Team Leader John Callanan.

"Clear span Westoks, pre-cambered at no-cost, hit the mark in terms of economic design."

The cellular secondary beams, and heavier primary 'spine' beams, with 450mm diameter cells at 650mm centres, have been coordinated closely with the M&E installation to provide maximum servicing flexibility, while minimising floor construction depth and overall building height.

A braced stability core located centrally within the building footprint, acting in conjunction with just two additional braced bays to either gable end, removed the need for a movement joint in the almost 100m-long building. Importantly this also provided the aesthetic benefit of not requiring diagonal bracing in the main external elevations.

Commenting on the design, Ramboll Technical Director Gary Willis says: "The project was always likely to be a steel-framed building, although having looked at many alternative options early in the design stage, we were able to confirm that steel was the way to go."

"Once a steel frame was chosen as the most efficient construction method, the building's design quickly evolved around the requirements of the cladding system."

As 8 First Street occupies a prominent position and will be seen by thousands of motorists every day, the landmark building has a striking elevational treatment, with two-storey high 'punched' windows

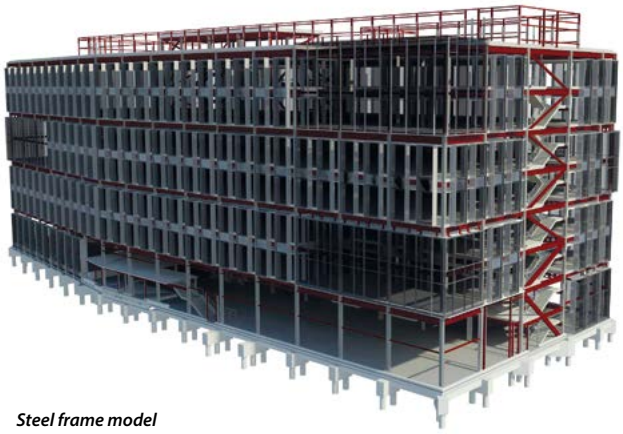
## What's in a name?

Where did the name "First Street" come from? Over many years, the First Street area had been known by a number of different names so in 2008 the developer embarked on a rebranding exercise necessary in order to enhance the area's reputation.

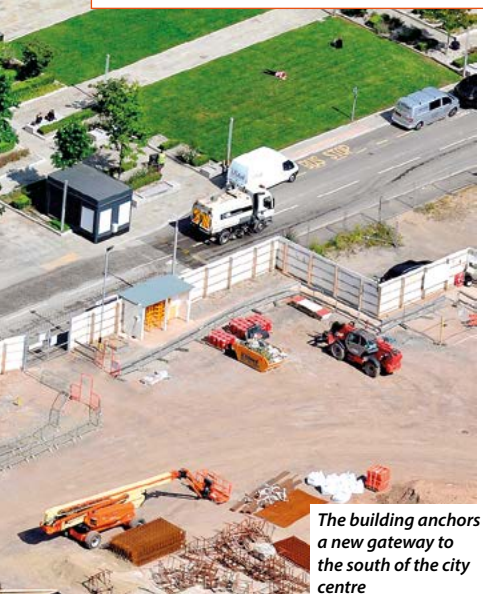
Consequently the name First Street was decided upon, as it had been more than 20 years since a new street on this scale has been created in Manchester city centre.

Although the name reflects the key feature of the scheme's public realm – the new 300m long × 18m wide tree-lined street – the vision was to extend that name to the wider neighbourhood.

First Street now anchors the extended area, helping to deliver a neighbourhood of choice within this key gateway location at the southern edge of Manchester city centre.



*Steel frame model*



*The building anchors a new gateway to the south of the city centre*

*Some winter gardens overlook the tree-lined pedestrian thoroughfare*

projecting forward from a contemporary architectural mesh that also wraps into the entrance lobby and other key internal spaces.

Assessment of a range of grid spacings confirmed that the modest 6m perimeter column spacing, typically accommodating a pair of the two-storey high windows, minimised the challenge of edge beam deflection versus allowable movement in the more affordable cladding solutions.

"It also gave us a competitive kg/m² steelwork floorplate weight, with a viable total piece-count," adds Mr Willis.

The 'punched' windows will be installed as pre-assembled 7m × 1,800mm bespoke cassettes, not only containing the glazing but also the surrounding composite return panels and flashings.

The prefabricated cassettes are formed on hot-rolled secondary steel frames, secured to the concrete floor slab via cast-in channels, which provide a large degree of adjustment to deal with normal construction tolerances.

A key architectural feature, that will set this office block apart from others, is a series of six internal winter gardens. These two-storey high glazed naturally ventilated spaces are placed in a staggered formation, around the building perimeter, two per floor on levels 1, 3 and 5.

With a range of planting and seating, they will provide break-out space for the building's occupants.

In order to accommodate the winter gardens, the floor plates, at levels 2, 4 and 6, have been cut-back, with access to these break-out areas provided at each lower level.

The building's large clear spans are maintained above and below the two-storey winter gardens, and so the cut-back floors and internal cladding lines are supported by being hung from the full floors above, as well as being supported by the full floor below.

Floor-to-ceiling heights throughout the building, with the exception of the gardens, are set at 3.9m, however the ground floor is a double-height zone at 6.9m high.

As well as accommodating the main entrance lobby, this level also houses mezzanine floors for the retail units and back-of-house bicycle storage.

Founded on piled foundations, steelwork contractor Elland Steel Structures began its erection programme in May. Using the site's two tower cranes for the majority of the lifting, the steelwork was completed during September.

"Logistics have been a key factor on this job," sums up Carillion Project Manager Paul Holt. "Although we have seven gates to feed the job with materials, it is an island site and as the building occupies most of the footprint there is little room for storage.

"Luckily we have space on an adjacent site, where our site cabins are located and where the next phases of the First Street development will be taking place."

8 First Street is scheduled for completion in September 2017.

*The 7.5m-deep eastern cantilever is framed by a Vierendeel truss*

# Steel creates office landmark

Featuring three cantilevering façades, No.1 Spinningfields will be Manchester's third tallest office building and the last structure to be built in the city's new business district. Martin Cooper reports.

**FACT FILE**
**No. 1 Spinningfields, Manchester**
**Main client:** Allied London Properties
**Delivery architect:** Axis Architects
**Main contractor:** BAM Construction
**Structural engineer:** RoC Consulting
**Steelwork contractor:** William Hare
**Steel tonnage:** 3,500t

Forming the final element of the Spinningfields masterplan, a grandiose scheme that has created a new business district in central Manchester, No. 1 Spinningfields will deliver 32,000m² of Grade A office accommodation providing high quality space to a range of occupiers.

What is more, topping out at 20-storeys high the building will not only be one of the highest structures in Manchester, it will claim the accolade for the city's tallest office block built in the last 50 years.

The project will also act as an anchor to the Spinningfields development and as such a standout design will be achieved via three cantilevering façades and a fully-glazed exterior.

Located on an island site surrounded by roads on three sides and a pedestrianised zone on the fourth, the cantilevers act as highly visible architectural features on what would otherwise be a standard cityscape.

Work on the project began in July 2015 and early works included deepening the basement left over from the previous building from one to two levels.

The lowest basement level [level -2] is formed with concrete and the main steel frame of the building kicks-off from basement level -1.

Although the project is structurally one large building it is a steel-framed structure with two distinct parts. Each with their own concrete core, one section extends up to the full 20-storey height, while the western portion of the building tops out at nine-storeys.

At ground floor level these two parts are separated by a pedestrian walkway that cuts through the building creating a shortcut between Quay Street on the south and Hardman Square to the north.

"Steel was chosen for its ease of construction and for its long span qualities," explains BAM Construction Design Manager Chris Edwards.

The office floorplates which extend upwards from first floor level are erected around a large grid pattern offering spans of up to 12m. The large open floorplates, so desired by today's commercial tenants, are largest on the levels up to seven, where the two portions of the structure form one large open-plan area.

The lower 2,300m² floorplates, from levels 1 to 7, are said to respond to large format

businesses, with the upper 930m² floorplates providing accommodation to attract smaller firms.

"To increase the available usable office space within the building both of the cores are offset along the southern elevation, instead of in a traditional position in the structure's middle," says RoC Consulting Design Director Jon Smith.

Steelwork contractor William Hare has used Fabsec cellular beams throughout the building for service integration within the structural void.

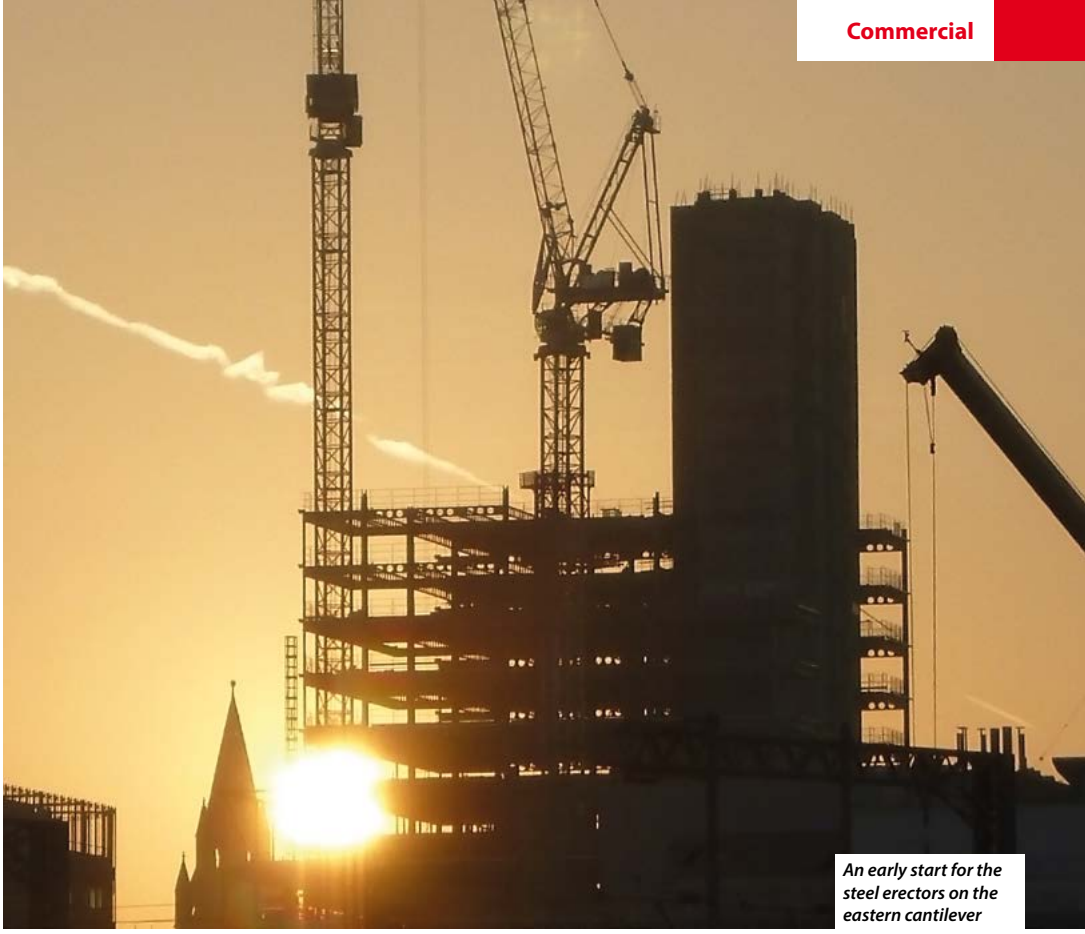
The most complex part of the structure's steel frame is the eastern cantilever which, as well as creating an architectural highlight for the building, also creates a canopy over the main entrance.

