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NSC

Steel rises on South Bank

Vol 25 No 7 July/August 2017

Manchester chapel houses students

New heart for Midlothian

Gateway for Downpatrick

Honours for steel at Oxford University

Cover Image
Welsh Baptist Chapel, Manchester
Main client: CZero
Architect: Buttress Architects
Main contractor: H.H. Smith & Sons
Structural engineer: BuroHappold Engineering
Steelwork contractor: EvadX
Steel tonnage: 96t

NSC

July/August 2017
Vol 25 No 7

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NSC IS PRODUCED BY BARRETT BYRD ASSOCIATES ON BEHALF OF THE BRITISH CONSTRUCTIONAL STEELWORK ASSOCIATION AND STEEL FOR LIFE IN ASSOCIATION WITH THE STEEL CONSTRUCTION INSTITUTE

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Healthy steel construction vital to UK

Nick Barrett - Editor

The Structural Steel Design Awards shortlist has just been announced, once again showcasing a striking range of world class designs using steel to its best advantage.

The shortlist includes a new design for a national grid pylon that will become a familiar shape across the UK, high rise offices in the City, commercial projects as far afield as Slough and Leeds, leisure and educational facilities, a footbridge and an aerial walkway through an arboretum.

This year we have produced for the first time a spread of photographs of the shortlisted projects which will give readers an idea of the scale of the tough, although pleasurable, task faced by the SSDA judges. All of the SSDA shortlisted projects are visited by judges, which is possibly unique among construction awards.

Only those that pass the strictest interpretation of the SSDA standards will go on to win recognition, and theoretically there could be no awards made if the judges are not sufficiently impressed by what they see on their visits. Looking at the photographs of this year's candidates that appears extremely unlikely, so pick your favourites and see how they fare at the awards ceremony in October.

Quality buildings and structures like these are only made possible by the ability of the UK constructional steelwork sector to help realise the vision of the architects and engineers involved.

That ability isn't something that should be taken for granted. After coming through a torrid recession along with the rest of the construction industry, steel construction's order books have returned to healthy levels, with a 4% rise in structural steel output last year. Around 120,000 people were directly employed in the fabrication and erection of almost one million tonnes of structural steel last year, contributing a vital £3.2 Billion to the economy as outgoing BCSA President Wendy Coney pointed out in her speech to the Association's National Dinner in June.

A healthy steel construction sector is of national significance and has to be nurtured if it is to continue to develop. The sector is doing its own bit in many ways like technical development and promoting Building Information Modelling. Spreading the word about steel construction is also important, which is what the SSDA helps do, as do other Steel for Life supported projects like New Steel Construction and the *www.steelconstruction.info* website.

It is good to see British Steel throw its considerable weight behind these efforts by joining Steel for Life as a Headline Sponsor from this month, joining ArcelorMittal, Barrett Steel, Jamestown and Trimble, alongside its other sponsors.

There is however a lot that steel construction has to rely on the rest of the supply chain to help with. More effective working relationships with Tier 1 contractors was mentioned by Wendy Coney as something that would produce mutual benefits. Early involvement of specialists like steelwork contractors for example would save money and time, helping the entire industry serve its clients better.

As the SSDA shows year after year, the construction industry can serve its clients well and excels at successfully executing the most challenging designs. The steel construction sector intends to do even better, as the SSDA will continue to show.

SSDA shortlist highlights steelwork's versatility

The British Constructional Steelwork Association and Steel for Life have announced the shortlist for the 49th Structural Steel Design Awards (SSDA).

The 17 shortlisted projects (see p10) showcase steel's flexibility and versatility in a number of different and varying applications.

The shortlist also reflects the wide geographical spread of steel's appeal for a variety of projects ranging from leisure and education buildings to retail buildings, with entries also received for an array of bridges, commercial developments and infrastructure facilities across the UK.

The winners will be announced at an evening reception on 4 October at the Museum of London.

The 2017 shortlist is:

- The Curve, Slough
- The Leadenhall Building, London
- Central Square, Leeds
- Fire Station, Waterford
- A400M MRO Facility, RAF Brize Norton
- LSQ London
- The Maxwell Centre, Cambridge
- Oriam, Heriot-Watt University, Edinburgh
- The Hurlingham Club Raquet Centre, London
- Wellcome Collection Dynamic Stair, London
- T-Pylon, Eakring
- West Croydon Bus Station
- Watermark Westquay Footbridge, Southampton
- Market Place Shopping Centre Redevelopment, Bolton
- Layered Gallery, London
- Stihl Aerial Walkway, Westonbirt Arboretum
- Selfridges – Duke Street Project, London

Containing 1,200t of steel, Deck 6 under construction

Car parking capacity set to increase at Port of Southampton

Port owner Associated British Ports (ABP) is looking for a project team to build another car storage facility at the Port of Southampton.

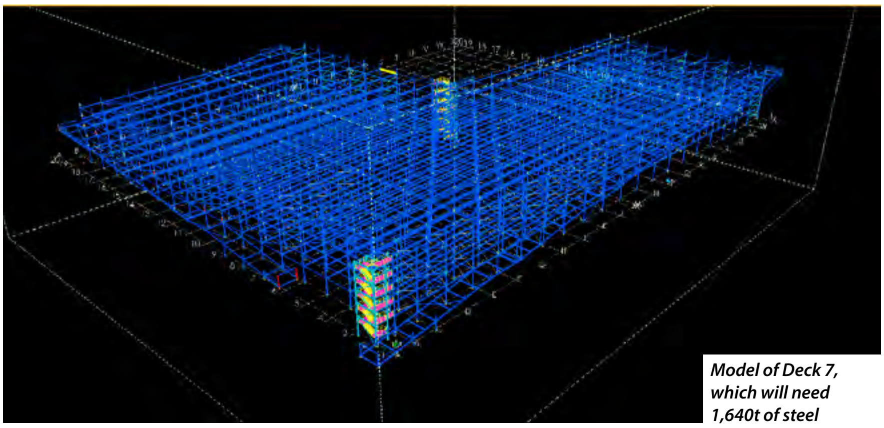
The facility will be five decks high with each deck measuring six acres in area. It will be the eighth and largest of a series of planned car storage buildings being developed to enable the port to handle a greater number of cars, which are shipped to meet overseas demand.

Connor Peter Smith, Project Engineer at the Port of Southampton said: "This latest multi-deck car park is likely to be a steel-framed structure supporting precast slabs as all of the previous ones have been built using this method."

Currently, Morgan Sindall is constructing multi-deck car parks 6 and 7, with steelwork being fabricated, supplied and erected by James Killelea.

Deck 6 is a 2.5- acre facility over five levels, which will provide car parking spaces for 3,251 vehicles. While Deck 7, the largest car storage facility on the port, is a 3.98-acre facility, which will be capable of housing 5,418 vehicles over five levels.

Alastair Welch, ABP Port Director, Southampton, said: "The Port of Southampton contributes around £1bn to the UK economy and supports about 15,000 jobs. Our automotive business plays a significant role in delivering that success and we are committed to investing in world class facilities to support that trade and help it to grow."



Model of Deck 7, which will need 1,640t of steel

BCSA publishes NSSS 6th edition

The British Constructional Steelwork Association [BCSA] has published the 6th Edition of the National Structural Steelwork Specification [NSSS] for Building Construction (BCSA Publication No. 57/17).

The 6th edition can be used for all types of building construction designed for static loading and is based on Execution Class 2 structural steelwork designed in accordance with BS 5950-1 or BS EN 1993-1-1 (including BS EN 1993-1-8 and BS EN 1993-1-10) and executed in accordance with BS EN 1090-1 and BS EN 1090-2.

BCSA Director of Engineering Dr David Moore said: "The NSSS clarifies and aids the process of translating designers' requirements into specific work instructions for execution. Specifiers are encouraged to use this latest NSSS as the default specification for all steel building structures."

Copies of the National Structural Steelwork Specification for Building Construction 6th Edition (BCSA Publication No. 57/17) can be obtained from BCSA's web site (*www.steelconstruction.org/shop*) at a cost of £20 for Non-members and £15 for BCSA members. This book is only available in PDF format.

President makes 'manifesto' call for improved working relationships

Steel construction enjoyed another successful year in 2016 and is looking ahead confidently to the challenges of the post Brexit world, outgoing BCSA President Wendy Coney told the National Dinner audience.

Ms Coney said structural steel consumption rose 4% in 2016, approaching the 1 million tonnes mark. The steel construction sector employed 120,000 people directly in fabrication and erection, and many more when the whole steel supply chain is included. Structural steel made a contribution of £3.2 billion to the UK economy, supporting economic growth in communities across the UK and Ireland.

Ms Coney said following the EU referendum and the general election her personal manifesto would include calls for policies to support business and investment, confirmation of a commitment to steel market development and a plea for improved working relationships in the supply chain.

Ms Coney said she was dismayed at cuts in investment in education and health service buildings which had helped support BCSA members through the recession. "My manifesto calls strongly for renewed investment in education and health infrastructure," she said.

She said BCSA is pleased that infrastructure investment remains a priority for government and the Association strongly supports new nuclear, HS2 and other energy and transport programmes.

"However, we must continue to push for government and their delivery agencies to maintain the momentum and not delay programme delivery," she stressed.

Ms Coney thanked the Steel for Life market development sponsors for their invaluable support.

Interactive Blue Book now available

Produced by the Steel Construction Institute (SCI) on behalf of Steel for Life, a new interactive version of the Blue Book is now available.

The comprehensive web-hosted resource includes design information in accordance with both the Eurocodes and BS 5950. It provides design data for the full range of both open sections and hollow sections (both hot-finished and cold-formed), and will not require any software to be installed on a host computer.

Design data is provided for:

- Universal beams, universal columns, bearing piles, & parallel flange channels to BS EN 10365
- Structural tees (cut from either universal beams or universal columns) to BS 4-1
- Equal and unequal angles to BS EN 10056
- Hot-finished structural hollow sections to BS EN 10210-2
- Cold-formed structural hollow sections to BS EN 10219-2

Tables are provided for both S275 and S355 grades for open sections, S355 and S420 grades for hot-finished hollow sections, and S355 grade for cold-formed hollow sections.

"This is a single comprehensive online resource that effectively replaces the old Tata Steel interactive Blue Book that served the

UK steel construction sector well for many years," explains British Constructional Steelwork Association (BCSA) Manager, Marketing and Technical Development Chris Dolling.

Michael Sansom of the SCI added: "The new user-friendly and refreshed interactive Blue Book has a format that allow users to either print information directly or export information to a spreadsheet on their own computer."

Comprehensive design data is also provided for bolts and welds, rolling tolerances are given, and there are comprehensive sets of explanatory notes for both the Eurocodes and BS 5950 data.

This new easy-to-use Interactive Blue Book is freely available at *www.steelforlifebluebook.co.uk* or via the steel construction sector's information-rich website *www.steelconstruction.info/The_Blue_Book*

Frame up for Preston Market redevelopment

Structural steelwork for the redevelopment of Preston's historic covered market has been completed by Border Steelwork Structures (BSS).

Working on behalf of main contractor Conlon Construction, BSS erected approximately 100t of steel to form new permanent stalls within the restored Victorian market.

Covering half of the covered market's floor space, the new steel-framed stalls will be able to accommodate 32 traders.

The remainder of the floor space will be used for 52 temporary stalls or as an events space.

