MARCH 2024

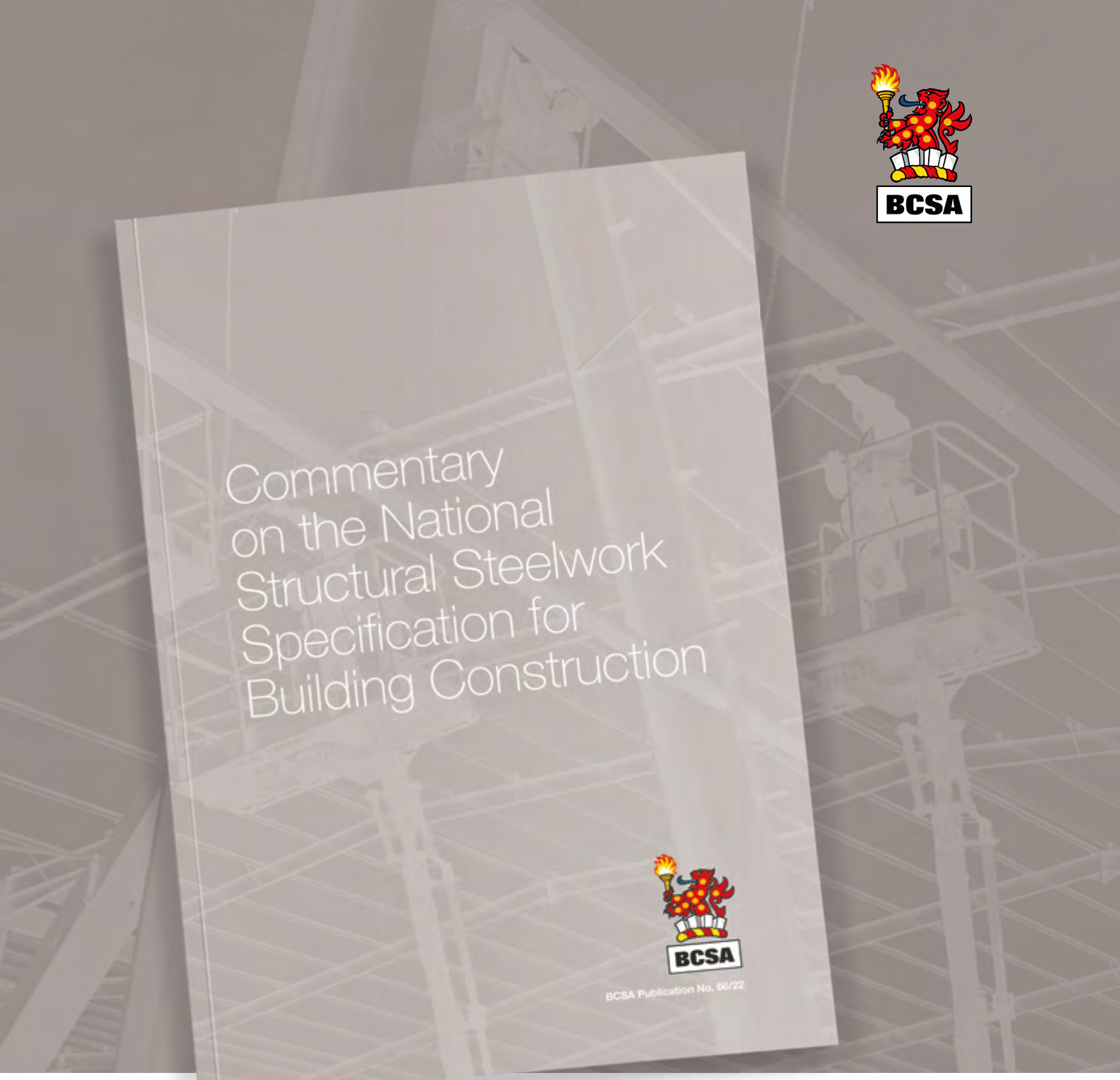
NSC

'Outstanding' target for Blackpool

Activity centre at Butlin's Bognor Regis

HIgh-rise residential in Liverpool

Sustainable steel for mobility hub



The 3rd edition of the Commentary on the National Structural Steelwork Specification for Building Construction 7th edition (NSSS) is now available.

The Commentary has been prepared to give guidance and additional information on the background and philosophy behind the recommendations given in the NSSS.

Main updates include:

- References to British Standards
- Section 5 – Workmanship
- Section 10 – Protective treatment (corrosion and fire)
- Section 11 – Quality management

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The publication can be purchased here, with BCSA members receiving a 20% discount on the £60.00 RRP.

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NSC

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Talbot Gateway, Blackpool
Main client: Muse Developments & Blackpool Council
Architect: Make Architects
Main contractor: VINCI Building
Structural engineer: Alan Johnston Partnership
Steelwork contractor: Leach Structural Steelwork
Steel tonnage: 1,100t

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

NSC online

more than just a magazine

It's a digimag.

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

It's a website.

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

Simple support could boost potential and productivity

Nick Barrett - Editor

Government support for steel manufacturers captures headlines when it is asked for to support carbon emission reduction measures that support the climate change struggle. That support is, from the point of view of the steel sector itself and many commentators from elsewhere, vital to secure the strategic ability of the UK to produce a strategic resource as well as to support the industry's net-zero ambitions.

For itself, the BCSA has always taken pride in having a financially sound, technically competent and world leading membership that makes few demands on government. Like all other sectors however constructional steelwork does need some consideration from government, and the BCSA has from time to time identified areas where government action would benefit the industry and the wider economy. In February the BCSA launched a 'manifesto' (see News) detailing some measures that would benefit steelwork contractors and manufacturers as well as others in the construction industry and the entire UK.