The deepest of the building's cantilevers, this feature element is 7.5m-deep and extends from level 1 up to the underside of level 7, thereby incorporating six floors.

A large six-storey Vierendeel truss positioned along the cantilevers façade forms and supports this feature element. The outer corners of the truss are supported by two V-shaped nodes, each weighting 19t, that not only connect with the first floor beams and the truss, but also a feature vertical CHS column that frames the elevation.

"However, the cantilever is so deep that extra supports are required in the form of two plane trusses positioned at level 1 and the underside of level 7, that support the Vierendeel and are braced back to the main tower's core," says Mr Smith.

This forms a kind of structural sandwich with the six floors of the cantilever positioned between the trusses.



*An early start for the steel erectors on the eastern cantilever*

Some of the project's heaviest pieces of steelwork are located in the area between the eastern cantilever and the main core. Because of the long spans and the extra loadings generated by the cantilever and its associated trusses, many of the columns are large bespoke fabricated plate girders.

Carrying the extra loadings from this area are eight steel columns that go all the way down to the lowest level and are founded directly onto pile caps.

The other two cantilevers in comparison are quite ordinary as they are formed by beams and columns connected to the main steel frame. At 3.5m deep, the western cantilever extends from level 3 up to level 7, the highest point on this side of the building.

Meanwhile the north cantilever, which is 4.5m-deep, starts at the level three and extends all the way up the highest part of the building to level 20.

The tower's two uppermost floors, level 19 and level 20, will house a rooftop restaurant and a plant area respectively.

No.1 Spinningfields is scheduled to be complete by mid-2017.

*The building completes the Spinningfields materplan*

# Lakeside centre shops for steel

## Steel-framed buildings have taken centre stage at the Rushden Lakes retail and leisure complex.


*How the retail offering will look*

Shopping and nature may not necessarily go hand in hand, but a new development in Northamptonshire could change this perception, as it will offer retail outlets and leisure facilities situated on the banks of a lake set within a Site of Special Scientific Interest (SSSI).

Known as Rushden Lakes the scheme is centred around a series of man-made and natural lakes in the Nene Valley. Located on the busy A45 and it has been estimated that 600,000 people live within a 30-minute drive.

Getting people to come will not be a problem as there will be plenty to occupy visitors including 30 retail outlets, a visitor centre and lakeside restaurants, while a boathouse will provide aquatic craft for hire.

The adjacent SSSI will be integrated into the scheme with footpaths and cycle ways even extending to neighbouring tourist attractions.

Crown Estate Regional Portfolio Manager Hannah Milne says: "Rushden

One of the lakeside restaurants under construction

# The Boardwalk

Aside from the scheme's retail offering, Rushden Lakes' main attraction will be the waterfront. A steel-framed boardwalk structure wraps around a section of the lake, supporting timber decking and a timber-framed boathouse and a visitor centre.

Forming the boardwalk's curve around the lake's edge are a series of curved box sections (pictured below). The entire structure is supported on a series of 1.5m-high columns, which are arranged in an 8m x 8m grid pattern.

Where the boardwalk supports the heavier boathouse and visitor centre, the steel structure has been stiffened with additional deeper beams to support a concrete slab.

Caunton Engineering have also erected three steel-framed single storey restaurant blocks that overlook the lake and sit adjacent to the boardwalk structure.

Lakes will be the first in a new generation of shopping parks, setting an entirely new standard for the retail and leisure experience offered by assets of this type.

"We will see occupiers coming to Rushden Lakes that have never traded out of town before, demonstrating the quality of the scheme."

The retail outlets are all accommodated within three large steel-framed structures, known as Terrace A, B and C. The latter two buildings house the project's three anchor stores, House of Fraser (HoF) in C and Marks & Spencer, and Primark in B.

Terrace C is the longest of the retail buildings at 196m with the two-storey HoF store accounting for approximately one-third of the structure. This block is a portal-framed building with steel columns – typically 305UC sections – spaced at 7m centres and supporting rafters that create two 26m-wide spans with the aid of one line of internal valley columns.

Overlooking the scheme's lake, the eastern end of the Terrace C (the part housing HoF) features a bull-nose rounded elevation. Steelwork has been facetted around a 66m radius to form this architectural feature.

Attached to the HoF part of the building the portal-framed structure narrows down to a width of 37m (with two 18.5m-wide spans) to accommodate five more smaller retail units.

Opposite C and on the other side of a large surface car park Terrace building A and B sit end-to-end pointing towards the scheme's lakeside.

Terrace B is a 144m-long column and beam constructed building, gaining its stability from roof level bracing working in conjunction with the concrete floor that acts as a diaphragm.

One end of the building, measuring 51m wide, accommodates a two-storey M&S store, where steelwork is based around a 9m × 9m grid pattern.

Adjoining this store the building narrows to 31m and houses a single storey Boots store, while beyond this the structure then widens again to 38m to house a two-storey Primark and then decreases slightly in width once more for the final three smaller single storey retail units.

The Primark store has a similar grid pattern to M&S, while the smaller units have generous grid patterns of 8m × 15m and 9m × 18m.

Finally Terrace A is slightly longer measuring 157m, and this portal-framed structure will house 21 individual retail units. Each outlet will be accommodated within one of the structure's 7.5m wide bays.

Typically this structure offers 31m-wide clear internal spans with the exception of one end of the building that widens to 37m and a small recess area that offers 26m wide spans.

"For flexibility this building has been erected as an entirely single storey structure, but it has been designed to accept mezzanine levels should tenants wish to add them," explains Caunton Engineering Design Director Robert Weeden.

All of the retail Terrace structures may

▶22

**FACT FILE**
**Rushden Lakes, Northamptonshire**
**Main client:** Crown Estate
**Architect:** HPW Architecture
**Main contractor:** Winvic Construction
**Structural engineer:** BE Design
**Steelwork contractor:** Caunton Engineering
**Steel tonnage:** 2,000t

*Shops are accommodated in three long steel-framed structures*

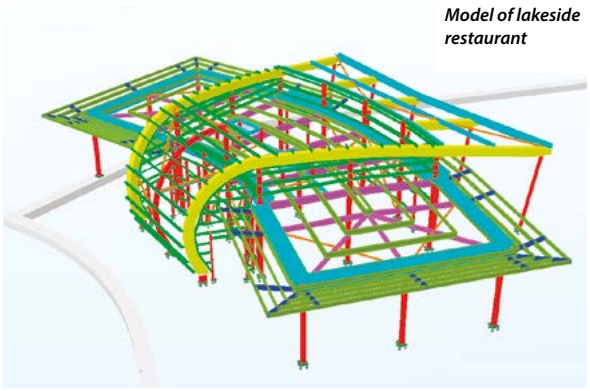
▶21 be slightly different but they do share one architectural detail and that is a 4.5m wide canopy that extends along each of the building's main elevations.

These independent structures will be erected after the main steelwork and cladding programmes have been completed. Stubs attached to columns and protruding through the cladding accept the canopy structures, which are also supported by a series of columns.

The columns are predominantly 9m-high Circular Hollow Sections (CHS) where the buildings are two-storey high, and decreasing to 7m-high sections for the single storey elements.

Caunton Engineering, who have been contracted on a design and build package for the terrace, boardwalk and restaurant steelwork, is due to complete on-site work this month (November) and the first retail outlets will be open early in the Spring.

Future plans at Rushden Lakes include two further phases, consisting of a steel-framed cinema complex and more retail units.



*Model of lakeside restaurant*

David Brown of the SCI discusses

## Alternative framing arrangements

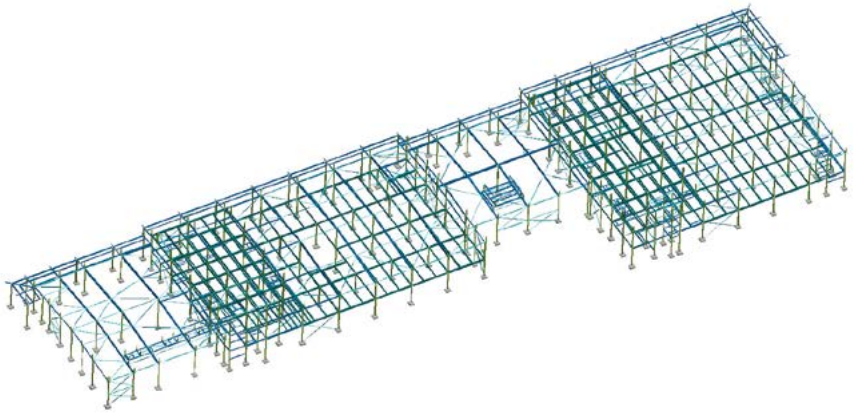
The three terraces at Rushden Lakes demonstrate alternative framing solutions, with two terraces of portal frames and one which is a fully braced box, with simply supported rafters. Portal frames are rightly considered to be a very structurally efficient way of enclosing volumes – frames are lightweight, stable in-plane and only require bracing in the out-of-plane direction.

Despite their apparent simplicity, portal frames are relatively complicated structurally – their flexibility means that second-order effects are generally important and the potential for reversing bending moments mean that the restraints to the compression flange must be carefully considered. Comprehensive guidance is provided in P399.

For maximum efficiency, frame design will be completed using software specifically developed for portal frames.