Frank Whittle Partnership Architect John Bridge said steel was chosen for its flexibility and ease with which it can form the cantilevering stall structures.

"Steel has also given us a contemporary feel within the restored Victorian wrought-ironwork of the old market building."

The redevelopment of the covered market is the third phase of Preston's much larger Market Quarter scheme. So far this has included, during phase 1 and 2, the redevelopment of the adjacent Fish Market and the restoration of the Covered Market's 110m-long roof.

Two more phases are planned; phase four will consist of the demolition of the nearby multi-storey car park and market building. This will then free-up space for a fifth phase, consisting of a new steel-framed cinema, restaurant and retail complex.

NEWS IN BRIEF

British Steel has reported a profit for the first year as an independent business since being sold by Tata Steel. The company posted £47M in earnings before interest, tax, depreciation and amortisation in the 12 months ending 31 March. British Steel Executive Chairman Roland Junck said: "In 12 months we have started transforming from an inward-looking production hub into a profitable, more agile business by controlling costs, improving our product range and quality, and through strategic investments."

Trimble has released a variety of new tools for Tekla Structures, which it said will enable customers to detail miscellaneous steelwork easily and quickly. Expanding upon the group of default components already available in Tekla Structures, Trimble has added new components to address more complex situations. The new tools, which can be used for a multitude of projects, whether it's residential, industrial or architectural, are said to allow detailers to create curved platforms, spiral staircases and mezzanine floor systems.

Swansea Council has approved plans for a £500M redevelopment which is set to reinvigorate a large swathe of the city centre. The 11.5-hectare project will be home to new shops, restaurants, offices, housing and a cinema to the north, and an indoor arena and hotel to the south. The scheme, which is likely to include a number of steel-framed structures, will also involve the partial demolition of the existing St David's shopping centre.

Steelwork contractor **Severfield** has announced that its pre-tax profits nearly doubled in the year to March, rising from £9.6M to £18M on the back of surging orders and the first full-year contribution from the acquired Composite Metal Flooring business.

AROUND THE PRESS

New Civil Engineer
July 2017
Light & space

[BBC Wales HQ, Cardiff] - "Steel for the upper levels has been used for a number of reasons, such as speed of construction and the ability to create the 18m-long clear spans in the offices which provides the BBC with maximum flexibility," says ISG Project Director Kevin McElroy.

New Civil Engineer
July 2017
Cutting edge

[52 Lime Street, London] - "We've made a considerable weight saving as all of the beams have varying flanges and webs depending on the relevant loadings," explains Arup Project Engineer Steve McKechnie. "All of this was worked out automatically via the BIM model."

Building Magazine
16 June 2017
Close to the edge

[V&A Museum, Dundee] – The external walls are also restrained by steel beams connected back to the core at first floor level. Huge, 2m deep steel trusses up to 28m long are employed at roof level as these have to restrain the walls without intermediate columns.

Construction Manager
July/August 2017
Starting on a high note

[Theatre in the Woods, Surrey] – The construction team has built a new drum-shaped steel frame building infilled with blockwork - the finishing cladding will be completed at a later stage.

Fifth Headline Sponsor joins Steel for Life

British Steel is the latest company to become a Headline Sponsor of Steel for Life, bringing the total number of Headline Sponsors up to five and the total number of Steel for Life sponsors to 24.

Steel for Life was launched in 2016 and is a wholly-owned subsidiary of BCSA, with funding provided by sponsors from the whole steel supply chain.

It manages a market development programme designed to ensure that steel maintains and develops its leading position as the preferred supplier of framing solutions for key sectors of the market, such as multi-storey buildings and single storey industrial buildings.

British Steel Construction Director Richard Farnsworth said: "Steel for Life embodies everything British Steel stands for and we're delighted to be a Headline Sponsor.

"While we are proud of our heritage, our dedicated and highly-skilled employees are building a stronger future for ourselves and our partners by making and developing the high-quality products our customers rightly expect.

"Central to our strategy is the continued development of our UK-wide network of distribution and metal centres, which put customers' needs at their heart.

"We look forward to working with our Steel for Life partners to ensure we build a sustainable future for British Steel, our customers and the wider industry."

Steel for life's key purpose is to communicate and disseminate the advantages that steel offers to the construction sector, which make it the material of choice for a wide range of buildings, bridges and other structures.

This industry-wide approach provides significant benefits to clients, specifiers and main contractors. By working together as an integrated supply chain for the delivery of steel-framed solutions, the constructional steelwork sector will continue to innovate, educate specifiers and clients, and market the significant benefits of steel in construction.

Steel for Life Headline Sponsors are: ArcelorMittal, Barrett Steel Limited, British Steel, Jamestown and Trimble Solutions (UK) Ltd.

Steel hangar for RAF Marham's latest jets

Galliford Try Lagan Construction Joint Venture (GTLC) has been awarded a contract worth £135M to upgrade infrastructure and facilities at RAF Marham near Kings Lynn in Norfolk for the Defence Infrastructure Organisation (DIO).

GTLC has been appointed to design and build a new steel-framed aircraft hangar with associated support buildings known as an operational conversion unit as well as to reconstruct the two runways.

As part of a wider, ongoing £250M investment by the DIO at Marham this new project will accommodate the new F-35B Lightning II aircraft fleet that will arrive in the UK from mid-2018. GTLC will start work immediately and complete in summer 2019.

Bill Hocking, Chief Executive of Construction & Investments at Galliford Try, said: "This is a hugely significant award for us with the DIO, an existing client. It demonstrates the combined strength of our Infrastructure and Building divisions which will carry out the work together and complement the international experience of our partner Lagan".

Kevin Anthony Lagan, CEO of Lagan Construction Group, said: "Having completed projects on over 50 airports in five continents, airport infrastructure works are a core part of our business. Our teams are experienced in providing the engineering skills and technologies necessary to deliver both airside and groundside support facilities.

"We are pleased to work with the DIO again having recently completed successful contracts at RAF Akrotiri and RAF Gibraltar. We look forward to working collaboratively with our joint venture partner Galliford Try to deliver these works to the highest safety standards and within programme and cost requirements."

Steel rises on Oxfordshire science project

The latest project at the prestigious Harwell Science Campus in Oxfordshire has started to take shape.

Known as the Harwell Facilities Building, it will provide specialist support space allowing researchers to test and commission new scientific equipment for use on the campus and around the world.

Steelwork is being fabricated, supplied and erected by Hambleton Steel, working on behalf of main contractor Willmott Dixon.

A total of 900t of steel is required for the project and this includes a series of large toblerone-shaped tubular cambered roof trusses, fabricated and delivered in three sections.

Procured through Scape Group's major works framework, Willmott Dixon is working with Oxford architects, Clarke Nicholls Marcel and AECOM to complete the facility by spring 2018.

Willmott Dixon was appointed by the Science & Technology Facilities Council (STFC) for a £23.7M contract to build the Harwell Facilities Building.

Peter Owen, Managing Director of Willmott Dixon in the Midlands said: "It's less than two years after the company completed the RAL Space facility for STFC, also a steel-framed structure at the Harwell Science Campus. We are delighted to be back working with STFC."

Bridge opens up King's Cross development

Photo: John Sturrock

A new pedestrian and cycle bridge that spans the Regent's Canal in the heart of London's King's Cross development has been officially opened.

Designed by Moxon Architects, the 38m-span bridge forms a vital link between Camley Street and an area of retail, residential and office schemes.

Working on behalf of main contractor Carillion, S H Structures fabricated the bridge structure from 15mm steel plate at its works in North Yorkshire.

Once fabricated, the bridge was trial assembled before being sent to site in four individual sections.

Assembled on-site, the completed 55t bridge was lifted into place using a 750t-capacity mobile crane.

The bridge was installed on 4 May and officially opened to the public on 5 July.

Anglesey gets steel-framed science park

Steelwork erection has been completed on phase one of the Menai Science Park on Anglesey.

Being built for a wholly-owned subsidiary of Bangor University, it is hoped the park will drive growth in knowledge-based science, low carbon energy, the environment and computing sectors.

Working for main contractor Willmott Dixon, EvadX has erected 500t of steel for phase one which consists of a 5,000m^2 three-storey building.

Aiming to achieve a BREEAM 'Excellent' rating, the building will comprise offices, laboratory and workshop space for up to 700 people. It will form the hub for the entire park and become an important regional centre for a range of businesses from start-ups to large corporate companies.

Ieuan Wyn Jones, Executive Director of the park said, "The science park will create a bridge between innovative companies and Bangor University. We are already in advanced discussions with a number of potential tenants from a range of sectors. This project ties in with many on-going economic strategies and comes at an opportune time to link with other ongoing projects in the region."

New wide flange purlins launched

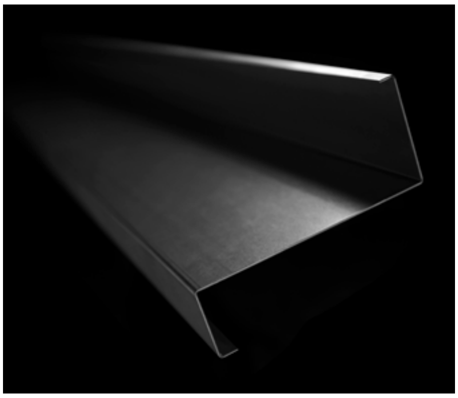
voestalpine Metsec has launched the wide flange purlin, claiming it had identified a need in the claddings market for a flange with a wider surface for fixing to.

Previously, cladders working on a project that required a larger fixing face would have to engineer a solution from existing products and work around the problem.

The company said the introduction of this product means that the roofing contractor has an on-hand, bespoke, engineered solution which reduces the amount of materials and labour needed, as well as providing a cost saving.

Kevin Jones, Sales Director for Metsec Purlins, said: "Our focus is on service and meeting our customers' needs at all times. In speaking with our customers, we realised claddings that needed a larger fixing face was a pain point for them, and so we developed our wide flange purlin product that would give an engineered, fit-for-purpose solution.

"By introducing this into the market, we aim to save both time and money for our customers as well as providing an easy-to-use solution that we hope will become the standard for claddings with larger fixing faces."



Diary

For SCI events contact Jane Burrell, tel: 01344 636500 email: *education@steel-sci.com*
For Institution of Structural Engineers events email: *training@istructe.org* or telephone 0207 201 9118

Monday 11 September 2017
Modular Construction
This webinar will cover the various forms of modular construction and examples of recent projects in the residential , health and educational sectors.
Repeated on Tuesday 12 September 2017

Wednesday 13 September 2017
Steel Essentials – Practical Design of Structural Steelwork
The aim of this course is to present practical guidance on key aspects of preliminary scheme development and detailed scheme design in structural steelwork.
London

Tuesday 26 September 2017
Designing Stainless Steel
This one day seminar will launch the Fourth Edition of the Design Manual for Structural Stainless Steel and will equip engineers with the skills necessary to design structural stainless steel in accordance with current European design practice. Each delegate will receive a copy of this new publication.
London

SSDA Shortlist 2017

A total of 17 diverse projects from around the UK and Ireland that highlight steelwork's numerous attributes have made it onto the 2017 SSDA shortlist.