The manifesto calls for Parliament to introduce five measures to improve situations that are preventing constructional steelwork and others from achieving their potential. First among these is an end to cash retentions. Steelwork contractors are among the first to complete their work on site but can be at the end of the queue to be fully paid when the project completes. Insolvency can overcome main contractors before these amounts are paid, so BCSA has joined an industry groundswell of calls for instituting Project Bank Accounts to keep retentions safe from liquidations.

The manifesto calls for prioritising UK companies on all public funded contracts such as HS2, and for social value assessments and government's existing Procurement Policy to be monitored and enforced all along the supply chain.

The UK faces a large and growing skills crisis and the BCSA has supported moves to increase the number of apprentices entering the industry, but financial incentives to colleges and apprenticeships providers are unintentionally encouraging provision of Level 3 apprenticeships over Level 2, for which the demand is higher. BCSA calls for a 'fit-for-purpose' apprenticeship scheme that removes this anomaly to meet the skills crisis.

There is a widely acknowledged need for improved access to finance that would support innovation and productivity improvement. The BCSA's members have a long track record of investing in the latest CNS fabrication machinery and software, which helps explain the sector's world leading performance, but encouragement for government departments and funders to support these investments is needed.

Steel manufacturers have shown themselves to be keen to decarbonise their operations and prepared to make substantial investments, but this needs support of all kinds from government. BCSA warns that without this support more steel will be imported to meet net-zero targets. One key measure would be to extend the national grid to provide power for electric arc furnaces.

As BCSA CEO Dr David Moore said at the House of Lords manifesto launch, the UK steelwork sector is an economic building block that needs and deserves recognition and support of its potential to be a booming industry creating jobs, boosting GDP and delivering opportunity. These are simple measures that politicians could take to deliver a shot in the arm for the sector and beyond. Let's hope the government and its successors take heed.

Steelwork sector launches manifesto ahead of general election

Left to Right: BCSA President Gary Simmons and BCSA CEO, Dr David Moore deliver the steel sector manifesto.

The UK structural steelwork sector has launched its manifesto for the sector at an event in the House of Lords, urging sitting and prospective politicians to take action to protect and grow the industry.

The sector is worth approximately £1.6bn per year and employs around 60,000 people in the UK. The British Constructional Steelwork Association's (BCSA) manifesto includes a range of measures, which it believes are necessary to both sustain and promote its members.

The manifesto would like to see the end of cash retentions, as they stifle cash flow and potentially damage smaller companies, while the sector would also like UK firms to be prioritised on all public-funded contracts, such as HS2.

Other points on the manifesto wish list include better support for apprenticeships, more access to finance to help the industry innovate with the latest technology, and a commitment from the Government to support steelmakers decarbonise their operations.

BCSA CEO, Dr David Moore, said: "The UK steelwork sector is, literally and figuratively, an economic building block. It is both the fabric of our growth and development, and has the potential to be a booming industry creating jobs, boosting GDP and delivering opportunity.

"The industry does not operate in a vacuum and there are simple measures that our politicians could take, which would be a real shot in the arm for our sector. It is our hope that a future government, of whatever political persuasion they may be, will recognise both the value and potential of the constructional steelwork industry and take the action we need to flourish and grow."

Sponsoring Peer Lord Aberdare, said: "The practice of cash retentions in the construction sector – withholding a proportion of payments due to subcontractors for work they have completed – has a pernicious impact on the sector.

"Smaller contractors may have to wait for an extended period for sums owed to them, and sometimes never receive them at all. This not only eats into their already tight profit margins, but reduces their ability to invest in training, technology and growth. The government has been thinking about how to tackle retentions for far too long; it is high time they were finally put to an end."

Severfield joins the A-list for climate change

Steelwork contractor Severfield has been recognised for its leadership in corporate transparency and performance on climate change by CDP, the global environmental non-profit organisation, securing a place on its annual A-list.

Based on information reported through CDP's 2023 climate change questionnaire, Severfield is one of a small number of companies that achieved an A-list ranking, out of over 21,000 firms assessed.

Severfield said that achieving an 'A' rating demonstrates the Group's commitment to best practice when it comes to reducing its impact on climate change.

Other achievements made by the Group include: Achieving a 33% reduction in its Scope 1 and 2 GHG (greenhouse gas) emissions from 2018; switching to green electricity tariffs with 94% of its total purchased and consumed energy coming from these sources in 2023, and being accredited as carbon neutral for the third year running.

Severfield CEO Alan Dunsmore, commented: "Our commitment to reducing our impact on climate change has never been clearer. As market leaders in the steel industry, we have a responsibility to display best practice when it comes to environmental disclosure, and we are pleased that CDP have recognised that we are delivering on this."

Work starts on major Wolverhampton campus

Full construction work is now underway on the £61M Wolverhampton City Learning Quarter, which will provide a major boost to the local economy.

The project, supported by Government funding, will establish new educational facilities for the City of Wolverhampton College, Adult Education Wolverhampton and the Central Library, benefitting skills and employment outcomes for residents across the city and wider region.

Main contractor McLaughlin & Harvey says it has completed enabling works, such as utility diversions, welfare construction and hoarding installation. It is now carrying out strip-out, demolition and ground preparation works, with piling works due to commence to establish the foundations for the new building.

Council Leader, Councillor Stephen Simkins, said: "It is a very proud moment to see our City Learning Quarter vision becoming a reality. It will have a visible and tangible impact on the City of Wolverhampton and its residents, making a massive difference to everyday life through direct investment in skills and education - it has the potential to unlock future opportunities for all in the city."

British Steel submits application for electric arc furnace in Scunthorpe

Visualisation of the proposed EAF plant at British Steel's Teesside Beam Mill.

Steelmaker British Steel has submitted a planning application to North Lincolnshire Council for a proposed Electric Arc Furnace (EAF) in Scunthorpe.

Once the application document has been verified, it will be considered by the council. This follows the company's application to Redcar and Cleveland Borough Council in December to build a similar EAF at its Teesside Beam Mill.