The moment resisting connections at the eaves and apex can also be complex, so the use of software to design these connections is highly recommended. Although portal frame structures are often designed by the Steelwork Contractor (as was the case at Rushden Lakes) engineers often need preliminary sizes and the look-up tables given in P399 for S355 steel can be very helpful.

Designers should note that the preliminary sizes given in the earlier publication P252 are for S275 steel, which is no longer readily available in the UK.



Terrace B is a fully braced box, which is a useful reminder that other forms of steel construction can be an economic alternative to a portal frame. Terrace B includes extensive mezzanines, roof-mounted plant and a number of different spans, so the solution adopted was to provide plan bracing at the roof level and vertical bracing around the six commercial units that form the terrace. Rafters are simply supported beams. A fully braced box is a simple solution, amenable to manual design.

The connections are nominally pinned, as found in the "Green Book" series of publications. The compact connections can be an advantage if space is limited and does not allow haunched moment-resisting joints.

The disadvantage of simply supported members is the increase in structural depth as the spans lengthen, but this can be managed by the use of fabricated members. Within Terrace B, ordinary rolled sections were used because the building layout allowed the use of intermediate columns, reducing the span of the beams.

Second-order effects must still be assessed even in a braced box, though the calculation is simpler than the process for a portal frame. P365 demonstrates how to assess frame stability for a braced frame.

celebrating

# excellence in steel

## Call for entries for the 2017 Structural Steel Design Awards

The British Constructional Steelwork Association and Steel for Life have pleasure in inviting entries for the 2017 Structural Steel Design Awards.

The Awards celebrate the excellence of the United Kingdom and the Republic of Ireland in the field of steel construction, particularly demonstrating its potential in terms of efficiency, cost-effectiveness, aesthetics and innovation.

The Awards are open to steel-based structures situated in the United Kingdom or overseas that have been built by UK or Irish steelwork contractors. They must have been completed and be ready for occupation or use during the calendar years 2015-2016; previous entries are not eligible.

**To find out more and request an entry form visit www.steelconstruction.org/resources/design-awards or call Gillian Mitchell of BCSA on 020 7747 8121**

**Closing date for entries:**
**Friday 24th February 2017**

BCSA

STEEL for life

# Accommodating steel frames

Three accommodation blocks in Newcastle are being built to a tight programme in order to satisfy the city's increasing demand for student flats.

**FACT FILE**
**Student Accommodation, Newcastle-upon-Tyne**
**Main Client:** BAM Connislow JV
**Architect:** Xsite Architecture
**Main contractor:** BAM Construction
**Structural engineer:** 3E Consulting Engineers
**Steelwork contractor:** Harry Marsh [Engineers]
**Steel tonnage:** 500t

Steel construction has proven to be the most efficient solution for three student accommodation blocks being built on a tight and confined Newcastle site with little room for materials storage.

"This is a very constrained site, with roads and existing buildings surrounding us," explains BAM Site Manager Ian Teasdale. "As every part of the project's footprint is being built on we had to bring steelwork to site in scheduled deliveries with manageable loads that were sometimes erected straight off the delivery truck."

Below ground one of Newcastle's main sewers crosses the site and this important pipeline had to be bridged by 12m-long ground beams supported on piles positioned either side of the sewer. In order not to overload these foundations, and potentially damage the sewer, it was important the lightest framing solution available was used.

"Steel ticked all of the boxes because of its ease and speed of construction, and importantly as it is lighter than alternative concrete framing solutions," adds 3E Consulting Engineers' Steve Watson.

Being developed by a BAM Connislow joint venture, a developer set up to specialise in student accommodation, the project will help to alleviate the city's need for more and better located student living space.

Located to the east of Newcastle city centre the development is approximately 500m from Northumbria University's City Campus East, and only a 15-minute walk from the Newcastle University Campus.

The scheme, which has been designed by Xsite Architecture, is set out over three blocks that rise to seven, six and five storeys respectively. Structurally independent, all of the buildings are formed into a close configuration, filling-up the site with only the narrowest of gaps between them.

Inside of the blocks, the accommodation will be a mixture of en-suite bedrooms with shared kitchens, and self-contained studio flats with their own cooking facilities, offering a total of 409 beds.

The five-storey block C will exclusively contain the larger studio facilities, while the six-storey block B and the seven-storey block A will have the slightly smaller en-suite facilities with shared kitchens positioned on every floor at the corridor ends. Both of these two buildings will however each contain five of the larger studio rooms on each floor.

The North East division of BAM Construction started work on the £18.4M development in January and it is scheduled to complete the work next summer in time for the 2017/18 academic year.

Early works for BAM included the demolition of three industrial units that previously occupied the site before it could begin the groundworks programme. The steel frames are founded on piled foundations, and 40 of the piles had to be installed close to the major sewer that runs across the site.

"It was vital that we didn't hit or damage the sewer during the piling works and to

Steelwork progressed quickly on the confined site

Visualisation of one of the completed blocks

satisfy the authorities we had to install an underground camera during the installation of the 40 integral piles," says Mr Teasdale.

The site previously sloped and in order to flatten the terrain one end of the site was dug out and a retaining wall installed. Block A is positioned at this end of the site and this structure is consequently the only building to incorporate a partially subterranean lower ground level.

Steelwork contractor Harry Marsh [Engineers] was able to begin the erection programme in May and the entire steel package, including the installation of precast cores, was completed in 13 weeks.

Speed of construction was an important criteria and in order to help keep the project on schedule the three steel frames were erected to full height using 20m-long columns.

The frames are all stabilised with cross bracing, positioned in partition walls, around stairwells and close to the precast lift cores. The bracing meant that once a few bays were erected the structure was immediately stable and this allowed Harry Marsh to hand over each building to the follow-on trades when only half the frame was erected.

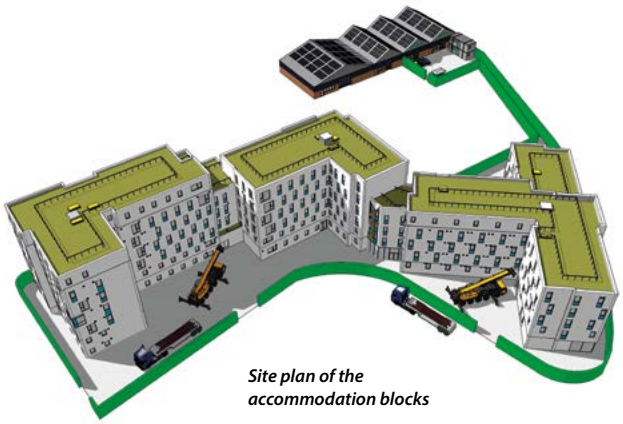
This helped the programme maintain its speed of construction as it allowed the metal decking and the concrete flooring to be installed more quickly.

"Logistics and interaction between the different trades are key to this job. There is little or no room on site and many trades working in sequence on the three buildings," says Mr Teasdale.

"The steel erection programme was tight due to these space constraints, while the cranes had to carefully work into the corners and edges of the site."

All of the three braced frames are built around perimeter column spacings of 5m, with internal spans for the accommodation up to 5.2m long. Each of the blocks has 2m wide centrally positioned corridors separating the accommodation wings.

Summing up Dougie Peters, Managing Director, BAM Properties says, "The BAM Connislow JV is delighted to be working on our second student accommodation project. We intend to develop more schemes in locations where there is high demand from students. Our advantage is that we can draw on the development, design, construction and facilities management expertise in BAM as well as the specialist funding expertise of Connislow to develop effective schemes that will be attractive to students."



Site plan of the accommodation blocks

# Boxed up

*Shipping containers are used as eating and drinking outlets*

Topped with a steel-framed roof structure, an innovative eating and drinking venue has recently opened in Croydon as part of a large-scale redevelopment scheme.

**FACT FILE**
Boxpark Croydon
**Main client:** Boxpark Croydon
**Architect:** BDP
**Main contractor:** Randall Developments
**Structural engineer:** BDP
**Steelwork contractor:** TSI Structures
**Steel tonnage:** 172t

Ninety-six shipping containers have found a new use in central Croydon as a new eating and drinking venue. Known as Boxpark, the steel containers are stacked two-high to form ground and first floor levels for outlets, while a central covered courtyard for seating and events is spanned by a steel-framed canopy to ensure the venue is a year-round and all-weather attraction.

Following on from the successful launch of the first Boxpark in Shoreditch, east London, this latest venue forms part of the Ruskin Square development that is set to transform a large area of Croydon.

Commenting on the scheme that offers 42 restaurants and bars, Boxpark's founder and CEO Roger Wade says: "Croydon is one of the last London boroughs to be developed. Stratford, White City and Nine Elms have all seen recent new developments. I want everyone to re-think their view of Croydon. It's the home of Kate Moss, Tracey Emin and now Boxpark!"

The new Boxpark has direct pedestrian access to the adjacent East Croydon station, as well as a footpath that will link into the new Ruskin Square commercial development.

The proximity of the station meant the project team had to ensure the cranes did not overslew the railway lines at any time and in order to avoid this and make the erection sequence as easy as possible, the containers and the project's steel roof

nearest to the station were installed first. The project team then worked its way out of the site in a southerly and sequential manner towards Dingwall Road, where the site entrance is located.

Although the containers and the steel-framed roof are independent structures, both had to be installed simultaneously by steelwork contractor TSI, as erecting them individually would have been problematical, especially as the site is very tight and confined.

"The containers were brought to site in batches of nine and these were then lifted into position by TSI who then erected an adjacent portion of roof," explains Randall Developments Project Manager Steve McNamara.