The Leadenhall Building, London

Central Square, Leeds

LSQ London

The Maxwell Centre, Cambridge

© Wellcome Trust

Wellcome Collection Dynamic Stair, London

T-Pylon, Eakring

Market Place Shopping Centre Redevelopment, Bolton

Layered Gallery, London

The Curve, Slough

Fire Station, Waterford

A400M MRO Facility, RAF Brize Norton


Oriam, Heriot-Watt University, Edinburgh

The Hurlingham Club Raquet Centre, London

West Croydon Bus Station


Watermark Westquay Footbridge, Southampton

Stihl Aerial Walkway, Westonbirt Arboretum


Selfridges – Duke Street Project, London

Challenges rising on President's watch

Meeting the challenges of continuous change and uncertainty is the day-to-day business of senior management, but new BCSA President Tim Outteridge is becoming a steel construction sector figurehead at a time when an unusually large number of challenges loom.

Steel construction has enjoyed a few years of steady growth since the credit crisis and recession, which it came through in good shape. Now leaving the European Union is throwing up new challenges that nobody even imagined having to grapple with until the Brexit referendum a year ago, and that nobody has any experience of dealing with, all to be managed by a newly elected minority government.

Construction meanwhile is responding to new client expectations that demand more collaborative approaches to working. In addition, developers and investors fear that interest rates might rise worldwide. Uncertainty reigns and there are concerns that the project backburner could become over-crowded. "It does feel that the gas has been turned down a bit since the election," says Tim, "although the underlying sentiment remains broadly positive. And we have a lot to respond to away from issues that Brexit might throw up."

From Perthshire Stock, Tim studied Civil Engineering at St Mary's in Southampton and has had a 25-year career in civil engineering as well as steel bridge and building construction. He is now International Sales Director at Cleveland Bridge UK, which gives him a vantage point to see how construction sectors work in other countries as well as how international contractors operate. Tim's career as a subcontractor has focused on steel structures and bridges, and he is passionate about the steelwork sector and its ability to deliver steelwork contracts cost effectively, on time and to the client's specification.

Cleveland Bridge is of course a world recognised brand, one of the UK's leading bridge builders with a 140-year history of delivering major structures across the globe. Current exports include contracts for UK designed and fabricated rural bridges to Sri Lanka, all being built at its Darlington Factory. Tim is really proud that a quality British product is competitive and exportable in a very demanding arena.

Tim has extensive commercial experience and is a Fellow of the Chartered Institute of Marketing. His experience in the structural steelwork sector includes senior positions at Bourne Steel Ltd and Mabey Bridge. In his role as BCSA's Deputy President over the past three years Tim supported the implementation of CE marking for the structural steelwork sector, the development of a new apprenticeship framework and the introduction of the BIM Charter while also serving as a member of the Steel Construction Certification Scheme. Tim sits on the UK Metals Council representing the views and interests of the BCSA membership.

A formative part of Tim's early career was spent with Balfour Beatty, where he had a 'four-year baptism of fire' of training on major projects as diverse as power stations, water treatment plants and breweries. "It was good training, I was well mentored and trainees received a lot of pastoral care," he remembers. The construction environment in the 1980's and 1990's was a commercially aggressive one, an industry feature that he is glad to see has faded. "I am happy those days have passed, they couldn't continue."

He wanted overseas experience so in the 1990's he went to the Middle East and Africa where he freelanced. His re-entry to UK construction came oddly enough, with concrete frame contractors who he enjoyed success in winning work for. Steel frames, he discovered, were similar to concrete frames in the way that they were bid for and his work winning skills caught the attention of Bourne Steel.

"I met David Sands in 2004 when he Chaired Bourne Steel and he impressed me a lot. I appreciated the way he did things and I had enormous respect for him. I knew I would emerge from working with him as a better person."

After a successful period with Bourne Steel his career took him to Belgium for a short spell with steel contractor Victor Buyck until Mabey Bridge made him an offer to return to the UK. He enjoyed great success running Mabey's UK bridges operation until the company decided to withdraw from UK infrastructure.

Cleveland Bridge had been acquired by new owners in 2000. Tim took an opportunity to join Chris Droogan, his managing director at Mabey Bridge, who was now heading up a reinvigorated company that was being supported by its new owners as it strove to re-establish its great name as a force in world markets.

"The first two full financial years that Chris has led have seen significant improvements to virtually all areas of the business, not least of which that we're profitable. We are now focused on repositioning the company with clients in the UK and overseas, with new systems and processes. Clients have responded well and we have won contracts on the A14, A1 Barton to Leeming, Newtown bypass and Aberdeen Western Perimeter Road where we delivered by road some of the longest girders the UK has seen."

Tim notes that the UK infrastructure and international sectors are showing promise and good potential. Tim is confident that Cleveland will win increased market share through providing a good service to its customers and having a positive impact on the communities in which they're working.

Being a Deputy President of the BCSA is a highly rewarding experience, says Tim. "It places you in the front line of reinforcing the use of UK steelwork, and demonstrating to clients and end-users the value in the high standards the industry has set".

Cleveland Bridge has installed eight bridges for Aberdeen's 43km-long bypass

"We are a nation of entrepreneurial engineers and we have a perfect opportunity to showcase our talents for high quality manufacturing"

"It has also been very interesting attending regional meetings and becoming more familiar with the wide variety of skills and experience our members embody. We are a nation of entrepreneurial engineers and we have a perfect opportunity to showcase our talents for high quality manufacturing."

One feature of Tim's time as President will be a raised profile for the role. An early sign of that will be the launch of a series of Presidential columns in NSC, that will reveal what he sees as some of the key issues facing the steelwork sector and its clients. "There are a number of developments taking place in the wider economy, in the construction industry and in the steelwork sector itself, which I believe the BCSA President should be seen to be commenting on, signaling the steelwork sector's willingness to promote change and to play a leading role in creating the construction industry that best serves a modern economy."

Responsible procurement will be a theme of Tim's Presidency, which means main contractors and clients treating their supply chains properly as well as specialist contractors acknowledging that the customer is king. Tim says: "Main contractors have to acknowledge that the specialist contractors are the experts and innovators and reward them with work continuity and providing a team-wide can-do approach to project delivery".

Streamlining the prequalification processes is a target, one he realises will take a concerted effort to reform. "Through BuildUK and others it is now being acknowledged that Trade Associations can do a lot of that, saving everyone a lot of duplicated work. This will be a job for a few years though, I don't expect a quick result."

Driving efficiencies into procurement processes and taking out wasted effort has been a long-term ambition. "The world is changing, the way we trade and do business is also changing, it would be really good to see the construction industry lead the change and drive out the wasted effort and direct it to positive use," says Tim.

Home is in West London where he lives with his partner. He also has two daughters at University. Away from work he is a keen golfer at the London Scottish Golf Club and a supporter of Fulham FC. Not that there has been much time for either recently. "Between the Deputy President years and the presidential period I will have worked with the BCSA for six years and I am enjoying it immensely. I want my contribution to make a difference."

One of Cleveland Bridge's rural Sri Lankan structures

An introduction to computer software for steel design and fabrication

Steelwork contractors are often held up as being in pole position in terms of the introduction of and increasing use of BIM. In this article, NSC looks at how computer software is utilised at each stage of the structural steelwork process.

At the earliest stage, modelling and estimation software plays an essential part of the steelwork contractor's role on a project in the bidding process, and its use is increasing. Using this software provides the ability to create a model of the steel frame so steelwork contractors can; visually present the content of their bid alongside the associated costs, provide insight into the sequence of construction works; can identify solutions to reduce health and safety risks and can identify areas for improvement.

> *"Trimble's steel design and detailing packages are no longer simply tools for producing drawings. They are a core business system that produces and processes data throughout the life cycle of the project feeding all departments of the steel fabricator company, and beyond."*
> **Richard Fletcher, Managing Director,Trimble Solutions (UK) Structures Division**

Detailed frame design, 3d modelling and BIM

Following appointment on a project, commonly used software in the steelwork sector is that which closely supports the design and fabrication process.

For design, structural frame analysis aids the process of calculating the forces, moments and deflections to which the members in a structure will be subjected. Software to carry out analysis of structural elements was first used by the steel construction industry. Over time, it has developed from providing a rudimentary analysis to a comprehensive analysis of very complex structures. Software for the design of connections is also heavily used with a large range of specialist solutions available to the steelwork contractor.

3D modelling software allowing steelwork contractors to create a virtual prototype of the steel frame is one of the most important pieces of software a modern steel fabricator uses. Data from the model can feed into many business processes. Importantly, data from other parties can be imported into the modelling software and the steel model can be exported in Industry Foundation Classes (.IFC) format for use by others. It's this function which plays an important role in the adoption of BIM.

The BIM process is not about specific software products but about working collaboratively to produce good designs and better assets through fully coordinated and electronic data interfaces. The objective is to provide the building owner with the data they asked for in the format they requested. They will then use the data to manage and maintain the asset over its lifetime.

Material resource planning

During the design phase, the structural steel will be modelled to facilitate fabrication. Materials Resource Planning (MRP) software then processes the bill of materials data from the model which is used for procurement of materials, manages data to drive automated cutting and fabrication machinery, plans logistics, as well as piece weights for crane planning.

MRP software can also be used to monitor progress of fabrication by capturing data about each part as it passes through the different fabrication processes.

Transport logistics

Software solutions that can be used to plan and manage transport activities include the organisation of empty trailers for loading as well as dispatch of finished loads to site.

Global Positioning System (GPS) technology and software to track delivery vehicles has been available for some years and the use of radio-frequency identification (RFID) technology enables individual objects to be tracked if required.

Data from model to site and back

Advances in software interoperability means that specific data from a design model can be created and imported directly to the surveying equipment used on site. The process can also be carried out in reverse, enabling data captured on site to be imported back into the construction model for compliance and comparison purposes.

Actual progress of the works can be captured and reported back using an increasing number of mobile devices and Apps available for use on site.

Sponsors Computer software

Headline Sponsor - Trimble Solutions (UK)

An independent steel frame forms the apartments

Historic chapel reborn as student accommodation

A steel-framed structure has been erected inside of a Manchester ecclesiastical landmark as part of a restoration and conversion project. Martin Cooper reports.

Built in the 1830s by Sir Charles Barry, famous for his rebuilding of the Palace of Westminster, the Welsh Baptist Chapel in central Manchester is being brought back to life with a new steel-framed interior to form student apartments.

The scheme will provide 73 high quality, private residential apartments within the chapel and the adjacent Sunday school building. The project also incorporates a contemporary new build element providing facilities including a fitness room, cinema room and residents' lounge.

The new build will be linked to the restored chapel by an underground passage, excavated through the area that once accommodated a graveyard.

The chapel is situated on Upper Brook Street and the Grade II listed building has been a local landmark for many years, although in recent times it had been derelict and without a roof.

The current work will help remove it from Historic England's At Risk register, while restoration work will repair and revive the existing fabric. This includes retention and repair of the distinctive rose window, corbels and vaulted springers along with the reconstruction of the chapel roof.

A structurally independent steel composite frame has been erected inside the chapel to form a new six-storey apartment block. This new frame supports a new steel and timber roof that has the same pitch as the original Victorian structure.

"Having an independent frame was important as we wanted minimal impact on the existing chapel walls," says Buttress Architects' Samantha Gill. "The steelwork sits within and not on the historic building, meaning that there are no additional loads on the stone and brickwork walls. The existing fabric is only tied back to the steel frame by small channels, and so the existing structure acts a cladding around the new structure."

Another reason why steel was chosen was the project needed a lightweight solution for the new interior, one that would not require expensive deep foundations. So, like the original chapel walls, the new steel frame is founded on ground bearing foundations.