British Steel said the applications are central to its plans to transform the company into a clean, green and sustainable business by adopting EAF steelmaking at both sites.

A company spokesperson, said: "EAF technology is the only solution to significantly reducing our carbon emissions in a relatively short period of time. It is prudent to evaluate different operational scenarios to help us achieve our goals and we are continuing to assess our options.

"However, we firmly believe electrification will provide a rapid and sustainable solution to our decarbonisation challenge. Our proposals remain subject to the appropriate support from the UK Government with whom we remain in talks."

Final phase of Olympia steel package underway

Forming one of the final steel-framed elements of the wider Olympia redevelopment scheme in west London, the G-Gate building is currently underway.

The complex structure will accommodate, events space (at first floor level), a theatre at second to seventh floor, and three uppermost levels of office space.

Located on a plot previously used for car parking, the G-Gate will accommodate one of the largest new theatres to be built in London since the 1970s.

The structure's steel beams and columns are set at three separate grid patterns for each of the different uses.

Long-span transfer trusses positioned on the second and eighth floors support and accommodate the change in column positions.

Working on behalf of main contractor Laing O'Rourke, BHC is fabricating, supplying and erecting 20,000t of steelwork for the overall project.

Once complete in 2025, the 14-acre Olympia project will create a new cultural hub. Centred around two retained exhibition halls, the hub will also include two hotels, a live music venue, restaurants, rehearsal spaces, a jazz club, retail units and offices.

Green light for Manchester library

Planning permission has been granted for a state-of-the-art library at Manchester Metropolitan University.

Manchester City Council has approved the project, which will involve the current library on Oxford Road replaced with a modern and dynamic zig-zag-shaped structure.

Architects Hawkins\Brown and Schmidt Hammer Lassen were commissioned to design the new iconic building and demolition works are expected to begin this Autumn. Construction work is due to complete in early 2028, with the library ready for the start of the 2028-29 academic year.

The eye-catching new building will feature digitally enabled teaching and research facilities to enhance students' data science and analytical skills.

It will house the University's Special Collection Museum and the Manchester Poetry Library – the North West's first public poetry library – plus a new gallery and event spaces.

Andrew Fallon, Director of Estates and Capital Development at Manchester Metropolitan University, said: "The new library will be a striking addition to our estate and the Oxford Road skyline, serving as an iconic architectural gateway to our University.

"Once built, it will provide a vibrant learning, research, and collaboration hub, empowering our University community and fostering creativity and engagement for future generations."

NEWS IN BRIEF

Lindapter has announced that its Type FL beam flange clamps have been independently fire rated for up to 120 minutes by BRE Global. The product is used to secure building services from structural or secondary beams without the need for drilling or welding.

BAM Construction has been appointed by the University of South Wales (USW) to deliver a new academic building at the Treforest Campus in Pontypridd. Designed by Stride Treglown Architects, the building will contain more than 40 teaching, learning and research spaces, including electronics and hydraulics labs, a flight simulator, a robotics lab, clean and industrial research spaces, collaborative teaching spaces, as well as virtual reality capability, and exhibition spaces.

Main contractor **Kier** has been appointed by the Sussex Partnership NHS Foundation Trust to deliver a new £60M 54-bed acute inpatient mental health hospital in Bexhill-on-Sea as part of its Re-designing Inpatient Services in East Sussex (RIS:ES) Programme. The 5,300m² facility will provide high-quality inpatient services for adults and will replace out-dated services currently provided in the Department of Psychiatry, at Eastbourne District General Hospital.

GMI Construction Group has broken ground on a £50M student accommodation scheme on the site of a former York cinema and bingo hall. The 7,500m², four-storey building in the Fulford area will provide 275 beds alongside an array of modern amenities, including a gym, yoga studio, games room, co-working spaces, group dining areas, integrated cycle parking, and landscaped courtyards. In a nod to its heritage, it will also feature a cinema.

Work has started on the redevelopment of **Bournemouth & Poole College**'s Lansdowne area campus, which will serve a range of students from school leavers to adult learners. The new build facility will contain teaching space throughout, providing a modern teaching environment for courses in media, computing, sport, fitness, travel, health, social care, hair, beauty, hospitality and catering.

PRESIDENT'S COLUMN

An article entitled "The engineering behind nuclear grade steel as used at Hinkley Point C" was published in the *New Civil Engineer* (*NCE*) on 19th Jan 2024.

While I cannot contest the individual statements contained within the article, the implication I got from reading the full text is that we have a significantly limited supply of UK steel that is suitable for use on nuclear sites. And I wasn't the only one to come away with this impression as within a few days of publication, one reader was already questioning how much longer the UK would be able to produce the necessary high-quality steels required for a project of this nature.

I was first alerted to the article by an industry colleague who, like myself, has been working on the Hinkley C project for the past few years. He too, had interpreted the content of the article to be suggesting that steelwork of the quality required to build a nuclear power plant is not readily available in the UK.

I therefore feel it necessary to clarify this perception.

When completed, over 30,000 tonnes of steelwork will have been supplied to construct the Hinkley Point C nuclear site. The vast majority of this steelwork has been sourced from UK mills or stockholders, with the remainder sourced directly from Europe. Since this steelwork is specified for its structural qualities, the general grade of this steelwork is S355, which is commonly available around the UK from suppliers such as British Steel, Tata, Liberty Steel and steel stockholders such as Barrett Steel and others.

The steelwork referred to in the NCE article was specifically limited to the 245-tonne dome roof that sits on top of the nuclear reactor and provides containment against the leakage of radioactive materials. The supply of this steel is usually specified in accordance with ASME codes to comply with pressure containment rather than structural behaviour, hence the term "nuclear grade material". The difference between this grade of steel and what we all recognise as "standard structural steel" is related to manufacturing controls and chemical element limits as well as the material yield strength. For example, a commonly specified nuclear grade material is SA508, which can have yield strengths ranging from 345MPa to 585MPa depending on the nature of the design.