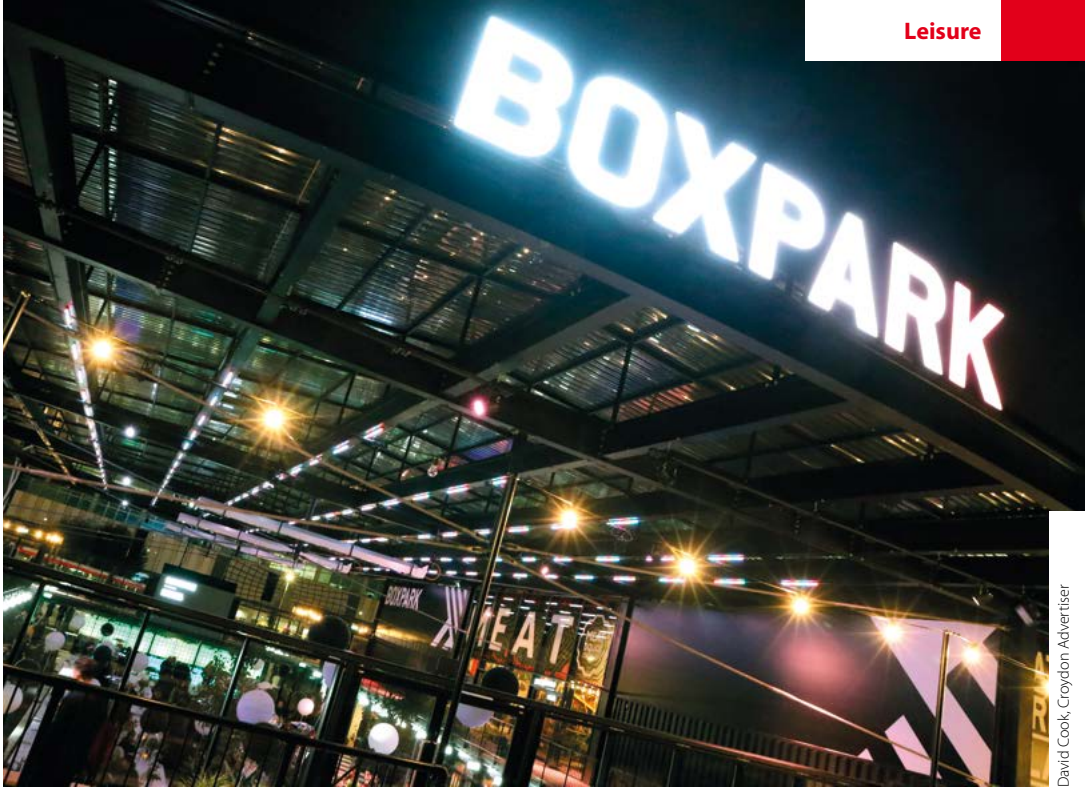
Prior to being delivered to site the 2.4m wide x 6m-long containers were all modified offsite in readiness for their installation. This work involved cutting out entrances and side doors into some units to allow two or three containers to be joined together on-site to form larger outlets.

For the container installation TSI had to design a bespoke lifting frame as company Draughtsman David Williams explains: "Because of the modification work the containers had lost some of their rigidity and lifting them conventionally with a crane would have damaged them."

Early site works included Randall Developments installing piles for the steel roof support columns and laying timber sleepers for the ground floor containers to sit on.

The containers are arranged into two main banks separated by a wide-open courtyard, while a third row of containers fills in the back elevation adjacent to the station.

An independent steel roof structure covers the containers




David Cook, Croydon Advertiser


Boxpark Croydon officially opened at the end of October

David Cook, Croydon Advertiser

The upper level containers are generally positioned at 90 degrees to the lower units thereby creating room for a wrap-around first floor level circulation route.

As the upper containers are not stacked in a conventional manner as they would be on a ship or quayside, stiffening posts to absorb the unusual loads were added to the ground level units during the modification process.

As the south elevation has no containers and is effectively the main entrance, a steel-framed footbridge spans this area at first floor level.

In order to cover all three of the outdoor seating areas, the steel-framed roof canopy structure is cruciform-shaped, with the central zone spanning the courtyard and the two wings covering the upper seating zones.

"There are 12 primary steel columns for the roof," explains Mr Williams. "These support a series of primary beams and secondary posts on to which there are purlins that form the gentle pitch of the roof structure. It is clad with polycarbonate which allows natural light to penetrate the areas below."

"The roof structure, which measures approximately 20m x 20m, has been designed as a sway frame to ensure rigidity, while a series of Macalloy cross bracings located between the primary columns adds some extra lateral stability," says BDP Civil and Structural Engineer Director Jonathan Pye.

As well as having a link into the railway station and the Ruskin Square scheme, Boxpark also has two main street level entrances, the main Dingwall Street entrance and another on George Street.

Both of the entrances are adorned with curved beams forming a canopy. While along Dingwall Road the main entrance features steel staircases leading to the first floor and two further outdoor eating zones that are outside of the roof's span.

Mr McNamara says Boxpark may only have a six-year lifespan, after which it will be dismantled to make way for the final commercial building in the Ruskin Square development.

"In the meantime Boxpark will provide the area with a focus and a destination while all around the regeneration programme in central Croydon progresses."

In summary a Boxpark statement says: "Forty one of London's most exciting and vibrant operators will combine to deliver an endless range of foodie options, including grab-and-go artisan coffees, juices and wraps alongside grab-and-stay tapas, pizzas plus many more."

# Use of EN 1993-1-5 section 4 and 10 for biaxial stress

Chris Hendy, head of Bridge Design and Technology at Atkins and Chairman of SCI's Steel Bridge Group discusses the background to a proposed change to the rules for the design of plates subject to biaxial compression according to BS EN 1993-1-5. This article was written before the recent issue of a relevant draft for public comment (16/30340641 DC. BS EN 1993-1-5 AMD1).

## 1. Introduction

Generally, section 10 of EN 1993-1-5 will not be required in design and the effective width method of section 4 of EN 1993-1-5 will be used in preference. However, where the geometrical conditions for the use of the effective width method are not met or where the combination of stresses (e.g. biaxial stress) are not covered by section 4, it may be necessary to use section 10. This latter case can arise, for example, in box girder bridges at transverse support diaphragms where there is local load introduction, such as at intermediate piers or stay cable supports. In such cases, it is also possible to adapt the rules of section 4 to include biaxial effects, but EN 1993-1-5 currently gives no rules for this situation.

The choice of design method leads to two important observations that designers should be aware of as follows:

(i) Section 10 takes no account of the beneficial shedding of load from overstressed panels and stiffeners so is mostly conservative by comparison with section 4, although not always (see ii). The choice of method can therefore have a large impact on steel tonnage. A particular difficulty occurs when the majority of the length of bridge sees uniaxial direct stress but local zones of flange (e.g. adjacent to diaphragms) see biaxial direct stress. This leads to different designers taking different approaches which are essentially: (a) use section 4 throughout, without corrections for biaxial stress locations; (b) use section 4 throughout, making corrections for biaxial stress locations; (c) use section 4 generally and section 10 for biaxial stress locations; (d) use section 10 throughout. Reference 1 provides some guidance on the comparison of the methods.

At this stage, this note merely draws attention to the fact that method (a) is not conservative, method (b) is appropriate provided that suitable assumptions for the interaction are made and methods (c) and (d) are likely to lead to ever increasing quantities.

Method (b) could be informed by ECCS publication 44, section 2.625 for example, which recommends an interaction of the utilisations of the two direct stress such that the square root sum of the squares of the utilisations is less than unity. It was not however written with the express intent of then using EN 1993-1-5 for the further interaction of this combined utilisation with shear in section 7. Alternatively, the affected element could be checked for biaxial stress using section 10 to subsequently determine a reduction factor for that element for subsequent use in section 4 and 7. Detailing such calculation methods are outside the scope of the note.

(ii) EN1993-1-5 section 10 is typically more conservative than section 4, but ***is unconservative for cases of biaxial compression and should not be used for such cases in its current format.*** The sections below identify the problem and propose an interim modification until EN 1993-1-5 is itself modified.

## 2. Biaxial compression – the problem in EN 1993-1-5 section 10

Depending on plate slenderness, the behaviour under biaxial compression varies as follows:

(i) Where there is no tendency for buckling (stocky plates), the behaviour is accurately predicted by the Von Mises yield criterion:

$$\left(\frac{\sigma_{x,Ed}}{f_y/\gamma_{M1}}\right)^2+\left(\frac{\sigma_{z,Ed}}{f_y/\gamma_{M1}}\right)^2-\frac{\sigma_{x,Ed}}{f_y/\gamma_{M1}}\frac{\sigma_{z,Ed}}{f_y/\gamma_{M1}}+3\left(\frac{\tau_{Ed}}{f_y/\gamma_{M1}}\right)^2\le 1.0$$

In essence the presence of biaxial stress provides confinement which means that the allowable compressive stress in one direction may be increased by applying compressive stress in the other. Stresses in excess of yield can be reached.

(ii) For very high slenderness, the interaction between compressive stresses is essentially that for elastic buckling and is linear. The material strength itself is not relevant.

(iii) For intermediate slenderness, the behaviour is intermediate to the above and has to be determined by non-linear theory.

These three cases of interaction are shown in Figure 1 over the page.

EN 1993-1-5 chooses to use a form of the Von Mises equivalent stress criterion for verifying plates under in-plane stress fields, whether stocky or slender, via (10.5):

$$\left(\frac{\sigma_{x,Ed}}{\rho_x f_y/\gamma_{M1}}\right)^2+\left(\frac{\sigma_{z,Ed}}{\rho_z f_y/\gamma_{M1}}\right)^2-\frac{\sigma_{x,Ed}}{\rho_x f_y/\gamma_{M1}}\frac{\sigma_{z,Ed}}{\rho_z f_y/\gamma_{M1}}+3\left(\frac{\tau_{Ed}}{\chi_w f_y/\gamma_{M1}}\right)^2\le 1.0$$