In order to maximise the available space, the frame utilises slim sections, typically 152mm × 152mm × 37mm UCs and 203mm × 133mm × 30mm UBs, that support metal decking with only a 140mm-thick concrete topping for the floors.

Finding suitable locations for the steelwork's bracing was a challenge for the design team, as BuroHappold Engineer Carl Pendlebury explains: "The chapel's existing windows prevented us from using the perimeter steelwork for bracing locations and so we had to put it within a lift and stair core, as well as in the roof."

The uppermost floor contains larger apartments

Steelwork is based around a 4.2m × 4.2m grid pattern for most of the floors, but has been offset across the building and in parts is irregular in order to avoid putting columns in front of, and obscuring, the chapel's existing windows.

Another design consideration was that the new steel columns could not clash with the restored chapel vaulted springers that once supported the roof. Spaced along the two main walls at approximately 3.5m intervals, they are now key features of the new scheme and as such they have been incorporated into the third-floor apartments.

Overall the new steel frame incorporates two rows of apartments with a central dividing corridor. This configuration is only interrupted on the uppermost accommodation floor, where some slightly larger rooms are located. To support the column grid change, a series of transfer beams has been installed below this sixth level.

Prior to the steelwork being erected within the chapel, main contractor H.H. Smith had already begun its extensive restoration work on the structure, as well as preparing the chapel interior for the installation of the new frame.

The company has experience of restoring old structures and converting them for new uses. It recently completed a similar project at Ashton-under-Lyne, where a new steel frame helped turn the Victorian baths into a new business suite.

As well as working on the chapel, work was also started on the conversion of the adjacent Sunday school [see box] and the new build element.

Early in the programme, H.H. Smith installed a tower crane for the site and this was used by steelwork contractor EvadX for lifting steel over the existing walls.

"To make it easier to lift the columns into the chapel we had to splice the members in three," explains EvadX Drawing Office Manager Andrew Roberts.

Space was at a premium and so the steel erection process had to be planned carefully.

Using two small mobile elevating work platforms (MEWPs), positioned within the chapel, and working in conjunction with the tower crane, EvadX had to initially erect the columns with perimeter floor beams to give the frame stability.

They then worked from the roof downwards, through the six floors finishing at level one. Moving onto the next grid, they then repeated this process until the final grid line.

"We knew once we had the entire steel frame up we would then have the problem of how to get the MEWPs out of the chapel, as they were hemmed in under the first floor steelwork," adds Mr Roberts. "The narrow entrance we used to get the machines into the structure was now blocked by four new columns."

The solution was to leave the MEWPs where they were until the floors had been cast. At this point the team were able to unbolt the column splices under the first floor, which was temporarily propped by H.H. Smith, remove the four column sections that were blocking the entrance, extract the MEWPs through the now clear entrance and then reintroduce the four column sections making good the bolted splices before removing the temporary propping.

The project is due to be complete by this month (July).

FACT FILE
Welsh Baptist Chapel, Manchester
Main client: Czero
Architect: Buttress Architects
Main contractor: H.H. Smith & Sons
Structural engineer: BuroHappold Engineering
Steelwork contractor: EvadX
Steel tonnage: 96t

The steel frame goes up in the confined space of the chapel interior

Sunday school work

Housing 12 of the project's apartments, the adjacent Sunday school, is now linked to the chapel via a glazed passageway. The building measures approximately 11m × 11m, and to create more floor space a new first floor has been installed within the load-bearing masonry structure.

Additional headroom was needed and so the building's timber roof trusses have been cut and two steel cranked moment frames installed in their place. The cut trusses will be retained within the project and act as a key feature within two apartments.

The school building was in a much better state than the chapel and was being used until recently. Restoration work has included repairing the roof, by replacing missing slate tiles, and renovating the exterior.

How the converted chapel and Sunday school will look

Before construction work started the chapel had fallen into disrepair and had no roof

Community spirit

A community hub containing a high school is set to reinvigorate Midlothian's former coal mining area.

FACT FILE
The Newbattle Centre, Easthouses, Midlothian
Main Client:
Hub South East Scotland on behalf of Midlothian Council
Architect:
Cooper Cromar
Main contractor:
Morrison Construction
Structural engineer:
Arup
Steelwork contractor:
Hescott Engineering
Steel tonnage: 1,150t

A state-of-the-art community hub and high school, known as The Newbattle Centre, is under construction in Easthouses, Midlothian. The Centre will replace an existing school and provide an array of facilities for the local catchment area which includes a number of former mining towns.

The steel-framed building is 15,714m^2, and it will accommodate a new library, gym, swimming pool, sports facilities (including all weather pitch) as well as a high school containing further community facilities.

The building is being delivered by Midlothian Council's development partner, Hub South East, and its appointed contractor Morrison Construction.

Designed by Cooper Cromar, the £34M project is expected to open in 2018 and will accommodate up to 1,200 pupils.

The Newbattle Centre has three distinct parts, a triple-span structure housing the sports facilities, the teaching block, which is three-storeys high and, joining these two parts together, a single storey link structure that accommodates a library, café and the main entrance/reception.

The sports accommodation was always going to be a steel-framed structure, with its requirement for long clear spans. However, the decision to use a steel framing solution for the teaching block was not so clear cut.

"The client wanted a 3.5m-high floor-to-ceiling height with a clear and exposed soffit, something that had been achieved at one of its previous schools. That project had used a concrete frame, but on this project we suggested a steel solution, which would be more cost-effective and as quick to build," says Morrison's Construction Manager Jeff Thornton.

A frame analysis was conducted whereby it was proven that the steel option could deliver everything the client wanted. The design incorporates steelwork supporting precast planks from the bottom flange with the aid of welded on plates.

"During the fabrication process all the teaching block's beams had plates welded on to them as landing points for the slabs," explains Hescott Engineering Director Alan Scott.

In its finished state the steelwork has been moved into the depth of the floor, while the underside of the precast slabs and the beams are painted white, all of which creates a seamless clear exposed soffit in the classrooms.

The teaching block has two rows of classrooms, on every floor, positioned along both main elevations. Circulation routes overlook a large open full height atrium that is located in the middle of the building. The atrium is topped with roof lights that will allow natural light into the structure's inner areas.

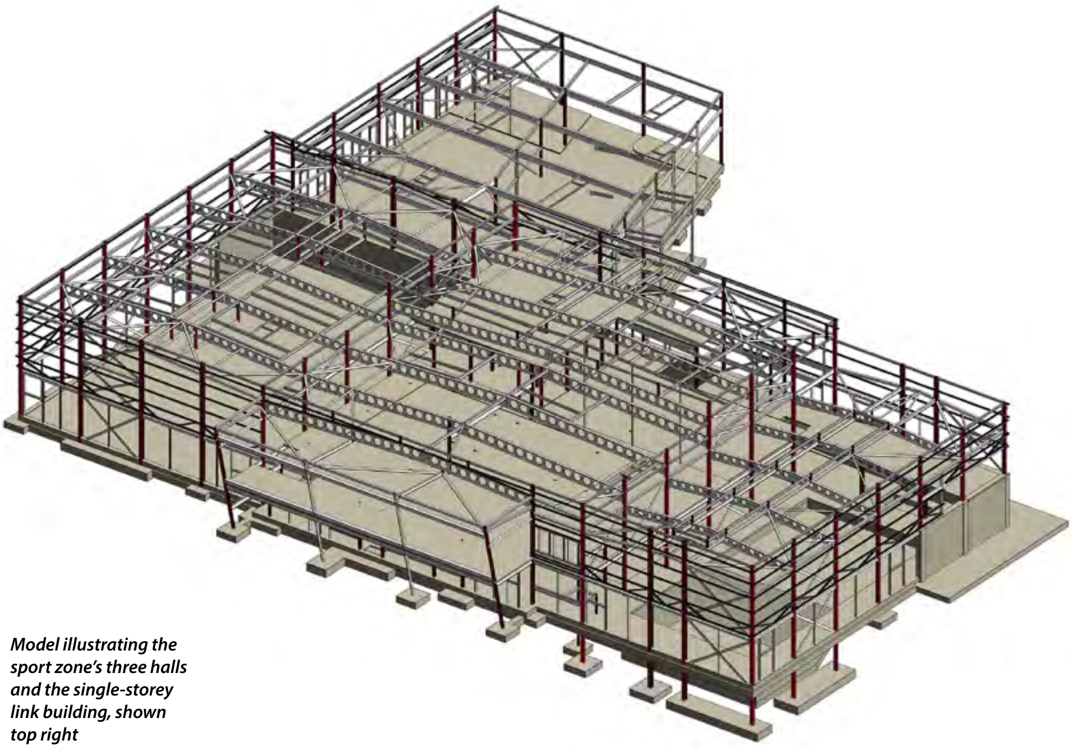
The ground floor of the atrium accommodates the school's dining hall and assembly hall, a facility that can also double-up as a public theatre space. A wide feature staircase, with terraced seating areas along one side, leads from this zone up to the building's first floor level.

Structurally, the teaching block is predominantly built around a regular 8m grid. Stability is derived from vertical bracings, which are mostly located in stair cores.

Adjoining one end of the teaching block is the single storey link building. This long-span area houses the main entrance, a library and a café, all of which will be open to the local community.

As the name suggests, the link building offers access and joins the two parts of the Centre. As the entire steel frame of the project is so large, more than 100m long, the link is structurally separated from the sports zone by a movement joint.

The high school portion of the project



Model illustrating the sport zone's three halls and the single-storey link building, shown top right

Early works

The town of Easthouses is situated in the middle of what was once a thriving coal mining region. The local colliery opened in 1909 and reached its peak, with a workforce of more than 1,000 men, in 1965. Employment has diversified since the closure of the mine in 1969, with many of the town's residents now commuting to Edinburgh.

This industrial legacy played a significant role in the preliminary works for The Newbattle Centre. Although the building is on a previously greenfield site, a number of mine workings needed to be grouted before construction could begin.

A cut and fill operation was then undertaken to level most of the site, prior to the piling and steelwork programmes kicking off.

The sports zone is divided into three braced long span areas, each topped with a shallow dual-pitched roof. For economy reasons, Westok cellular beams have been used to form each of the three roofs.

Explaining the reason for designing braced frames instead of portal frames for the halls, Arup Senior Engineer for Building Structures Gary Stephen says the decision was based on aesthetics.

"Portal frames, with their deeper columns, work perfectly well in distribution centres or industrial buildings where it doesn't really matter if columns protrude into the structure.

"But in our sport facilities we wanted the steel columns to be as narrow as possible to give us smooth walls and this meant we had to have braced frames."

The bracing is located in the roofs, which are braced in two directions, and this then diverts the loads to further vertical bracing positioned in perimeter and division walls.

Of the three sports halls, the middle one housing a fitness suite and changing rooms is the widest with a span of 33m. This hall accommodates a mezzanine level, formed compositely with metal decking. This extra floor will have a large glazed façade giving people using the facility's exercise machines views over the surrounding countryside.

Either side of this hall are two slightly smaller areas. A multi-sports hall with a 26m-wide span, and an 18m-wide hall housing the Centre's 25m-long six-lane swimming pool.

Summing up Mr Thornton says: "This is an exciting new development for the communities of Mayfield, Easthouses, Newtongrange and Gorebridge, and Morrison Construction is delighted to be a part of it.

"The Newbattle Centre will provide a fantastic, modern environment for the community to enjoy and a stimulating learning environment for both staff and pupils."