Given the correct specification, it is therefore possible that nuclear grade material could be sourced from a range of UK suppliers and is more readily available than the article appears to suggest.

And, while on the subject of UK steel supply, many BCSA members have raised questions as to whether the imminent closure of Tata Steel's Port Talbot blast furnaces will affect the availability of certain steel products in the UK prior to the opening of the new Electric Arc furnace at the same site in 2027. In response, Tata Steel has confirmed that the supply will remain uninterrupted by the import of semi-finished slabs from their overseas plants in the Netherlands and India to feed its downstream processes in the UK. In addition, Tata Steel will continue to operate the hot strip mill through the transition period and in the future.

With UK steel production at its lowest level since the Great Depression of 1931/32, we need the confidence that both Tata Steel and British Steel will successfully deliver their upcoming projects and get the UK back among the top G20 countries where steel production is proportionate to the size of the economy.

Gary Simmons
BCSA President

Steel bridge installed at major M25 junction upgrade

Said to be one of the longest footbridges on the M25, the 91m-long Sandpit Lane Footbridge has been installed as part of the M25 Junction 10 upgrade scheme.

Working on behalf of main contractor Balfour Beatty, Nusteel Structures fabricated and then delivered the bridge to site as two 45.5m-long Warren trusses, each weighing 47t. The trusses each span a separate carriageway and are supported by an abutment on the side of the highway, as well as a central pier.

In order to keep traffic disruption to a minimum, the bridge was installed during two separate weekend motorway closures using a 450t-capacity mobile crane.

This is the first footbridge to be installed at this location and forms part of National Highways commitment to create a new 5km route that will connect with many existing paths, tracks, and bridleway.

Jonathan Wade – National Highways Senior Project Manager for the M25 J10 upgrade, says: "We're keen to make sure that our scheme benefits the local community as well as motorists and this new footbridge will make crossing the M25 much safer and easier for pedestrians, cyclists, and horse riders."

The Sandpit Hill Footbridge is due to open this coming Autumn, once work to the surrounding embankments is finished.

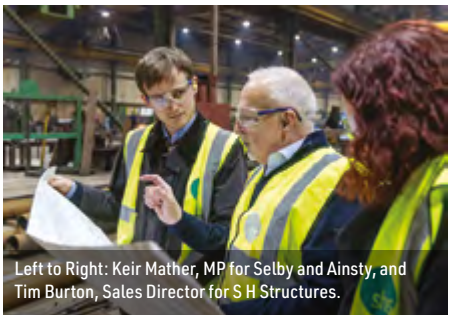
Yorkshire steelwork contractor gets MP endorsement

Keir Mather, MP for Selby and Ainsty, visited Sherburn-in-Elmet-based S H Structures, a prominent constructional steelwork company located in his constituency.

During the visit, Mr. Mather engaged in discussions with industry leaders from the company and the British Constructional Steelwork Association (BCSA), shedding light on critical issues affecting the constructional steelwork sector.

The primary topics covered during the visit included concerns over HS2 Contracts, Pre-qualification assessments and tender access, as well as issues with public project procurement.

MP Keir Mather said, "It was great to visit S H Structures to learn more about the work they do putting Sherburn-in-Elmet on the steelwork fabricator map, whilst creating skilled jobs in our local economy.



Left to Right: Keir Mather, MP for Selby and Ainsty, and Tim Burton, Sales Director for S H Structures.

"A vibrant steel sector is crucial to our economy and to our national resilience. As the Labour MP for Selby, I look forward to supporting the company and its invaluable work long into the future."

Tim Burton, Sales Director for S H Structures, said: "We appreciate Keir's interest in understanding our challenges and opportunities. It's essential to collaborate with policymakers to create an environment conducive to the growth of our industry."

Oxford United set all-electric-powered stadium goal

League One, Oxford United FC has announced plans to build the first stadium in the country powered solely by electricity to create a sustainable new home.

As part of the club's pledge to deliver a state-of-the-art stadium it would use a low-carbon energy supply to create an 'all electric' stadium, with power also generated by solar panels.

Jon Clarke, Development Director at Oxford United, said: "The standout element of the stadium is it will be the most sustainable mid-sized sports venue in the country. We want to make the most of the opportunity to create something special – it would be one of the greenest football stadiums to be built."

The proposed 16,000 capacity stadium, to be built near Kidlington on the outskirts of Oxford, would not use any high carbon intensity fossil fuels such as gas.

Renewable energy sources, including 3000m^2 of solar panels on the roof, along with energy efficiency measures would achieve radical carbon emission reductions. The club said the solar panels would generate enough energy to boil around 3 million 3-litre kettles per year.

Modern building fabric design and heat recovery solutions would also be used to maximise thermal efficiency.

The plans for the stadium also include a 180-bed hotel, restaurant, conference centre, health & wellbeing space, gym and a community plaza. The club is currently preparing to submit its full planning application.

Space skills centre to land in North East

Northumbria University has secured £50M in funding to create a world-leading space skills, research and technology centre in Newcastle.

The funding from the UK Space Agency and global aerospace giant, Lockheed Martin, have been match-funded by the University itself, to create the North East Space Skills and Technology Centre.

The centre, which will be known as NESST, will be a "game-changer" for the UK space economy. It is expected to directly support the creation of over 350 jobs and inject over £260M into the local economy over the next 30 years.

Located in the heart of Northumbria University's Newcastle city campus, NESST will be a new national space asset that brings together industry and academia to collaborate on internationally significant space research and technological developments.