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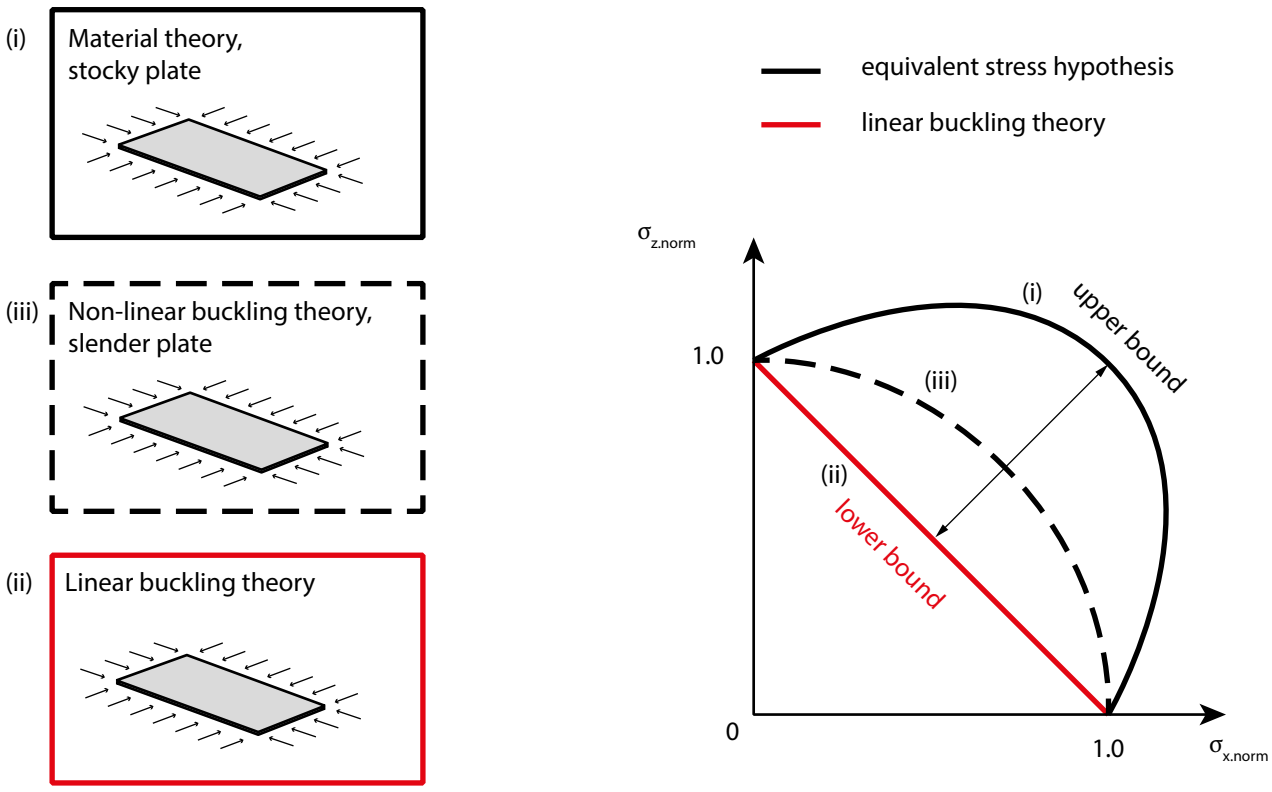


*Figure 1: Different types of interaction for biaxial compression*

The reduction factors $\rho_x$ and $\rho_z$ are introduced to allow for buckling. Their inclusion in all denominators means that the interaction between stresses is always convex, whilst at high slenderness it is known that the interaction should be almost linear as mentioned above. In simple terms, by applying the reduction factors $\rho_x$ and $\rho_z$ to the negative term (when both direct stresses are positive and compressive), this beneficial term becomes large and too much benefit is taken from it.

The results of EN 1993-1-5 (10.5) are shown for a square plate in biaxial compression with varying slenderness (*b/t* ratio) in Figure 2 and compared with the results of the German DIN 18800-3 code. It can be seen that at high slenderness, *b/t*=100, the EN 1993-1-5 prediction is still very convex, while the DIN code has a linear interaction. From non-linear studies it is known that EN 1993-1-5 is unsafe in this case and DIN 18800-3 is conservative. It is evident some correction is needed to the rules of EN 1993-1-5 for biaxial compression at high slenderness.

### 3. Biaxial compression – the interim correction to EN 1993-1-5 section 10

The following amendments should be made to EN 1993-1-5 section 10 until such time as the standard is itself modified. The amendments reduce the benefit of the negative term in expression (10.5) by eliminating the reduction factor terms in its denominator when both direct stresses are compressive. For this reason, the method of clause 10(5)a) should not then be used because the reduction factor is always automatically applied to all the stresses.

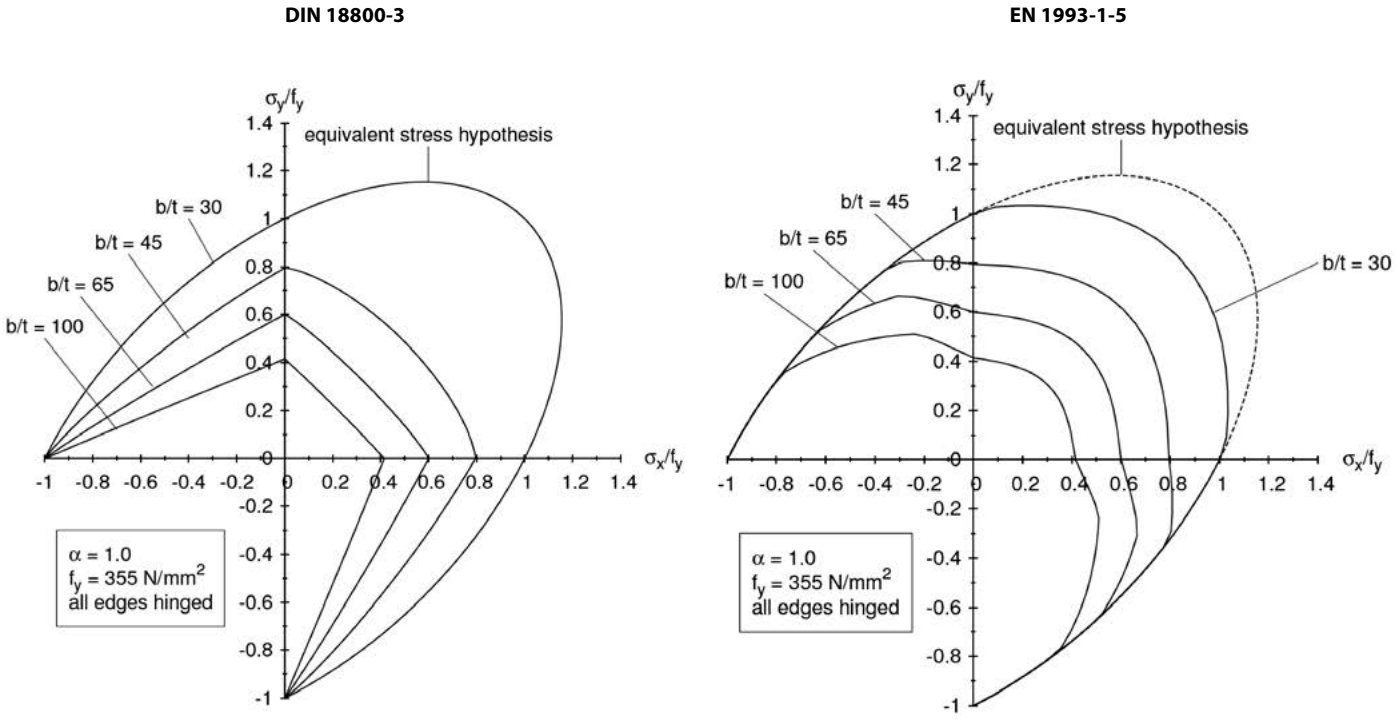


*Figure 2: Interaction for biaxial compression according to DIN 18800-3 and EN 1993-1-5*

The method in EN 1993-1-5 clause 10(5)a) should not be used.

In clause 10(5)b), expression (10.5) should be replaced with the following:

$$\left(\frac{\sigma_{x,Ed}}{\rho_x f_y/\gamma_{M1}}\right)^2+\left(\frac{\sigma_{z,Ed}}{\rho_z f_y/\gamma_{M1}}\right)^2-V\frac{\sigma_{x,Ed}}{\rho_x f_y/\gamma_{M1}}\frac{\sigma_{z,Ed}}{\rho_z f_y/\gamma_{M1}}+3\left(\frac{\tau_{Ed}}{\chi_w f_y/\gamma_{M1}}\right)^2\le 1.0$$

where:
$V = (\rho_x \rho_z)$ when $\sigma_{x,Ed}$ and $\sigma_{z,Ed}$ are both compressive, or $V = 1.0$ otherwise.

## References

1. Hendy, C R, Murphy, C.J, *Designers' Guide to EN1993-2: Design of steel structures Part 2, Steel bridges*, Thomas Telford (2007)

For more information on the Steel Bridge Group go to *http://steel-sci.org/the-steel-bridge-group.html*

# AD 402:
# Design of end plate joints made with preloaded bolts subject to coincident shear and tension.

Advisory Desk note AD373 gave a summary of the checks required on connections subject to combined shear and tension. This AD note discusses the behaviour of such a connection in more detail.

Where a preloaded bolt in a joint is subject to a tensile force, the preload is theoretically not affected but the clamping force between the plates is reduced. This is based on the assumption that the bolt acts as a spring and the plates are infinitely stiff. In reality, the plates are not infinitely stiff and the clamping force is only reduced by 80% of the applied tension. Where a bolted joint consisting of end plates and preloaded bolts is subject to both shear and tension, the applied tension reduces the clamping force between the faying surfaces and the shear resistance of the joint is therefore also reduced.

Bolted joints designed with preloaded bolts are categorized in Table 3.2 of BS EN 1993-1-8:2005 either as shear connections: B (slip-resistant at serviceability), C (slip-resistant at ultimate) or as tension connections: E (preloaded). If a joint of the type described is subject to both shear and tension, and it is necessary to eliminate slip at either serviceability or ultimate limit states (category B or C), additional preload is required in the joint which may mean additional bolts to ensure no slip occurs.

Clause 3.9.2 deals with this issue and formulae for the design slip resistance per bolt are given in equations 3.8a and 3.8b for category B and C connections respectively. In each case, the bolt preloading force is reduced by 80% of the tension force in the bolt as result of the design value of the loading (effect of actions), to allow for the flexibility of the end plates. For example, for the serviceability case, equation (3.8a) is:

$$F_{s,Rd} = \frac{k_s n \mu}{\gamma_{M3}} \left(F_{p,C} - 0.8F_{t,Ed,ser}\right)$$

Prying action results in an increased bolt tension and an equal and opposite compression between the plates in the joint. There is therefore no reduction in clamping force due to prying and $F_{t,Ed}$ does not need to include any prying force.

Consider an end plate joint made with eight M20 grade 8.8 bolts subject to a shear of 200 kN and a coincident tension of 500 kN. If we assume the holes are normal, there is one friction plane, the friction surface is class B and the joint is class C, the preloading force in a bolt is 137.2 kN. The tension per bolt is 62.5 kN so the reduction in preload per bolt is 50 kN.

The design slip resistance of a grade 8.8 or 10.9 preloaded bolt is given in clause 3.9.1(2) as:

$$F_{s,Rd} = \frac{k_s n \mu}{\gamma_{M3}} \left(F_{p,C} - 0.8F_{t,Ed}\right) = \frac{1.0 \times 1.0 \times 0.4}{1.25} \times (137.2 - 50) = 27.9\text{kN}$$

The design shear divided by the design slip resistance is 200/27.9 = 7.2 so eight bolts are required. If no tension were present, six bolts would be sufficient to carry the design shear force.