The portal-framed multi-sports hall

Trusses top leisure arena

A civic gateway to the town of Downpatrick is being created by a leisure centre with a bespoke hybrid design. Martin Cooper reports.

Gym users will have views of the nearby Cathedral

The Northern Ireland town of Downpatrick is said to be the burial place of St Patrick, consequently a large number of tourists regularly visit the county town of Down.

Many of them will have noticed a large structure taking shape alongside one of the main routes into the town. This is Downpatrick's new £14.5M leisure centre, which is said to be the biggest local government construction programme in the Down area.

The 6,000m² centre — which will feature a 25m, six lane swimming pool — will also include a learning pool with movable floor, four court sports hall, multi-purpose rooms and a spa area. There will also be a state-of-the-art fitness suite with over 80 stations.

Although the leisure centre is a functional structure, the location dictated that its design


Work progresses on the tight site sandwiched between the existing leisure centre and the main road

needed to create a building that was much more than that.

Kennedy FitzGerald Architects' Project Manager Jonny Cassidy explains: "The centre is situated on the entrance to Downpatrick town centre and so it is viewed as a gateway project. As such it will have a number of high-quality finishes, including plenty of glazing, fibre cement panels and anodized aluminium, to create a standout building."

Internally, the centre is no less impressive as the design has to accommodate all of the required facilities within one three-storey building. A hybrid design has been adopted, with structural steelwork forming much of the building, with the notable exception of the swimming pool area - where a concrete sub-structure has been cast - and the main cores and lift shafts.

"The design incorporates a complex hybrid arrangement of structural steel and concrete, with each material complimenting and relying on the other," says RPS Project Engineer Gavin Dougan.

Steel has been primarily chosen for the parts of the structure where long spans and column-free spaces are necessary, such as the sports hall and the fitness suite.

Steelwork has also been used for its speed of construction, an attribute which has proven to be very useful.

"In many areas, we have steelwork and concreting teams both working at the same time, with one following on right behind the other. In these areas steelwork has allowed us to get zones of the building up quickly in readiness for the follow-on trades," says Felix O'Hare Project Manager Paul Maginn.

"In order to speed things up in the pool hall, we changed the main columns from concrete to steel as they were quicker to erect, even though we still had to encase them in concrete later in the programme to ensure they were protected from the corrosive atmosphere."

Work on the leisure centre began in mid-2016. The building is being constructed in front of the current leisure centre, on land that was the facility's car park. Once the new centre is up and running, the old leisure centre, which opened in 1980, will be demolished.

Temporary car parking, for the duration of the construction programme, has been provided at the rear of the current leisure centre. This is reached via a temporary road which Felix O'Hare put in during the very early stages of its work. When the current complex is demolished it will be replaced by a new car park boasting 150 spaces.

Because of the poor ground conditions Felix O'Hare's early works included soil stabilization and the installation of 350 CFA piles.

Working in conjunction with the other trades, steelwork contractor Walter Watson began its erection programme with the main entrance and sports hall. This work was undertaken while the swimming pools were being cast at the other end of the building.

The sports hall sits at first floor level above a series of multi-purpose rooms and the main entrance. The hall's open plan area is formed by a series of 18.2m-long × 1.1m-deep roof trusses, supported on top of two reinforced concrete walls.

Overhanging the entrance, the entire northern elevation features a 6m-wide cantilever. As this part of the first floor accommodates the sports hall's store room, a lot of loadings are expected and consequently a large 20m-long truss supports the floor and forms this cantilevering elevation.


The entrance elevation truss is installed

The final part of the steel erection progamme, which is being done during July and August, involves the most complex part of the scheme's steelwork - three rooftop trusses, all working in conjunction with each other to support the roof of the third-floor fitness suite and a plant deck.

The fitness suite sits directly above the main swimming pool and its floor is formed by bridge beams spanning the aquatic zone.

Two primary trusses, measuring 18.5m-long × 2.2m-deep are positioned at either end of the fitness suite, helping to form the large column-free space. A series of 610UBs span the area between the trusses.

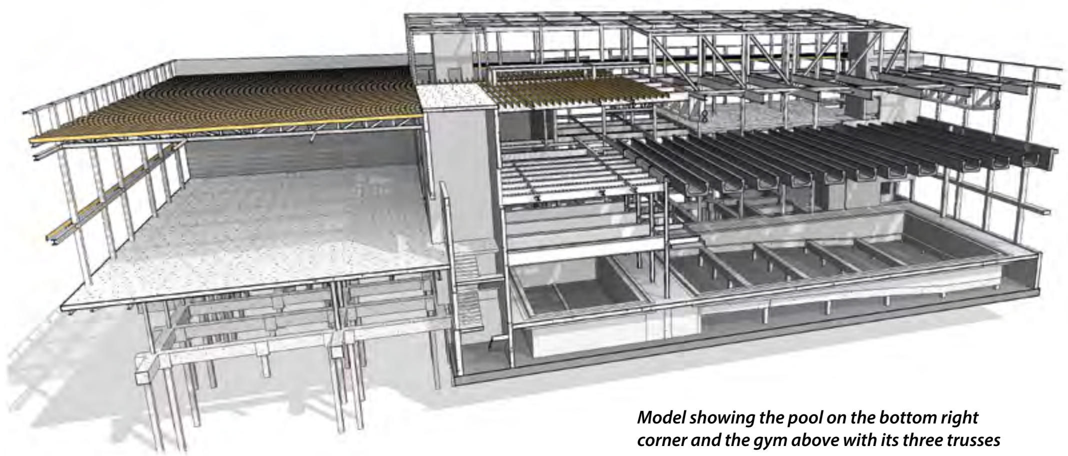
These two trusses, along with the roof beams are supported at one end by the main perimeter steelwork columns, and at the other end by another secondary truss.

Measuring 23m-long × 5.2m-deep and weighing 11.6t, the secondary truss supports the roof and the floor of the plant area, as well as picking up roof beams and trusses spanning the fitness suite.

"All of the project's trusses have been fabricated in one piece and delivered to site on extendable trailers," explains Walter Watson Project Manager Trevor Irvine. "We then erected them using either a 50t or 260t-capacity mobile crane."

Down leisure centre is due to be completed by September 2018.

FACT FILE
Down leisure centre, Downpatrick
Main client: Newry, Mourne and Down District Council
Architect: Kennedy Fitzgerald Architects
Main contractor: Felix O'Hare
Structural engineer: RPS
Steelwork contractor: Walter Watson
Steel tonnage: 450t


Model showing the pool on the bottom right corner and the gym above with its three trusses

Top marks for steel frame

Structural steelwork has proven to be the best option for a new chemistry teaching block at the University of Oxford.

FACT FILE
University of Oxford Chemistry Teaching Laboratories
Main client: University of Oxford
Architect: FJMT
Main contractor: ISG
Structural engineer: AKS Ward
Steelwork contractor: Four Bay Structures
Steel tonnage: 150t

Oxford has been a seat of learning for nearly a thousand years and its university is regarded as the oldest university in the English-speaking world.

Maintaining its position as one of the world's top universities requires investment in its estate to provide students and researchers with cutting-edge teaching facilities. That's exactly what has driven this latest project for the Department of Chemistry.

With available construction space at an absolute premium within Oxford University's estate, the University hit upon the idea of creating a new build extension to an existing 1960s university building, incorporating underused space within this building to augment capacity.

ISG is building a new three-storey steel-framed extension to create a suite of highly-specified undergraduate laboratories for the Department of Chemistry.

The existing structure is a 1960s-built concrete-framed building and a lot of design consultation was undertaken before deciding that a steel solution was the best option for the new extension.

Although the steel frame ties into the adjoining existing structure, it is in fact structurally independent in terms of vertical load.

"It is a fully braced frame down the length of the extension," explains Four Bay Structures Senior Estimator Tony Wright. "It takes stability from the old building in the other direction."

The extension is approximately 100m-long × 13m-wide, and comprises a partial basement, known as level A, with the laboratories situated above on level B and an enclosed plant zone and some offices on level C.

Level A will link into the existing building in one area to create a prep room and equipment store.

A glazed foyer and terrace with a louvred roof, which will also provide access into the existing building, divides the extension in two.

One of ISG's initial tasks on-site was to excavate the partial basement for the extension. This lowest floor level is 2m-deep and consequently it is described as a partial basement, as the three exterior elevations will have windows at ground level, allowing natural light into the rooms.

Once a series of 10m-deep piles had been installed, Four Bay Structures were able to begin the steel erection programme.

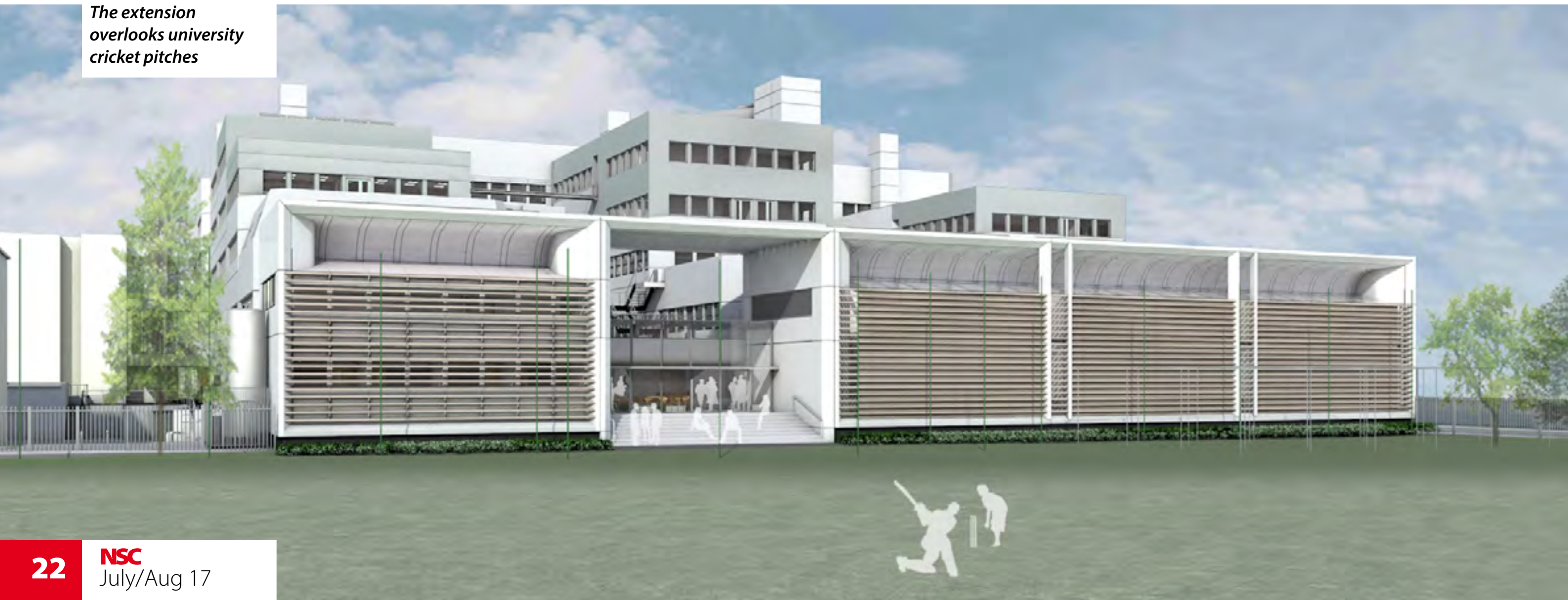
It is a very confined site, bounded by the existing building on one side and playing fields on another. With very little room for manoeuvering or materials storage, Four Bay erected the steelwork sequentially, starting at the furthest point from the site's road entrance.