Andrew Griffith MP, Minister of State at the Department for Science, Innovation and Technology, said: "Making Britain a space superpower means backing brilliant ideas up and down the land and harnessing the full potential of talent in our growing sector – from Dundee to Newcastle, Cornwall to Snowdonia. By investing with the private sector in research and facilities across the UK, we are ensuring they become home to global industries that support the growth of our £17.5 billion space sector, create hundreds of new jobs and build dynamic businesses across the UK."

Permission granted for major Fulham wharf development

Henley Investment Management has received planning permission to build a cluster of 17-storey residential buildings with 276 apartments at the Albert & Swedish Wharf, a site described as one of the last remaining undeveloped riverside locations on the River Thames in London.

Henley's scheme will also transform an underused two-acre site by Wandsworth Bridge, on the north bank of the River Thames, to provide a 5,100m² logistics facility. The development will include a new wharf and ancillary office space.

The planning application approved by London Borough of Hammersmith & Fulham councillors, includes a new jetty to improve capacity for handling waterborne cargo.

The 276 residential apartments will range in size from studio to four-bed, and 35% of them will be designated as affordable, a mix of social rent and intermediate rent. Every flat will have a private balcony or terrace, the developer said.

Ian Rickwood, Chief Executive of Henley Investment Management, said: "The redevelopment of Albert & Swedish Wharf is a truly unique opportunity to bring this site back into positive use. Not only does it provide much needed housing for London but also an operational wharf for last mile logistics, where demand remains high and having a site like this is incredibly rare. The River Thames has huge untapped potential for handling light freight and utilising the river more will help ease congestion and reduce pollution across London."

Contractor named for University of Oxford medical research building

Morgan Sindall Construction has been appointed by the University of Oxford to deliver the Institute for Global Health building.

The 4,700m² facility will accommodate 400 staff and 330 researchers over three floors. The building will act as a landing place and home for global health activities across the University and is said to represent an exciting new phase of development for medical research.

It will be constructed, insulated and ventilated to meet the rigorous environmental impact and energy-efficient design requirements to ensure Passivhaus standards are met. Morgan Sindall said it will deploy a range of intelligent solutions to achieve this, from sourcing sustainable materials to using the latest technologies and techniques.

Morgan Sindall Construction Area Director James York, said: "This state-of-the-art building will provide a modern, flexible space that will become a focal point for the University's world-class medical research and it's a privilege to play a role in its creation."

Diary

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

Tuesday 9 April 2024
Brittle Fracture
Webinar, SCI/BSCA Members only
The selection of an appropriate steel sub-grade is an essential part of a designer's responsibility. The UK National Annex makes significant modifications to the Eurocode approach, which is appropriate for structures subject to fatigue. The webinar will cover the process of specifying sub-grade, both in accordance with the UK NA, and using SCI publication P419, which is appropriate when fatigue is not a design consideration.

Wednesday 17 & Friday 19 April 2024
Fire Resistant Design of Steel Structures
On-line Course
This short course will cover the essentials of structural fire design of steelwork, from the Building Regulations to the resistance of beams and columns at elevated temperatures. It will cover only the so-called simple calculation models (which are complicated enough!), involving the calculation of reduced design loads, the time-temperature curve and modified material properties. An introduction to the protection of members with web openings and the special rules for portal frames in boundary conditions will also be presented.

Wednesday 24 April 2024
An Introduction to Steel Piling
Webinar (Free to all)
This 'Free to All' webinar will be presented by experts from the SCI's Steel Piling Group. It will give an introduction to steel piling, covering the specification and design of steel sheet and bearing piles. Other topics will include the installation and extraction of steel piles, and sustainability considerations. All attendees will receive a free PDF copy of P308 as part of their webinar handouts.

Galvanizing: the original green solution

Galvanizing a steel element provides a 70 year protection against rust and corrosion.

Construction is reported to be responsible for around 40% of total greenhouse gas emissions, and with governments, businesses and customers seeking more sustainable solutions that meet their own goals and aspirations, galvanizing has become the finish of choice for the industry.

Thanks to its winning combination of long-lasting protection, ease of application, and sustainability credentials, galvanizing offers a commercially viable and appropriate solution that's also kinder to the environment.

One organisation at the forefront, supporting those across a wealth of sectors to become more environmentally-friendly, is Wedge Group Galvanizing: the largest hot-dip galvanizing organisation in the UK.

The Group's Technical Services Director, David Nobes, explains why galvanizing is the original green solution, and explores their own journey to net zero.

"Hot dip galvanizing dates back to the mid-1700s, and thanks to its lack of produced waste, its recyclability, and longevity, it's the perfect partner for those looking to reduce their impact on our planet.

"A simple, one-off immersion in molten zinc will cover the steel component inside and out (even the hard-to-reach areas), providing a metallurgically-bonded finish that protects against rust and corrosion for more than 70 years. This allows for a highly resource-effective process, as it requires no maintenance, resulting in: minimal downtime, limited inconvenience, and low lifecycle costs (which is especially important in the current climate).

"Any unused zinc can remain in the bath ready for the next project, without changes to its physical or chemical properties. Plus, galvanized components can be recycled with scrap steel, or stripped, re-galvanized, and reused time and again - allowing for minimal waste.

"It's clear to note the abundance of sustainability credentials that the galvanizing process itself boasts. To enhance this, many galvanizing companies globally are seeking solutions and changes to internal procedures. But at Wedge Group Galvanizing, we're proud to take it one step further: dedicated to being advanced, novel and pioneering in our approach.

Wedge Group Technical Services Director David Nobes, says galvanizing offers numerous sustainability benefits.

"As part of our wider commitment, we're on a carbon reduction journey towards net zero, and through this have made some significant advancements and investments. We know this isn't something that can be achieved overnight, nor is it a simple tick box exercise - however, it's something that our entire team is passionate about. As a long-term goal, we've recently developed and implemented a sustainability commitment that the entire company lives and breathes.