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# New and revised codes & standards

**From BSI Updates October 2016**

## BS EN PUBLICATIONS

**BS EN 16681:2016**
Steel static storage systems. Adjustable pallet racking systems. Principles for seismic design
*No current standard is superseded*

## BS IMPLEMENTATIONS

**BS ISO 15787:2016**
Technical product documentation. Heat-treated ferrous parts. Presentation and indications.
*No current standard is superseded*

## CORRIGENDA TO BRITISH STANDARDS

**BS 7910:2013+A1:2015**
Guide to methods for assessing the acceptability of flaws in metallic structures
CORRIGENDUM 2

## BRITISH STANDARDS WITHDRAWN

**BS 4921:1988**
Specification for sherardized coatings on iron or steel
*This standard is withdrawn as it is no longer relevant*

## NEW WORK STARTED

**ISO 11126-8**
Preparation of steel substrates before application of paints and related products. Specifications for non-metallic blast-cleaning abrasives. Olivine sand
*Will supersede BS EN ISO 11126-8:1998*

**ISO 11484**
Steel products. Employer's qualification system for non-destructive testing (NDT) personnel
*Will supersede BS ISO 11484:2009*

**ISO 12107**
Metallic materials. Fatigue testing. Statistical planning and analysis of data
*Will supersede BS ISO 12107:2003*

**ISO 15835-3**
Steels for the reinforcement of concrete. Reinforcement couplers for mechanical splices of bars. Conformity assessment

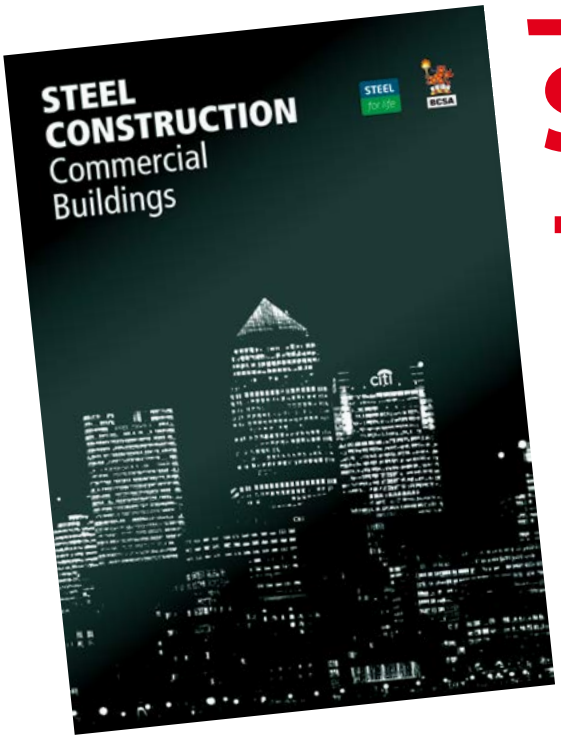
## DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

**16/30335964 DC**
*BS EN ISO 15612* Specification and qualification of welding procedures for metallic materials. Qualification by adoption of a standard welding procedure specification
*Comments for the above document were required by 30 September, 2016*

**16/30340641 DC**
*BS EN 1993-1-6 AMD1* Eurocode 3. Design of steel structures. Part 1-6. Strength and Stability of Shell Structures
*Comments on the above document were required by 10 October, 2016*

**16/30340644 DC**
*BS EN 1993-4-1 AMD1* Eurocode 3. Design of steel structures. Part 4-1. Silos
*Comments for the above document were required by 10 October, 2016*

**16/30340647 DC**
*BS EN 1993-4-2 AMD1* Eurocode 3. Design of steel structures. Part 4-2. Tanks
*Comments for the above document were required by 10 October, 2016*




# Steel dominates the commercial buildings market

Accompanying this issue of *New Steel Construction* is a brochure providing an overview of the commercial buildings market and how structural steelwork continues to be the preferred framing solution.

Steel Construction: Commercial Buildings is the latest in a series of publications from the steel sector that keeps construction professionals abreast of developments that will help them in design and construction of steel-framed buildings.

Steel frames are selected for around 70% of multi-storey commercial buildings in the UK and steel has proven for many years to be the most popular material for architects to express their visions.

Many of the most iconic structures in our urban landscape would not have been possible using any other framing material.

Case studies of real projects that are under construction illustrate many of the reasons why steel frames are consistently the preferred market choice for multi-storey buildings. The cost advantages of steel buildings are explained using up-to-date cost data from model studies of the sort of buildings that are actually being constructed in the UK.

The case studies also show why steel's inherent advantages as a construction material consistently deliver savings on construction programmes. Steel has been described as the ultimate sustainable construction material and its many sustainability advantages are explained.

Steel construction is an exemplar modern method of construction thanks largely to just in time delivery of offsite fabricated steel, which the recent Farmer Review highlighted as a key to the construction industry's survival.

Constructional steelwork has always been fabricated in factory controlled workshop conditions and brought to site when needed for safe erection.

More sophisticated use of developing techniques like Building Information Modelling (BIM) will be another key to a successful future and the steel sector was an early adopter of computer numerically controlled fabrication techniques whose software has been BIM ready for years. Seamless transition to BIM has been achieved by design and construction teams on steel-framed buildings.

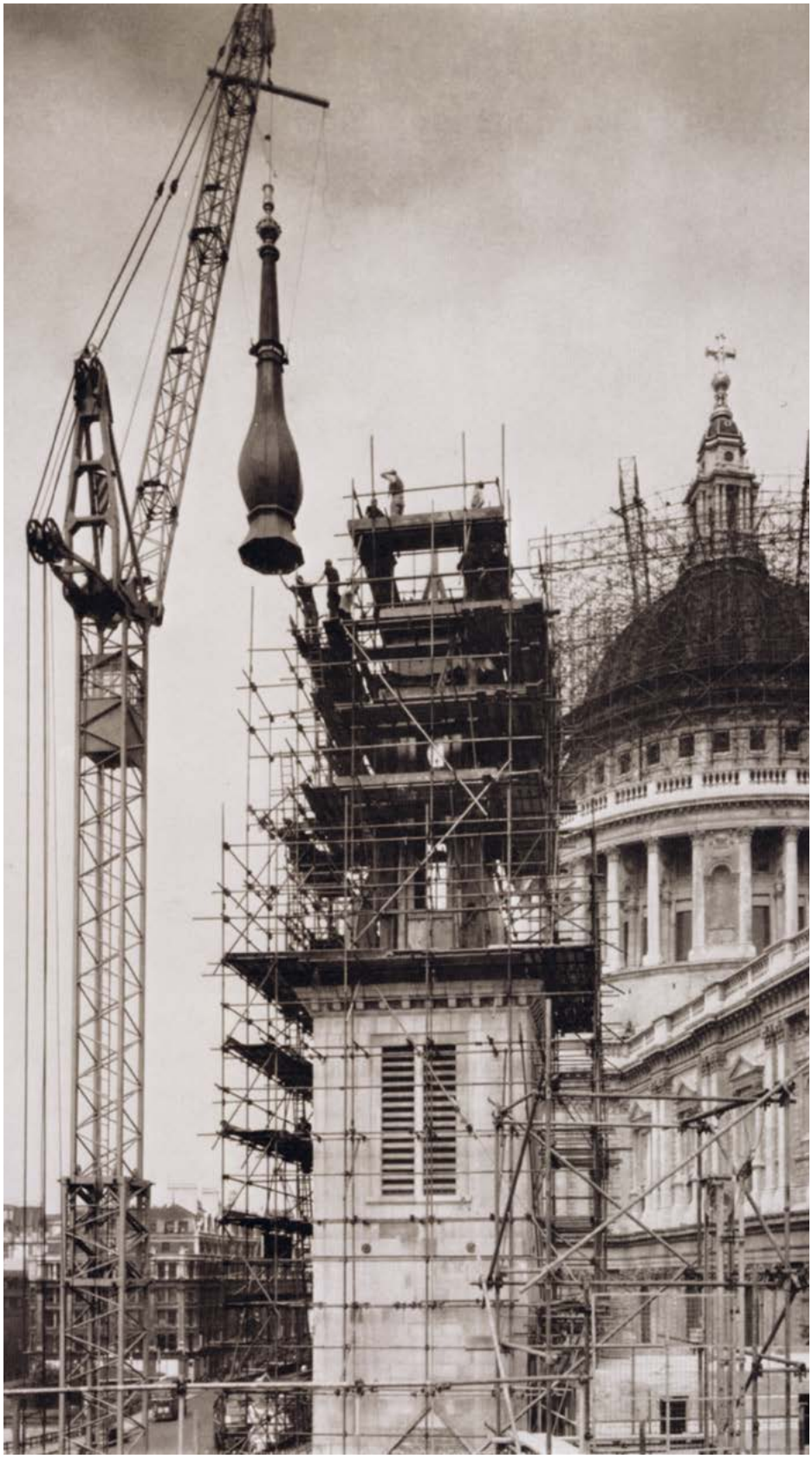
The brochure can also be downloaded at: *www.steelconstruction.info/Steel_construction_news*

***Principal Place in central London, like most commercial developments, requires large column-free floorplates***

BUILDINGWITHSTEEL Reprinted from Volume 4 No. 4 November 1966

# City of London history in the making –

## St. Paul's Cathedral and St. Augustine's Church



Anything that happens to St Paul's Cathedral is of absorbing interest to millions of people all over the world. When during the late war London and the City in particular was receiving a nightly rain of bombs, most of us thought it was only a question of time before Wren's beautiful church was destroyed.

But no major catastrophe occurred: although some damage was inevitable – the choir and North Transept were struck – the great cathedral survived to all intents and purposes intact while all around it everything was flattened. Some considered it a miracle.

A close neighbour of the cathedral was not so fortunate and bombing left little more than the walls of its tower. This gaunt shell has stood stark and ugly for more than twenty years. It is the church of St. Augustine, one of Wren's city churches literally across the road from St. Paul's.