Steelwork is predominantly set out around a regular 7.5m × 12m grid pattern, using Westok cellular beams for the internal spans.

"This is going to be a heavily serviced building, so cellular beams offered the most efficient solution," says ISG Project Manager James Howard.

The 12m spans form the column-free spaces for the teaching laboratories in the basement and first floor, and open-plan areas for the plant and offices on the second floor.

The extension overlooks university cricket pitches



The 100m-long extension is structurally independent

"A feasibility study was carried out and steel was the best option for the clear spans the building needed," explains AKS Ward Project Engineer Oliver Fyson.

"The existing building's floor-to-ceiling heights – designed prior to modern IT heavily serviced requirements – needed to be linked into on the first floor and so a shallow cellular arrangement was the chosen solution. This accommodates most of the services and allows for a similar floor-to-ceiling height in the extension."

A double row of columns has been installed along the internal elevation, forming a passageway and supporting the beams that connect into the adjoining concrete structure, as well as ensuring that loads are not transferred into this older building.

A composite structural solution has been used throughout with the steelwork supporting metal decking and a thin concrete topping. Metal decking has also been used to form the roof of the extension.

At roof level a row of 3.5m-long cantilevering beams form the extensions feature element. Known as the 'Scoop', the beams will support cladding, which will curve inwards from the top, sloping downwards towards the first floor and creating a curved façade.

The University of Oxford's core focus on environmental sustainability has resulted in demanding targets of operational performance for the new build extension and refurbished elements in the existing building. ISG is targeting a BREEAM 'Excellent' rating for the new chemistry teaching laboratory.

Sustainable measures include the installation of external solar shading, an extensive roof-mounted photovoltaic panel array, an advanced heat recovery system and connection into the university's combined heat and power (CHP) district heating system.

The steel-framed extension is due to be complete by April 2018.

The new steelwork is bolted to the existing concrete building

Cellular beams have created the 12m-long clear spans

Raking columns span the Bakerloo Line that runs beneath the site

Steel promotes South Bank development

Two steel-framed commercial blocks will provide a central element to a prestigious mixed-use development taking shape on London's south bank. Martin Cooper reports.

One of the largest construction projects to be undertaken in central London this century is currently under way on the south bank of the River Thames.

Situated between the London Eye and busy Waterloo Station, Southbank Place covers an area of more than 20,000m^2 and consists of two commercial blocks, and six residential towers along with new retail units, restaurants and cafés, all of which are located around the existing Shell Tower, which will become one of the centerpieces when the project completes in 2019.

The two new commercial office blocks, known as One and Two Southbank Place are both steel-framed structures, containing 11 floors and 17 floors respectively.

Apart from one residential tower, the two commercial structures are the first buildings to take shape on what is already a very busy and logistically challenging site.

Faced with the usual traffic, noise and lack of space all inner-city projects have to cope with, Southbank Place will eventually have a maximum workforce of 1,600 people.

The steel erection has been carried out immediately behind the large-scale groundworks programme, which is currently progressing throughout the site.

Viewed from outside of the hoardings, the project is a forest of tower cranes – there are currently 16 cranes – needed to feed and lift the various materials being used.

"There is very little room on-site and certainly no room for materials to be stored," explains Canary Wharf Contractors Project Manager Sam Hayward. "All of the steelwork has to be delivered on a just-in-time basis and is being offloaded and erected by tower crane."

Severfield began its steel erection programme in January. Work was able to commence once the concrete formed basements were completed, along with the slip-formed cores.

Building One has two cores, a main core that reaches the full height of the structure, and a secondary satellite core that only serves the lowest five levels. Building Two has just the one centrally-positioned core.

"Building One is a fairly straightforward building, based around a repetitive 9m × 12m grid pattern," explains WSP Associate Director Andrew Martin. "Two on the other hand is much more complicated as its design is partially dictated by the Bakerloo underground line that passes beneath its footprint."

The tube line actually passes under the structure's south eastern corner and consequently no piles could be installed in this area. In order to not position columns over this important transport link, this corner, that houses the main entrance of the building, slopes inwards from the sixth floor

Building One incorporates a series of steps for outdoor terraces

Steel model of Building Two

down, with the aid of two raking columns.

These raking columns make the building structurally pull itself towards this corner. To counterbalance this, temporary bracing has been installed, which has to remain in position until the structure's floors are complete.

Both buildings have used cellular beams throughout for efficient service integration. However, unlike Building One, which has some internal columns, Building Two has none, with clear uninterrupted spans reaching a maximum length of 17m.

"With such long spans, some of our connections are very big, as the finished main member is up to 30t in weight in places," says Severfield Senior Project Manager Paul Walmsley. "We've also had to use a number of plated sections to achieve these spans and for the supporting columns."

The north and west elevation of Building Two features a series of outdoor spaces accommodated on 2m-wide cantilevers. These spaces extend upwards from level 6, and they are formed by two further raking columns positioned at fourth floor level that extend up to the underside of the sixth floor. ▶26

FACT FILE

One & Two Southbank Place, London

Main client: Braeburn Estates

Architects: Squire and Partners, Adamson Associates, Kohn Pederson Fox

Main contractor: Canary Wharf Contractors

Structural engineer: WSP

Steelwork contractor: Severfield

Steel tonnage: 6,300t

Building One (foreground) and Building Two viewed from York Road

▶25

The uppermost floor of Building Two is known as the entertainment area. Formed with 12m-high elliptical members, it is a glazed pavilion that is set back from the floors below and offers access to a rooftop terrace. Adjacent to this feature the structure also has a rooftop two-storey plant enclosure.

Meanwhile, Building One's standout feature are the five further outdoor terraces, formed as the structure steps in at levels five, eight and nine, and Level 11 is a plant space.

Both blocks will have different cladding systems, with Building Two finished with curtain walling, and One predominantly clad with large precast panels weighing up to 12 tonnes each.

Both buildings are aiming to achieve a BREEAM "Excellent' rating, and are due to complete towards the end of 2018.

The project is one of the first to be operating as an Ultra Site under the Considerate Constructors Scheme.


Visualisation of the completed Building Two

Connections to concrete cores

Richard Henderson of the SCI discusses the challenges of connecting structural steel to concrete cores - the motivation for a forthcoming publication on the subject commissioned by Steel for Life.

Connections to cores

Members of the public passing the Southbank Place development cannot fail to notice the cranes – but structural engineers will note the cellular beams and the several concrete cores which currently dominate the site. The connections to the cores are achieved by welding attachments to cast in steel plates positioned as the cores were constructed. These sorts of connections are full of challenges – including the accommodation of tolerances, the achievement of the design intent, which is often nominally pinned behaviour, and the transfer of the forces from the plate into the core walls. The Southbank Place development also includes inclined columns, so some connections must transfer both shear and tension concurrently.

Connection behaviour

The design of nominally-pinned connections is covered by the Green Book on Simple Joints[1]. These joints are not designed for coincident vertical and horizontal forces, as the tying check is entirely separate to the verification for the vertical loads. The necessary rotation of the joint is achieved primarily by bearing deformation in the bolt holes.

Real axial loads in beams, from inclined columns, or because of voids in the floor plates around the core, mean connections must be designed for concurrent axial and vertical loads – and are thus immediately outside the provisions in the Green Book. Perhaps more significantly, the axial load may demand substantial connection components, which will certainly make the joint stiffer. Without careful thought, the joint may not behave as the assumed nominal pin. The necessary provision to accommodate core construction tolerances may mean that the eccentricity of the vertical load is significantly more than commonly assumed, increasing the moment applied at the joint.

The connection in the concrete

Embedded plates are cast in with arrangements of shear studs and reinforcement connected to the back of the plate. A clear design model is needed – which components transfer the vertical force, and which carry the axial/tying force and the inevitable moment? For the concrete designer, there is the challenge of transferring these forces into the core, often through congested reinforcement.

The interface between core and steelwork

Professional interfaces also have an impact on the design of the joint between steel and concrete. The structural engineer generally determines the steel and concrete member sizes, designs the concrete structure and provides connection forces to design the connections. At the embedded plate, the design responsibilities of the two parties come together, with local forces to be transferred to the core concrete being dependant on the detail developed – perhaps by the steelwork contractor working in isolation.

This discussion describes some of the very real challenges with connections to cores which have been addressed at the Southbank Place development. Guidance on how to manage this important interface will appear later this summer in a new design guide commissioned by Steel for Life.

[1] SCI/BCSA Joints in steel construction: simple joints to Eurocode 3. P358, 2014

The design of hybrid fabricated girders - part 2

In Part two of the article, David Brown of the SCI discusses the lateral torsional buckling resistance and shear resistance of hybrid sections.

Cross sectional moment resistance – made easy

In Part 1, the cross section was classified as Class 4 (due to the web), leading the designer to BS EN 1993-1-5 and the challenge of calculating effective section properties. There is an easier approach, but the penalty is a conservative resistance.

Clause 5.5.2(12) of BS EN 1993-1-1 allows the class of the cross section to be based on that of the flanges alone, as long as it is assumed that the web is designed for shear alone and does not contribute to the bending resistance. This simple approach does not relieve the designer of considering shear lag and plate buckling, as clause 6.2.1(2) of BS EN 1993-1-1 makes clear.

In the example presented in Part 1, the flanges were Class 3. If the web is assumed to make no contribution to the bending resistance, then the resulting stress diagram is shown in Figure 1.

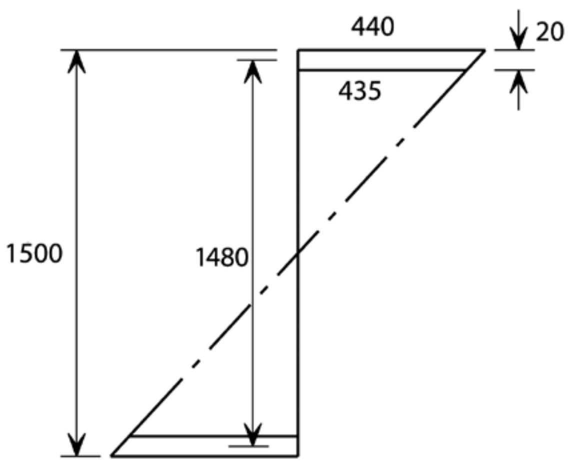


Figure 1: Class 3 stress diagram, neglecting the web

As demonstrated in Part 1, the flange does not suffer from shear lag effects or plate buckling effects.

Thus the bending resistance of the cross section = 400 × 20 × 437.5 × 1480 × 10^{-6} = 5180 kNm

The resistance calculated in Part 1 was 6485 kNm; an increase of 25% over the simple approach.

Lateral-torsional buckling

There is no real challenge in LTB resistance. The section properties must be calculated, or the on-line M_{cr} tool on *steelconstruction.info* can be used to calculate the section properties – and to compute M_{cr}, of course.