"That said, this is not a new phenomenon for us. Instead, it's something we've been working on for decades - for example, we introduced a bespoke rainwater harvesting system at multiple plants, and we became lead-free over 10 years ago.

"Plus, more recent developments include the introduction of high-velocity Smart-Firing technology, which has resulted in an impressive 35% carbon emissions reduction. Smart-fire furnaces analyse and monitor temperatures, heat exchangers transfer waste heat back into the galvanizing process, lagged tanks retain heat, and low-temperature degreasers work just as productively with an innovative chemical which requires much lower temperatures.

"We're also proudly one of the first lead and chrome-free galvanizing companies in the UK. Using alternatives which are much kinder to the environment complements our overall strategy around sustainability. We're also rolling out electrical manual handling equipment, such as forklift trucks, across the group.

"While we're making great advancements company-wide, we're not naive to the fact that we have a long way to go. This is a long-term commitment to become equally as advanced and novel in our approach to sustainability as the process itself is. And we encourage others within this sector to follow suit – deemed to be the next industrial revolution, it's vital that we all make conscious, considered, and careful decisions to work collaboratively for a greener tomorrow."

Wedge Group Galvanizing has a history dating back over 150 years. With 14 plants strategically placed across the country, the firm offers a truly national galvanizing service. ■

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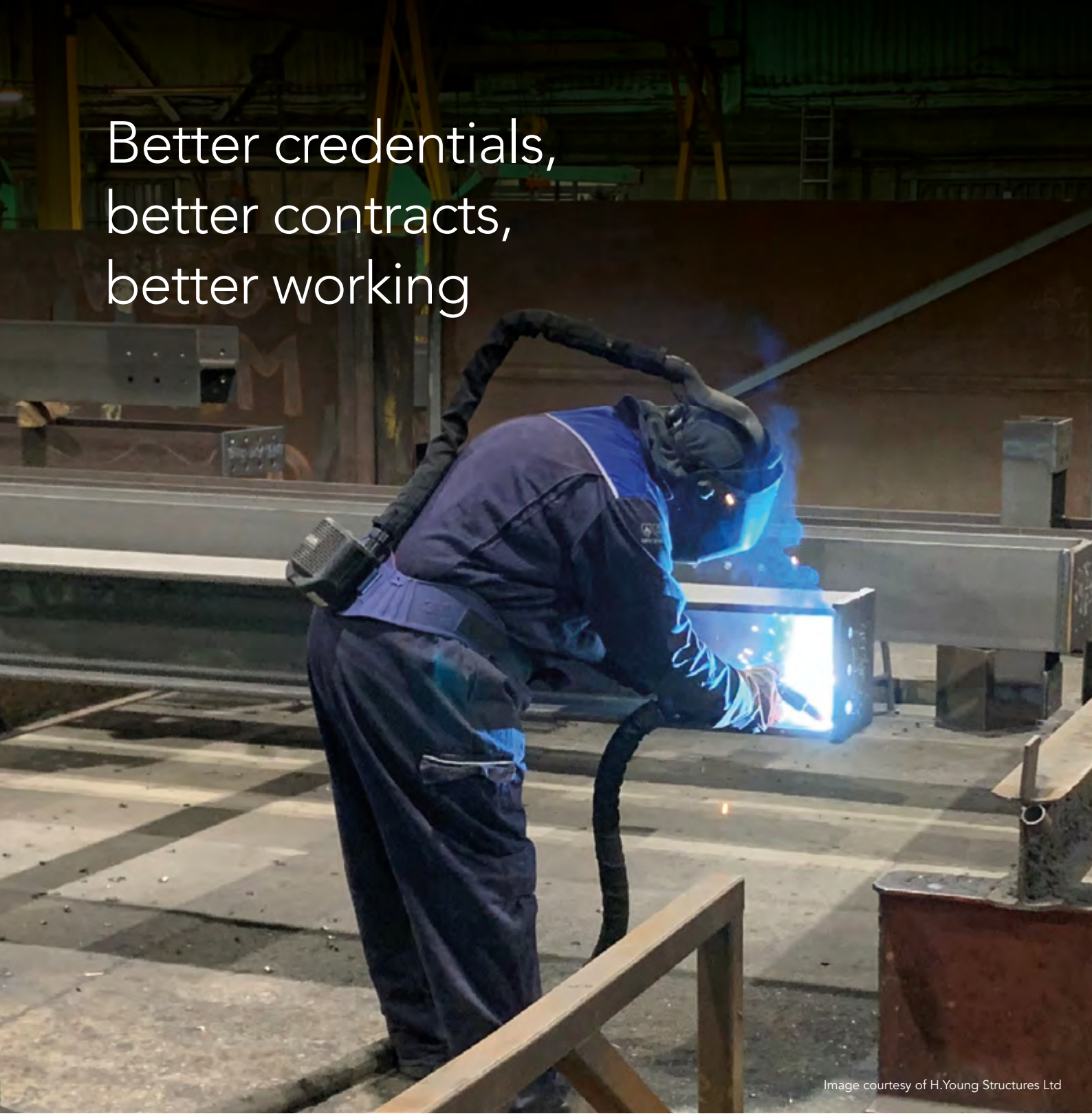

Image courtesy of H.Young Structures Ltd

Better internal operating systems help in winning more business

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Seaside regeneration

Structural steelwork is playing a leading role in the latest phase of Blackpool's wide-ranging Talbot Gateway scheme.

More than 3,000 civil servants will be relocating to a seven-storey regional hub in Blackpool town centre when the sustainable steel-framed project completes in 2025.

Forming the third phase of the multi-million-pound Talbot Gateway scheme, which has already regenerated a large swathe of land adjacent to Blackpool North railway station, the office block will generate significant footfall to the area, while boosting trade to local businesses, retailers and food outlets.