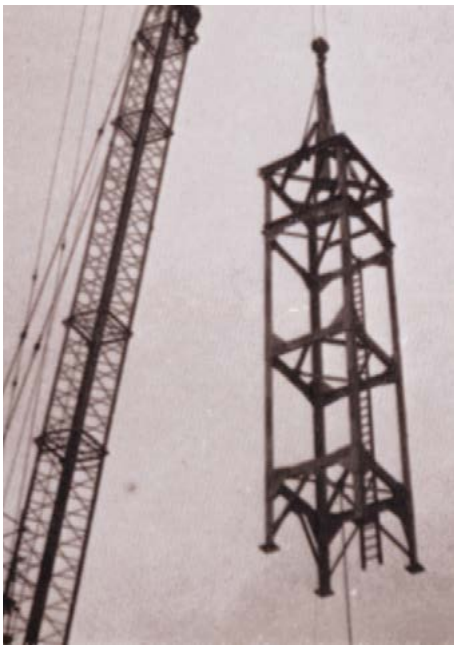
Two decisions were taken which made national news and as steelwork has had a little to do with implementing both of them, 'Building with Steel' is a natural medium to spare a little space for the record.

Firstly, it was decided to clean the outside of St. Paul's while the small bombing depredations were put right. As the outside walls had not been cleaned since Wren's builders finished their work early in the eighteenth century this was a decision received with mixed feelings. However, it has been completely vindicated and unsuspected beauties in the fabric have been revealed for the first time for many years: in fact, the building bears some real resemblance to its appearance 200 years ago.

The second decision was to keep St. Augustine's church tower and make it an integral part of the new Choristers' School now being built on the space left by the original bombing.

With the cleaning of the stonework of the cathedral completed the dome then came under scrutiny. This part of the building had been affected by blast from bombs and it was decided that its lead covering should be renewed, the cross at the apex regilded and the upper stonework of the Golden Gallery cleaned.

To carry out this work a tubular



structure of fascinating and apparently complex design was erected on the stone gallery: height of this structure is 90 ft by 135 ft outside diameter at the stone gallery level (approx.) which is about 200 ft above road level. Overall height of the cathedral to the top of the cross is 365 ft.

It consists of two outer rings of scaffold tube braced in elevation and also braced together in section and in plan forming a cylinder 9 ft thick by 90 ft. high. Inside the cylinder the internal scaffolding is supported by radial beams which in turn are carried by steel cross girders at the top of the structure. The braced cylinder acts as a hollow column to carry the whole of the vertical load and as a cantilever to resist the horizontal wind load.

In the design of the main girder the problems to be solved were erection, weight and deflection. While the span could not be reduced it was decided, due to the enormous depth of the first and second inner standards, that with suitable diagonals this part of the structure would cantilever from the outer ring and so reduce the load on the main girders.

After fairly intensive investigation it was decided to use a girder of structural steelwork sections. This decision obviated the unknown slip problem – this occurs at scaffold fitting joints – and reduced the design to orthodox structural steelwork methods. The girder is box-shaped in cross-section with the top booms of 3½ in.$^2$ by 6 gauge rectangular hollow sections spliced next to the nodes with a pipe flange type connection: the bottom booms are 6 in. by 3½ in. rolled steel joists except at the ends spliced similarly next to the nodes with thick web plates.

No flange plates were used so as to allow the radial beams to be connected at any position. The vertical and diagonal members are respectively 2 3/8 in. o.d. by 6 gauge and 1 29/32 in. o.d. by 8 gauge circular hollow sections. The horizontal wind bracing between the booms is also 1 29/32 in. o.d. by 8 gauge. The girders were prefabricated into component parts, diagonals and verticals were piece small and the booms were made in 18-ft lengths with gussets welded on, to which horizontal and vertical bracings were bolted. A 12-in. camber was built into the girder at works. The heaviest members to be hoisted were the bottom booms at 2 cwt.

These and many other problems had to be solved before the structure which has surrounded the dome of St. Paul's cathedral for a considerable time could be hoisted piece by piece from the ground to form finally one of the most spectacular and one of the most photographed features in the City of London.

*St. Augustine's*

The elaborate plan of buildings and roads around St. Paul's designed to display the cathedral to its greatest advantage, and made possible by the enormous bomb devastation, includes the building of a new Choristers' school as a prominent feature of the redevelopment.

The skeleton of St. Augustine's is being restored and the tower will form an entrance to the chapel of the new school. Among other features incorporated in the reconstruction is a very modern glass fibre spire now in position on the tower. Structural steelwork's contribution to this interesting renovation is the base upon which the spire rests. The structure is 42 ft high. This steel base was lifted into position with a mobile crane having a 130-ft jib: an unusual operation but it is in such ways that structural steelwork leaves a permanent record in the history of London.

*The main image (opposite page) shows: St. Paul's Cathedral and St. Augustine's Church undergoing the operations described.*

*Images on this page (left to right): Lifting into position of the steel structure upon which the glass fibre spire rests and an impression of the new glass fibre spire on St. Augustine's.*

*The work on the cathedral dome was carried out under the supervision of the Surveyor to the Fabric,Paul Paget, FSA, FRIBA, and the consulting engineers, Freeman, Fox & Partners. The scaffolding structure was designed by Cyril Blumfield & Partners. St. Augustine's Church is being restored under the direction of R. F. Rushton, ARIBA.*

# 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 | | | ● | ● | | | | | ● | ● | | | ● | ● | | 2 | | | Up to £200,000 |
| 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 £2,000,000 |
| 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 £2,000,000 |
| 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 |
| Arminhall Engineering Ltd | 01799 524510 | ● | | | ● | ● | | ● | | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £400,000 |
| 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 | | | | ● | ● | | | | ● | ● | | | ● | ● | ✔ | 3 | | ● | Up to £2,000,000 |
| Atlasco Constructional Engineers Ltd | 01782 564711 | | | ● | ● | ● | ● | | | | ● | | | ● | ● | ✔ | 2 | | | Up to £1,400,000 |
| Austin-Divall Fabrications Ltd | 01903 721950 | | | ● | ● | | ● | ● | | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £800,000 |
| B D Structures Ltd | 01942 817770 | | | ● | ● | ● | ● | | | | ● | ● | | ● | | ✔ | 2 | | | Up to £800,000 |
| Ballykine Structural Engineers Ltd | 028 9756 2560 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✔ | 4 | | | Up to £1,400,000 |
| Barnshaw Section Benders Ltd | 0121 557 8261 | | | | | | | | | | | | ● | | | ✔ | 4 | | | Up to £2,000,000 |
| 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 | | | ● | ● | ● | ● | | | ● | ● | | | ● | ● | ✔ | 2 | ✔ | | Up to £3,000,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | | | ● | ● | ● | ● | ● | ● | | | | ● | ● | ✔ | 4 | | ● | Up to £3,000,000 |
| Caunton Engineering Ltd | 01773 531111 | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ✔ | 4 | ✔ | ● | Up to £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 £800,000 |
| D H Structures Ltd | 01785 246269 | | | ● | ● | | ● | | | | ● | | | | | | 2 | | | Up to £100,000 |
| D Hughes Welding & Fabrication Ltd | 01248 421104 | | | | ● | ● | ● | ● | | ● | ● | | ● | ● | ● | ✔ | 4 | | | Up to £800,000 |
| Duggan Steel | 00 353 29 70072 | | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | | ● | ✔ | 4 | | | Up to £6,000,000 |
| ECS Engineering Services Ltd | 01773 860001 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 3 | | | Up to £3,000,000 |
| Elland Steel Structures Ltd | 01422 380262 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✔ | 4 | ✔ | ● | Up to £6,000,000 |
| EvadX Ltd | 01745 336413 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ✔ | 3 | | ● | Up to £3,000,000 |
| Four Bay Structures Ltd | 01603 758141 | | | ● | ● | ● | ● | ● | | ● | ● | | | ● | ● | | 2 | | | Up to £1,400,000 |
| Four-Tees Engineers Ltd | 01489 885899 | | | | | | | | | | | | ● | | ● | ✔ | 3 | | ● | Up to £2,000,000 |
| Fox Bros Engineering Ltd | 00 353 53 942 1677 | | | ● | ● | ● | ● | ● | | | ● | | | | ● | | 2 | | | Up to £2,000,000 |
| Gorge Fabrications Ltd | 0121 522 5770 | | | | ● | ● | ● | ● | | ● | | | | ● | ● | ✔ | 2 | | | Up to £1,400,000 |
| 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 |
| **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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 £1,400,000 |
| 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 | | | ● | ● | ● | ● | | | | ● | | | | | | 2 | | | Up to £3,000,000 |
| Murphy International Ltd | 00 353 45 431384 | ● | | | ● | | ● | ● | ● | | ● | | | | ● | ✔ | 4 | | | Up to £1,400,000 |
| Newbridge Engineering Ltd | 01429 866722 | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | ● | ● | ✔ | 4 | | ● | Up to £1,400,000 |
| 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 | | | | | | | | ● | | ● | | | ● | ● | ✔ | 2 | | ● | 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 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | | 2 | | | Up to £1,400,000 |
| Rippin Ltd | 01383 518610 | | | ● | ● | ● | ● | ● | | | | | | ● | ● | | 2 | | | Up to £1,400,000 |
| S H Structures Ltd | 01977 681931 | ● | | | ● | | ● | ● | ● | ● | ● | ● | | | | ✔ | 4 | ✔ | ● | Up to £2,000,000 |
| 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 £1,400,000 |
| Snashall Steel Fabrications Co Ltd | 01300 345588 | | | ● | ● | ● | ● | ● | | | ● | | | | ● | | 2 | ✔ | | Up to £1,400,000 |
| South Durham Structures Ltd | 01388 777350 | | | ● | ● | ● | | | | ● | ● | ● | | | ● | | 2 | | | Up to £800,000 |
| Southern Fabrications (Sussex) Ltd | 01243 649000 | | | | ● | ● | | | | ● | ● | | | ● | ● | ✔ | 2 | | | Up to £800,000 |
| 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 | | | ● | ● | ● | ● | ● | ● | | ● | | | ● | ● | ✔ | 2 | ✔ | ● | Up to £2,000,000 |
| TSI Structures Ltd | 01603 720031 | | | ● | ● | ● | ● | ● | | | ● | | | ● | | ✔ | 2 | ✔ | | Up to £1,400,000 |
| Tubecon | 01226 345261 | | | | | | ● | ● | ● | ● | | | | ● | ● | ✔ | 4 | | ● | Above £6,000,000* |
| Underhill Engineering & Building Services Ltd | 01752 752483 | | | | ● | | ● | ● | ● | ● | ● | | | ● | ● | ✔ | 4 | | | Up to £3,000,000 |
| W & H Steel & Roofing Systems Ltd | 00 353 56 444 1855 | | | ● | ● | ● | ● | ● | | | | | | ● | ● | | 4 | | | Up to £2,000,000 |
| W I G Engineering Ltd | 01869 320515 | | | | ● | | | | | ● | | | | | ● | ✔ | 2 | | | Up to £200,000 |
| Walter Watson Ltd | 028 4377 8711 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✔ | 4 | | | Up to £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 |
| **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)** |