For those who prefer to see the calculations:

$$I_z = 2 \times \frac{20 \times 400^3}{12} + \frac{1600 \times 12^3}{12} = 213 \times 10^6 \text{ mm}^4$$

$$I_w = \frac{I_z \times h_0^{\,2}}{4} = \frac{213 \times 10^6 \times (500 - 20)^2}{4} = 1.17 \times 10^{14} \text{ mm}^6$$

$$I_t = \frac{2}{3} b_f t_f^{\,3} + \frac{1}{3} h_w t_w^{\,3} = \frac{2}{3} \times 400 \times 20^3 + \frac{1}{3} \times 1460 \times 12^3 = 2.97 \times 10^6 \text{ mm}^4$$

(the calculation for I_t is a simplification; online tools give 2.92 × 10^6 mm^4)

Assuming the loading is uniformly distributed, then C_1 = 1.13. At this point, the value of M_{cr} can be calculated using the steel designer's favourite (or maybe not?) expression:

$$M_{cr} = C_1 \frac{\pi^2 E I_z}{L^2} \sqrt{\frac{I_w}{I_z} + \frac{L^2 G I_t}{\pi^2 E I_z}}$$, which computes to 5966 kNm.

It does seem rather odd to use online tools to calculate section properties and then compute M_{cr} by hand, when the same software will calculate M_{cr} to be 5970 kNm.

The general case given in clause 6.3.2.2 of BS EN 1993-1-1 is used for fabricated girders.

h/b = 1500/400 = 3.75, so curve d is used and α_{LT} = 0.76

Working through the expressions in clause 6.3.2.2, the reduction factor χ_{LT} = 0.447 and M_b = 0.447 × 6485 = 2899 kNm.

Web resistance

The web must resist shear, of course, but must also prevent the flange buckling in the plane of the web (a possibility for very tall, thin webs). When calculating the shear resistance, the presence of stiffeners (or not) makes a significant difference, as will be demonstrated. The shear resistance comprises a contribution from the web, but also an additional contribution from the flanges. The flanges can span between stiffeners and mobilise a tension field mechanism (see Figure 2) – essentially like a tension member in a truss. The contribution from the flanges is generally small and can only be used if the flanges are not fully utilised in carrying moment – so a simple solution is to neglect the additional resistance.

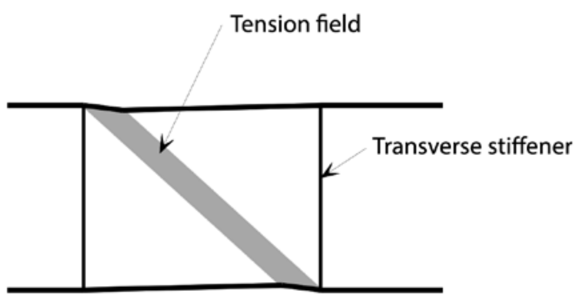


Figure 2: Flange contribution to web shear resistance (from Hendy and Murphy)

Shear resistance

The consideration of shear resistance starts in BS EN 1993-1-1, with an expectation that for tall thin webs, shear buckling will be critical (clause 6.2.6(6)).

For the web, $\varepsilon = \sqrt{\frac{235}{355}} = 0.81$. With η=1, then

$$\frac{h_w}{t_w} = \frac{1460}{12} = 121.7\,;\quad 72\frac{\varepsilon}{\eta} = 72 \times \frac{0.81}{1} = 53.3$$

▶27

▶28 A check of shear buckling is therefore required (the web would need to be 25 mm thick before a check of shear buckling is not needed), which takes designers to BS EN 1993-1-5 clause 5.2. Initially, the resistance of an unstiffened web will be calculated.

Unstiffened section - contribution from the web – clause 5.3

A series of intermediate values are required, determined from Annex A.3 and Annex A.1 of BS EN 1993-1-5

From Annex A.3, if the unstiffened span is 8 m, then $\frac{a}{h_w} = \frac{8000}{1460} = 5.48$. Because this value is greater than 1.0, the shear buckling coefficient, k_τ is given by: $k_\tau = 5.34 + 4\left(\frac{h_w}{a}\right)^2 + k_{\tau sl}$

$k_{\tau sl}$ relates to longitudinal stiffeners, so is zero in this example. Therefore, $k_\tau = 5.47$

From Annex A.1, $\sigma_E = 190000\left(\frac{t}{b}\right)^2 = 190000 \times \left(\frac{12}{1460}\right)^2 = 12.84$

From clause 5.3(3), $\tau_{cr} = k_\tau \sigma_E = 12.84 \times 5.47 = 70.2$

Then $\bar{\lambda}_w = 0.76\sqrt{\frac{f_{yw}}{\tau_{cr}}} = 0.76\sqrt{\frac{355}{70.7}} = 1.71$

Because $\bar{\lambda}_w > 1.08$ (From Table 5.1), $\chi_w = \frac{0.83}{\bar{\lambda}_w} = \frac{0.83}{1.71} = 0.49$

Thus the contribution from the web =

$$\frac{0.49 \times 355 \times 1460 \times 12}{\sqrt{3} \times 1.0} \times 10^{-3} = 1745 \text{ kN}$$

The contribution from the flange, assuming $M_{Ed} = 0$ at the supports, is 33.5 kN, so less than 2% of the contribution from the web – and small enough to be neglected.

The plastic shear resistance should be verified in accordance with clause 6.2.6(2) of BS EN 1993-1-2, and in this example is found to be 1980 kN – as expected, shear buckling is critical.

Stiffened section - contribution from the web – clause 5.3

If intermediate transverse stiffeners are provided, the shear resistance increases. In this case, it is assumed that the transverse stiffeners are spaced such that $a/h_w = 2$ (Figure 3).

Then k_τ=6.34; σ_E=12.84; τ_{cr}=81.4; $\bar{\lambda}_w$=1.59; χ_w=0.522 and the web resistance increases to 1874 kN

In this stiffened case, the additional contribution from the flanges increases to 96 kN, so is more significant.

Moment resistance or shear resistance – which is critical?

If, as calculated above, the LTB resistance, M_b is 2899 kNm, and assuming that M_{Ed} is 90% of M_b, then the UDL is 326 kN/m

The end shear is therefore 1304 kN, so in this example, even the unstiffened shear resistance of 1745 kN is sufficient.

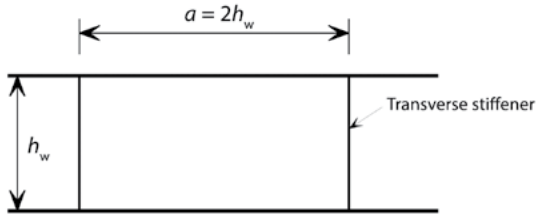


Figure 3: Aspect ratio of web panel

Flange induced buckling (clause 8)

To prevent flange induced buckling, the following criteria must be satisfied:

$$\frac{h_w}{t_w} \le k\frac{E}{f_{yf}}\sqrt{\frac{A_w}{A_{fc}}}$$

Since the elastic moment resistance has been calculated, the factor $k = 0.55$

Then $\frac{1460}{12} \le 0.55\frac{210000}{440}\sqrt{\frac{1460 \times 12}{7999}}$ or $121.7 \le 388.5$

The criteria is satisfied, so there is no flange induced buckling of the web.

Further guidance

The Designer's Guide to EN 1993-2 by Hendy and Murphy has extensive coverage of BS EN 1993-1-5. *Structural Design of Steelwork to EN 1993 and EN 1994* by Martin and Purkiss contains examples of fabricated section design including the design of intermediate transverse stiffeners and end posts. Readers of the second resource should note that the larger elastic section modulus (not the smaller) is calculated in example 5.4, with a consequent problem in the calculated resistance.

Conclusions from Part 2

This article has attempted to introduce the design rules that apply to any fabricated beam section with a Class 4 web – the fact that the web and flanges are of different grades is not significant. The hard work was completed with the calculation of the cross section moment resistance, covered in Part 1. On-line tools cannot help here, as the calculation of M_{cr} – where on-line tools are invaluable – is based on the gross section properties, not the effective section properties needed for the cross sectional resistance.

AD 409:
Recent Blue and Orange Book developments

Recent restructuring within the UK steel industry has led to new developments in the provision of structural steel design information produced by SCI; traditionally known as the 'Blue Book'. This AD note explains these changes.

The first version of the 'Blue Book': *Steelwork Design Guide to BS 5950-1: 2000, Volume 1, Section properties, Member capacities* (SCI publication P202) was published in 1985, based on BS 5950-1. Seven editions were published; the most recent in 2007.

In 2009, the Eurocode version of the Blue Book was published (SCI publication P363). Minor revisions and corrections were made in reprints published in 2011, 2013 and 2015.

Both of these publications (P202 and P363) are still available; hardcopy from the SCI shop *http://shop.steel-sci.com* or electronically to SCI members only, from *www.steelbiz.org*.

The first electronic version of the Blue Books was released by Corus in 2006. Since then, several downloadable versions of the Blue Books have been developed by SCI.

All downloadable versions of the electronic 'Blue Books' are no longer supported by SCI and users are encouraged to use the new, up-to-date, 'Blue Book' and 'Orange Book' websites as described below.

A web-based version of the 'Blue Book', known as the 'Tata Steel interactive Blue Book', was released in 2008. This website was withdrawn in March 2017.

Recent electronic 'Blue and Orange Book' developments

Recent 'Blue Book' user surveys revealed that many users were unaware of the additional functionality offered in the downloadable products. Where they were aware, they generally did not value these features. Furthermore, with increased company IT security, it was becoming problematic for users to download, install and update the software on their company PCs or laptops. The web-based versions also had the added benefit of enabling section ranges to be easily updated without the need for any software updates.

It was therefore decided to develop a new suite of 'Blue and Orange Book' websites. As at June 2017, the following products, developed by SCI, are available:

1. Users of the IHS Construction Information Service (CIS) are able to access a dedicated 'Blue Book' website from *www.ihsti.com/CIS*. Data are provided for the BS4 product ranges and commonly available European section ranges. British section resistance data, to the Eurocodes (UK National Annex), are provided for grades S275, S355 and S460 steel and the European ranges for grades S355 and S460.
2. The Steel for Life 'Interactive Blue Book' website, *www.steelforlifebluebook.co.uk*, is essentially the replacement for the previous Tata Steel interactive Blue Book. The Steel for Life Blue Book provides comprehensive design data; both Eurocode (UK National Annex) and BS 5950-1 for open section ranges to EN 10365:2017 and for structural hollow sections; hot finished to EN 10210-2 and cold formed to EN 10219-2.
3. The new Tata Steel 'Blue Book' website, *www.tatasteelbluebook.com*, replaces the recently withdrawn 'Tata Steel interactive Blue Book' website and provides data on Tata Steel's Celsius and Hybox structural hollow section ranges. Eurocode resistance data are available for S355 and S420 steel sections both in English (UK National Annex) and German (German National Annex). In addition, for the Celsius 355 range, resistance data to BS 5950-1 are provided.
4. The ArcelorMittal Orange Book website, *http://orangebook.arcelormittal.com*, provides member resistance data for S355/HISTAR355 and S460/HISTAR460 steel. Eurocode data (UK National Annex) are provided for the European open section ranges produced by ArcelorMittal and for the British section ranges according to EN 10365:2017.

With the exception of the IHS product, all websites are freely available and allow users to print information directly or export the data to their own computer.

Contact: **Michael Sansom**
Tel: **01344636555**
Email: **advisory@steel-sci.com**

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BUILDINGWITHSTEEL
Reprinted from Volume 4 No. 7
August 1967

Attractive new bridge at Windsor

Victoria bridge, which carries the Datchet-Windsor road over the River Thames, was one of a pair constructed about 1851 by the London and South Western Railway Company as part of the compensation for royal land made available for their railway work.