Designed by Make Architects, the £100M structure will create 20,000m² of floor space. The project is targeting a BREEAM 'Outstanding' rating, as it will operate on low energy and promote both sustainable development and wellbeing.

An inclusive approach to sustainability was taken from the outset, to make sure the building will be as energy-efficient as possible. It will have high levels of insulation and air source heat pumps to provide low-carbon heating and cooling. Demand-driven ventilation will improve indoor air quality, while at the same time allowing energy savings during times when the building is not occupied.

During the building's inception, the project team completed early-stage whole life and upfront embodied carbon assessments, to eliminate inefficiencies where possible and reduce the building's whole carbon footprint. The new offices are aiming to reduce upfront embodied carbon intensity to 800 kgCO2e/m², compared with 1,100kgCO²e/m² for a typical office development.

As the project design team were looking for the most cost-efficient and flexible framing solution for the building, a steel frame was the preferred choice.

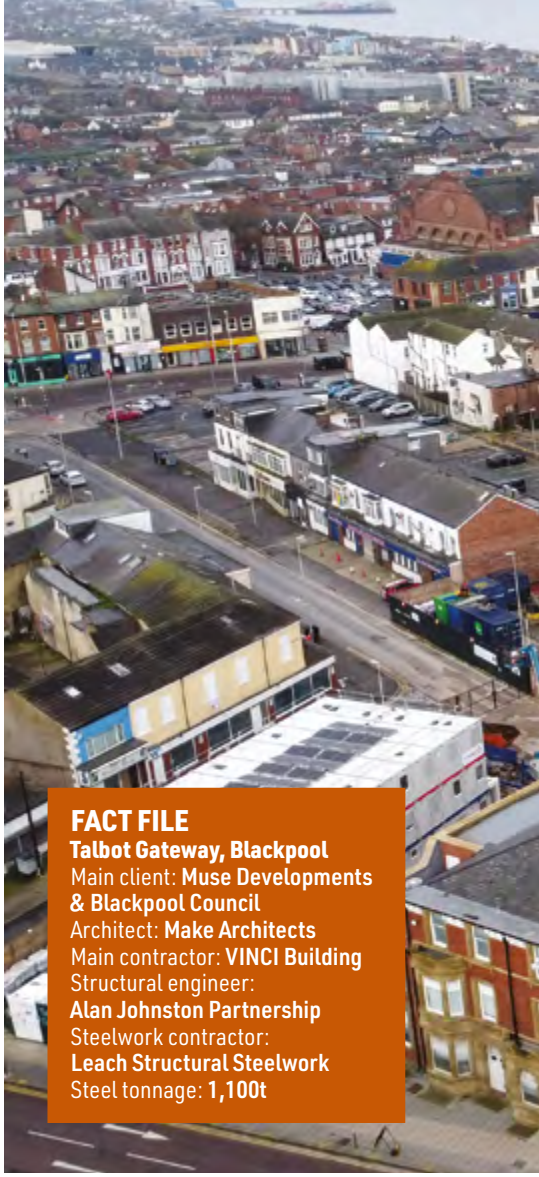
"Low energy and low carbon design as well as material choice have been at the heart of decision making. This will result in a truly energy efficient, low carbon building that we can all be proud of," says VINCI Building Regional Managing Director Garry Bowker.

The site was previously occupied by a mixture of ground level parking, retail units and housing, all of which was demolished and cleared prior to the construction programme beginning.

One of the initial construction tasks was the installation of a series of Contiguous Flight Auger (CFA) piles that along with pile caps support the steel frame.

Starting at ground floor, the building's steel frame is based around a regular grid pattern with internal spans of up to 15m-long.

Westok cellular beams have been used to accommmodate services throughout the building.



FACT FILE
Talbot Gateway, Blackpool
Main client: **Muse Developments & Blackpool Council**
Architect: **Make Architects**
Main contractor: **VINCI Building**
Structural engineer: **Alan Johnston Partnership**
Steelwork contractor: **Leach Structural Steelwork**
Steel tonnage: **1,100t**

"Two centrally-positioned concrete cores, accommodating lifts and stairs, provide the steelwork with its necessary stability," explains Alan Johnston Partnership (AJP) Director Danny Sinclair.

"They were constructed as freestanding slip-formed structures and the primary steelwork is connected to them via cast-in plates, which required careful design and coordination between the concrete contractor Mayo Civils, steelwork contractor Leach Structural Steelwork and ourselves."

Various flooring options were considered for this project, but Westok cellular beams that accommodate the building's services within their depth was the chosen option.

The openings within the beams were carefully designed and coordinated with the design team to accommodate the current MEP services and also allow for future flexibility.

The beams are also said to be the most efficient in terms of cost, loading, contractor familiarity, construction programme and embodied carbon. Forming a composite flooring solution, the cellular beams also support metal decking and a concrete topping.

Westok Design Team Manager John Callanan says: "It's great to be back on site at the impressive Talbot Gateway development, as Westok cellular beams and plate beams were used on the very first scheme on site, the 11,150m² Sainsbury's superstore, which completed back in 2014.

The seven-storey building forms part of the wider Talbot Gateway development.

"For this office development, we worked collaboratively with the team to deliver the lowest embodied carbon design solution. The efficiently designed lightweight Westok beams deliver a continuous string of cells for grids of 9m, 12m, and 15m clear-spans."

Although the primary steel columns begin at foundation level, further up the building some secondary elements start at roof level, creating a plant room and a perimeter MEP equipment protection screen.

The building's north western corner accommodates the stand-out feature of the project's design. A curved façade, formed with facetted steel beams, create the main entrance, which also includes a 3.85m-deep cantilever at second floor level.

The structural engineering and glazing teams worked closely to ensure that the deflection limits between the structure and the curved façade were achieved.

"We're focused with partners as we re-energise the town centre, by delivering a place that blends the town's rich history with its aspirations for the future," says Alan McBride, Projects Director at Muse.