# 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 |
|---|---|
| A Lamb Associates Ltd | 01772 316278 |
| Balfour Beatty Utility Solutions Ltd | 01332 661491 |
| Bluefin Group | 020 3040 6723 |
| Griffiths & Armour | 0151 236 5656 |
| Highways England Company Ltd | 08457 504030 |
| Kier Construction Ltd | 01767 640111 |

| Company name | Tel |
|---|---|
| PTS (TQM) Ltd | 01785 250706 |
| Sandberg LLP | 020 7565 7000 |
| Structural & Weld Testing Services Ltd | 01795 420264 |
| SUM Ltd | 0113 242 7390 |
| Welding Quality Management Services Ltd | 00 353 87 295 5335 |

# 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:**

- **FG** Footbridge and 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 | FG | 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 |
| 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 £3,000,000 |
| 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 |
| Four-Tees Engineers Ltd | 01489 885899 | ● | ● | ● | ● | | ● | ● | ● | ✓ | 3 | | | ✓ | ● | Up to £2,000,000 |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | ● | | ● | | | | ● | ● | ✓ | 4 | | | ✓ | ● | Up to £6,000,000 |
| 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 |
| Taziker Industrial Ltd | 01204 468080 | ● | ● | ● | ● | | | ● | ● | ✓ | 3 | | ✓ | ✓ | | Above £6,000,000 |
| Underhill Building & Engineering Services Ltd | 01752 752483 | ● | ● | ● | ● | | | ● | ● | ✓ | 4 | | | ✓ | | Up to £3,000,000 |
| **Non-BCSA member** | | | | | | | | | | | | | | | | |
| Allerton Steel Ltd | 01609 774471 | ● | ● | ● | ● | | | | ● | ✓ | 4 | | | ✓ | | Up to £4,000,000 |
| Centregreat Engineering Ltd | 029 2046 5683 | ● | ● | ● | ● | | ● | ● | ● | ✓ | 4 | | | | | Up to £800,000 |
| Cimolai SpA | 01223 836299 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | | Above £6,000,000 |
| CTS Bridges Ltd | 01484 606416 | ● | ● | ● | ● | ● | ● | | ● | ✓ | 4 | | | ✓ | ● | Up to £800,000 |
| 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 |
| Hollandia Infra BV | 00 31 180 540 540 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | | | | Above £6,000,000* |
| HS Carlsteel Engineering Ltd | 020 8312 1879 | ● | ● | | | | | ● | ● | ✓ | 3 | | | ✓ | | Up to £400,000 |
| IHC Engineering (UK) Ltd | 01773 861734 | ● | | | | | | | ● | ✓ | 3 | | | ✓ | | 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 |
| P C Richardson & Co (Middlesbrough) Ltd | 01642 714791 | ● | | | | | | ● | ● | ✓ | N/A | | | | | Up to £3,000,000 |
| Total Steelwork & Fabrication Ltd | 01925 234320 | ● | | | | | | ● | ● | ✓ | 3 | | | ✓ | | Up to £3,000,000 |
| Victor Buyck Steel Construction | 00 32 9 376 2211 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | 4 | | ✓ | ✓ | ● | Above £6,000,000 |

# 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 | | |
| Autodesk Ltd | 01252 456893 | | ● | | | | | | | | | | |
| 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 | 01724 404040 | | | | ● | | | | | | M | | |
| BW Industries Ltd | 01262 400088 | ● | | | | | | | | | M | | |
| Cellbeam Ltd | 01937 840600 | ● | | | | | | | | | M | | |
| Cellshield Ltd | 01937 840600 | | | | | | | ● | | | N/A | | |
| Cleveland Steel & Tubes Ltd | 01845 577789 | | | | | | | | ● | | M | | |
| CMC (UK) Ltd | 029 2089 5260 | | | | | | | | ● | | D/I | | |
| 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 | | |
| Dent Steel Services (Yorkshire) Ltd | 01274 607070 | | | | | | | | ● | | M | | |
| Duggan Profiles & Steel Service Centre Ltd | 00 353 567722485 | ● | | | | | | | ● | | 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 | | |
| Goodwin Steel Castings Ltd | 01782 220000 | ● | | | | | | | | | N/A | | |
| Graitec UK Ltd | 0844 543 8888 | | ● | | | | | | | | N/A | | |
| Hadley Group Ltd | 0121 555 1342 | ● | | | | | | | | | M | ○ | |
| Hempel UK Ltd | 01633 874024 | | | | | | ● | | | | N/A | | |
| Highland Metals Ltd | 01343 548855 | | | | | | ● | | | | N/A | | |
| Hilti (GB) Ltd | 0800 886100 | | | | | | | | | ● | M | | |
| Hi-Span Ltd | 01953 603081 | ● | | | | | | | | | M | ● | |

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | CE | SCM | BIM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| International Paint Ltd | 0191 469 6111 | | | | | | ● | | | | N/A | ● | |
| Jack Tighe Ltd | 01302 880360 | | | | | | ● | | | | N/A | | |
| Jamestown Cladding & Profiling Ltd | 00 353 45 434288 | ● | | | | | | | | | M | | |
| John Parker & Sons 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 | | |
| 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 Performance Coatings UK Ltd | 01773 814520 | | | | | | ● | | | | N/A | | |
| Prodeck-Fixing Ltd | 01278 780586 | ● | | | | | | | | | D/I | | |
| Rainham Steel Co Ltd | 01708 522311 | | | | | | | | ● | | D/I | | |
| Sherwin-Williams Protective & Marine Coatings | 01204 521771 | | | | | | ● | | | | M | ○ | |
| Sika Ltd | 01707 384444 | | | | | | ● | | | | M | | |
| Simpson Strong-Tie | 01827 255600 | | | | | | | | | ● | M | | |
| Structural Metal Decks Ltd | 01202 718898 | ● | | | | | | | | | M | ● | |
| StruMIS Ltd | 01332 545800 | | ● | | | | | | | | N/A | | |
| Tata Steel Distribution UK & Ireland | 01902 484000 | | | | | | | | ● | | D/I | | |
| Tata Steel Ireland Service Centre | 028 9266 0747 | | | | | | | | ● | | D/I | | |
| Tata Steel Service Centre Dublin | 00 353 1 405 0300 | | | | | | | | ● | | D/I | | |
| Tata Steel Tubes | 01536 402121 | | | | ● | | | | | | M | | |
| Tata Steel UK Panels & Profiles | 0845 3088330 | ● | | | | | | | | | 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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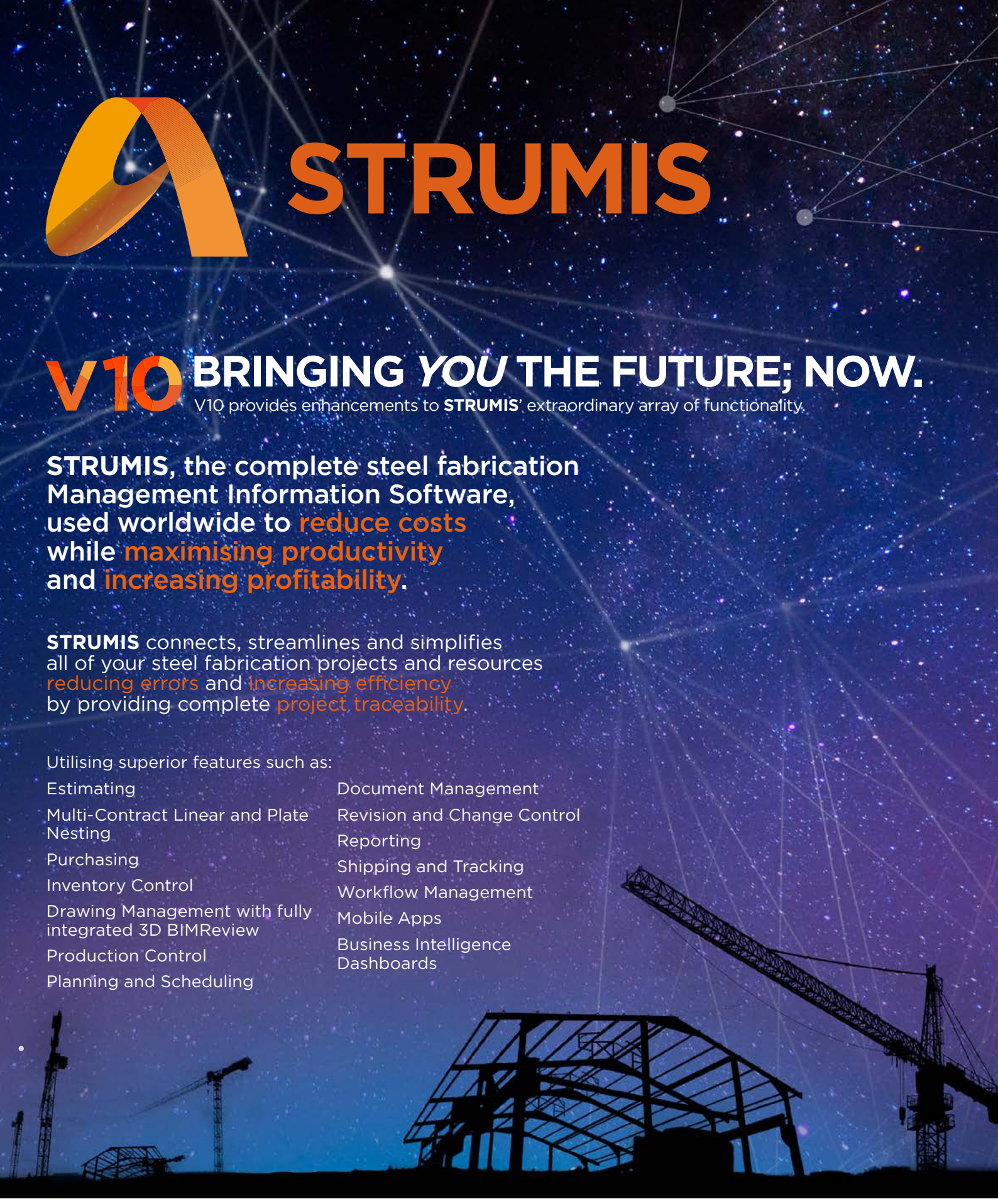

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