The original bridge was a five-ribbed cast iron elliptical arch flanked by arched abutments and surmounted by an elegant cast iron balustrade over elaborate tracery in the spandrels. As a fixed arch it was subject to damage from even the slightest movement of the foundations. The arch ribs became cracked at the quarter points and, despite several repairs, a load limit of 3 tons became necessary after the Second World War. A military heavy girder bridge was constructed over the old bridge in 1963.

Mott Hay & Anderson were commissioned by the County Councils of Berkshire and Buckinghamshire to design a new river span, the design to accord with the special requirements of the site and be visually acceptable in the context of the original arched abutments. The new bridge allows a headroom of 20 ft 9 in for river traffic above normal water level, and the span between bearings is 123 ft 6 in. By following the original design of an elliptical arch (with the major axis horizontal), the design provides the widest possible opening for vessels.

The two steel box arch ribs are well able to resist the bending stresses which result from adopting this shape. Bending due to fixity is eliminated, as the ribs rest on new pinned bearings at the abutments. Each arch rib is a welded box of high yield stress steel to BS 963, 3 ft 6 in wide by 2 ft 6 in deep. The corner welds connecting the 1¼ in flanges to the $^5/_8$ in web plates were made externally in V-preparations within the thickness of the flanges. There is a single site splice at mid-span.

The deck is a single reinforced concrete slab 32 ft wide overall, tapering in thickness from 13½ in at the bridge centre line to 19 in over each rib to form two longitudinal beams. These beams rest directly on and are shear connected to the ribs over a length of 32 ft at mid-span, and elsewhere are supported from the ribs on six pairs of 5-in diameter solid steel columns at 12-ft centres.

Erection was started in April 1966. The bridge was entirely closed to traffic during the progress of the work, but a temporary footbridge was built a short distance downstream. The military bridge was used to support the old bridge during dismantling and then removed.

The ribs were assembled and checked at the fabricators works before being transported to the site by barge. A 100-ton travelling crane standing on the abutments erected the half ribs, which were supported on a temporary mid-river trestle until spliced. The bearings were carefully jacked riverwards until the centre splice was closed, and when the connection had been fully grip bolted, trued up to 0.010–0.012 in clearance.

The completed bridge was subjected to a loading test in which vehicles were placed on one half of the spans and the quarter point deflections measured. Measured deflections were less than those calculated, probably owing to the stiffening effect of the deck acting compositely with the arch ribs for part of the span.

The bridge was opened to traffic on 17th March 1967. It contains approximately 72 tons of structural steelwork, of which 60 tons are high yield stress steel in the main arch ribs. The total cost was approximately £80,000, part of which was borne by British Rail in final discharge of the obligation incurred by the London and South Western Railway when the old bridge was built.

New and revised codes & standards

From BSI Updates June 2017

NEW WORK STARTED

ISO 11124-1
Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives. General introduction and classification
Will supersede BS EN ISO 11124-1:1997

ISO 11124-3
Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives. High-carbon cast-steel shot and grit
Will supersede BS EN ISO 11124-3:1997

ISO 11124-4
Preparation of steel substrates before application of paints and related products. Specifications for metallic blast-cleaning abrasives. Low-carbon cast-steel shot
Will supersede BS EN ISO 11124-4:1997

ISO 11125-9
Preparation of steel substrates before application of paints and related products. Test methods for metallic blast-cleaning abrasives. Wear testing, efficiency testing

DOCUMENTS NOT ISSUED AS DPCs

ISO/DIS 17607
Steel structures – Execution of structural steelwork

prEN 1011-3
Welding – Recommendations for welding of metallic materials – Part 3: Arc welding of stainless steels

CEN EUROPEAN STANDARDS

EN 1993-1-5:-
Eurocode 3. Design of steel structures. Plated structural elements
AMENDMENT 1: April 2017 to EN 1993-1-5:2006

EN 1993-1-6:-
Eurocode 3. Design of steel structures. Strength and Stability of Shell Structures.
AMENDMENT 1: April 2017 to EN 1993-1-6:2007

ISO PUBLICATIONS

ISO 3580:2017
Welding consumables. Covered electrodes for manual metal arc welding of creep-resisting steels. Classification
Will be implemented as an identical British Standard

ISO 14713-1:2017
Zinc coatings. Guidelines and recommendations for the protection against corrosion of iron and steel in structures. General principles of design and corrosion resistance
Will be implemented as an identical British Standard

ISO 14713-3:2017
Zinc coatings. Guidelines and recommendations for the protection against corrosion of iron and steel in structures. Sherardizing
Will be implemented as an identical British Standard

Steelwork contractors for buildings

BCSA

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	✔	Silver	Up to £2,000,000
Adstone Construction Ltd	01905 794561			●	●	●	●									✔	2	✔	Gold	Up to £3,000,000
Advanced Fabrications Poyle Ltd	01753 653617				●	●	●	●		●	●			●	●	✔	2			Up to £800,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●					●	●			●	●	✔	4			Up to £3,000,000
Angle Ring Company Ltd	0121 557 7241												●			✔	4			Up to £1,400,000
Apex Steel Structures Ltd	01268 660828			●	●	●	●			●	●			●			2			Up to £2,000,000
Arc Fabrication Services Ltd	01709 557654			●	●	●	●	●	●	●	●			●	●	✔	3			Up to £200,000
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				●	●				●	●			●	●	✔	4		Gold	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 £1,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●				✔	4			Up to £1,400,000
Barnshaw Section Benders Ltd	0121 557 8261												●			✔	4			Up to £2,000,000
BHC Ltd	01555 840006	●	●	●	●	●	●	●			●	●		●	●	✔	4		Silver	Above £6,000,000
Billington Structures Ltd	01226 340666		●	●	●	●	●	●	●	●	●	●		●	●	✔	4	✔	Gold	Above £6,000,000
Border Steelwork Structures Ltd	01228 548744			●	●	●	●			●	●				●		4			Up to £3,000,000
Bourne Construction Engineering Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	Gold	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		Silver	Up to £3,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	Gold	Above £6,000,000
Cementation Fabrications	0300 105 0135	●			●			●			●		●		●	✔	3		Gold	Up to £6,000,000*
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●		●		✔	4		Gold	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	✔	Gold	Up to £6,000,000
EvadX Ltd	01745 336413			●	●	●	●	●	●	●	●	●				✔	3		Gold	Up to £3,000,000
Four Bay Structures Ltd	01603 758141			●	●	●	●	●		●	●			●	●		2			Up to £1,400,000
Four-Tees Engineers Ltd	01489 885899												●		●	✔	3		Member	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
Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
H Young Structures Ltd	01953 601881			●	●	●	●	●		●	●			●	●	✔	2		🟢	Up to £2,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✔	4			Up to £3,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✔	4		⚪	Up to £6,000,000
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								●		●			●	●	✔	3			Up to £6,000,000*
Pencro Structural Engineering Ltd	028 9335 2886			●	●	●	●	●	●		●			●	●	✔	2			Up to £2,000,000
Peter Marshall (Steel Stairs) Ltd	0113 307 6730									●					●	✔	2			Up to £800,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		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
SAH Engineering Ltd	01582 584220			●	●	●				●	●			●	●		2			Up to £800,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●				●			●	●	✔	4			Up to £2,000,000
Sean Brady Construction Engineering Ltd	00 353 49 436 4144			●	●	●	●			●	●			●	●		2			Up to £800,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4		🟠	Above £6,000,000
SGC Steel Fabrication	01704 531286				●					●				●	●	✔	2			Up to £800,000
Shaun Hodgson Engineering Ltd	01553 766499	●		●	●		●			●	●			●	●	✔	3			Up to £800,000
Shipley Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●		2			Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✔		Up to £1,400,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●		2			Up to £1,400,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £800,000
Taziker Industrial Ltd	01204 468080									●				●	●	✔	3			Above £6,000,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●				●			●	●	✔	2			Up to £400,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●			●	●	✔	3	✔	⚪	Up to £2,000,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●		✔	2	✔		Up to £1,400,000
Tubecon	01226 345261						●	●	●	●				●	●	✔	4		🟠	Above £6,000,000*
Underhill Engineering 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 £400,000
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
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	08457 504030
Kier Construction Ltd	01767 640111
PTS (TQM) Ltd	01785 250706
Sandberg LLP	020 7565 7000
Structural & Weld Testing Services Ltd	01795 420264
SUM Ltd	0113 242 7390

RQSC
The Register of Qualified Steelwork Contractors Scheme

Steelwork contractors for bridgeworks

BCSA

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	✓		✓	Gold	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	✓	4			✓		Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●			●	●	✓	4			✓	Silver	Up to £3,000,000
Cementation Fabrications	0300 105 0135	●	●						●	✓	3			✓	Gold	Up to £6,000,000*
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	✓	4		✓	✓	Gold	Above £6,000,000*
D Hughes Welding & Fabrication Ltd	01248 421104	●		●			●	●	●	✓	4			✓		Up to £800,000
Donyal Engineering Ltd	01207 270909	●						●	●	✓	3			✓	Member	Up to £1,400,000
ECS Engineering Ltd	01773 860001	●	●	●	●		●		●	✓	3					Up to £3,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●		●	●	●	✓	3			✓	Member	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●		●				●	●	✓	4			✓	Gold	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		✓	✓	Gold	Up to £4,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●		●	✓	4	✓		✓	Silver	Up to £2,000,000
Severfield (UK) Ltd	01204 699999	●	●	●	●	●	●	●	●	✓	4			✓	Gold	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 Engineering 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 £1,400,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●		●	✓	4			✓	Member	Up to £800,000
Francis & Lewis International Ltd	01452 722200							●	●	✓	4			✓	Gold	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 £40,000
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		✓	✓	Gold	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		✓	✓	Silver	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		
Cleveland Steel & Tubes Ltd	01845 577789								●		M		
Composite Profiles UK Ltd	01202 659237	●									D/I		
Cooper & Turner Ltd	0114 256 0057									●	M		
Cutmaster Machines (UK) Ltd	01226 707865					●					N/A		
Daver Steels Ltd	0114 261 1999	●									M		
Daver Steels (Bar & Cable Systems) Ltd	01709 880550	●									M		
Dent Steel Services (Yorkshire) Ltd	01274 607070								●		M		
Duggan Profiles & Steel Service Centre Ltd	00 353 56 7722485	●							●		M		
easi-edge Ltd	01777 870901							●			N/A	Gold	
Fabsec Ltd	01937 840641	●									N/A		
Ficep (UK) Ltd	01924 223530					●					N/A		
FLI Structures	01452 722200	●									M	Gold	
Forward Protective Coatings Ltd	01623 748323						●				N/A		
Graitec UK Ltd	0844 543 8888		●								N/A		
Hadley Group Ltd	0121 555 1342	●									M	Silver	
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	Member	
International Paint Ltd	0191 469 6111						●				N/A	Gold	
Jack Tighe Ltd	01302 880360						●				N/A		
Jamestown Manufacturing 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	Gold	
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	01525 375234						●				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	Silver	
Structural Metal Decks Ltd	01202 718898	●									M	Gold	
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	Gold	
Wedge Group Galvanizing Ltd	01909 486384						●				N/A		
Yamazaki Mazak UK Ltd	01905 755755					●					N/A