"As a business, we're committed to creating places with purpose for people that offer tangible environmental and social benefits to local communities, and are looking forward to seeing the building progress."

Commenting on the successful steel construction and the overall team effort, Leach Structural Steelwork Managing Director Eric Leach says: "This project was a collaborative team effort, after partnering with Vinci at an early stage of the design, we were able to work alongside AJP, Westok and Mayo Civils to deliver an efficient and economic design.

"Low energy and low carbon design as well as material choice have been at the heart of decision making."

"This meant that all the complex aspects of the project could be thoroughly understood and planned for in advance, helping us to complete our work onsite three weeks earlier than programmed."

Summing up, Cllr Lynn Williams, Leader of Blackpool Council, says: "This is the third phase of the Talbot Gateway development we have now delivered in partnership with Muse. We are pleased to welcome VINCI Building to the partnership. We are looking forward to working with them and the social value benefits they can bring to our town through this contract.

"It is fantastic to see this development start on site and is a great start to the New Year. Throughout the pandemic, we were determined to push on with our regeneration of Blackpool and it is really exciting to see so much of our vision for the future coming to fruition."

The project is due to complete in March 2025 ■

Steel bracketry, attached to the beams, supports the building's cladding system.

Visualisation of the completed scheme

Steelwork has provided the scheme with the most flexible solution.

FACT FILE
Butlin's PLAYXPERIENCE, Bognor Regis
Main Client: **Butlin's**
Architect: **Inspired Partnership**
Main contractor: **Amiri Construction**
Structural engineer: **Crouch Waterfall**
Steelwork contractor: **Snashall Steel Fabrications**
Steel tonnage: **325t**

Steel checks in at holiday resort

Structural steelwork is playing a starring role in creating the latest addition to the entertainment roster at the Butlin's resort at Bognor Regis.

Structural steelwork is playing a starring role in creating the latest addition to the entertainment roster at the Butlin's resort at Bognor Regis.

A new £15M indoor activity centre at the West Sussex resort, known as PLAYXPERIENCE, will feature a variety of cutting-edge experiences, all under one roof.

This immersive steel-framed indoor hub, set over two floors and covering nearly 4,650m², will have an offering that will include Escape Rooms, Digi Darts, TechPutt, Laser Tag and a Batting Cage, where via AI technology, players will be able to compete in baseball, tennis, lacrosse, or cricket.

"A steel-framed structure has provided the client with its desired open-plan design and one that can also be reconfigured, by removing partition walls, if requirements change in the future," explains Crouch Waterfall Principal Chartered Engineer Rob Jones.

With a footprint measuring 64m × 42m, the two-storey steel frame is based around a 6m × 4.5m column grid pattern on the ground floor, while the upper level is more open plan with two 16m-wide spans.

The project is being overseen by main contractor Amiri Construction who started onsite early in 2023. The site was previously occupied by parts of the adjacent Butlin's fairground. This attraction has recently undergone a refurbishment and some of the rides were moved in order to make room for the new activity centre.

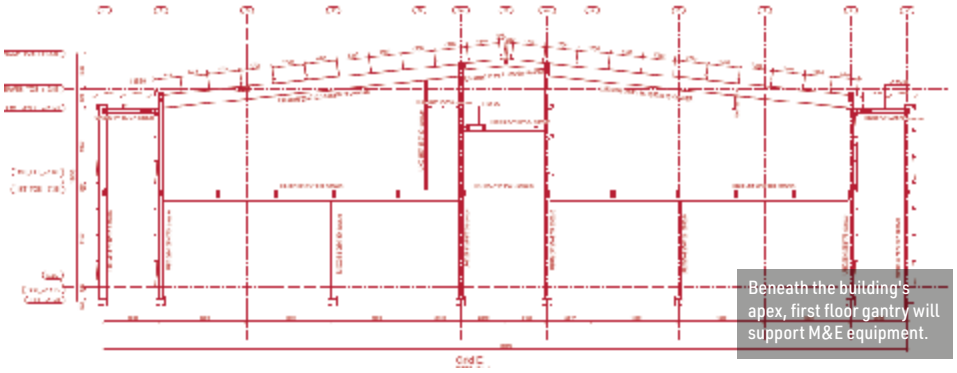
As the site is close to the sea, ground conditions are challenging and consequently the project's foundations consist of a series of CFA piles. These had to be installed down to the bedrock, which is up to a depth of 20m. Each of the activity centre's steel columns are supported by up to four CFA piles and a series of ground beams.

Logistics and coordination between different trades has been key to keeping this project on schedule,

The structure has a distinctive red and black cladding system.

"The steel construction has allowed us to create a flexible future proof space over two floors and a dedicated gantry level that will house highly efficient plant equipment."

Based around a regular grid pattern, the perimeter columns are 12.5m-tall.



Beneath the building's apex, first floor gantry will support M&E equipment.

on what is a confined and busy site. While the foundations and groundworks were still ongoing, steelwork contractor Snashall Steel Fabrications was able to commence the steel erection programme at the opposite end of the site.

The onsite coordination has also included the other follow-on trades, such as the cladding and roofing installers, who have completed their work immediately behind the steel erection.

"This is a 'live' site, situated within a functioning holiday resort with accommodation close by," explains Amiri Construction Site Manager Darren Warren. "So, as well as coordinating deliveries, which are sometimes restricted due to the arrival and departure of guests twice a week, we commence works from 8am to 6pm, to minimise the impact to resort guests."

Stability for the steel frame is derived from bracings, which are typically tubular members positioned along the perimeter and the roof.

The frame's perimeter columns are 12.5m-tall and support the roof rafters, which are 16m-long members. Weighing 2.1t each, the rafters represent the heaviest members in the overall 1,150 piece-count.

As the ground floor has a smaller grid pattern, many of the columns only extend to the underside of the first floor. The exception, along with the perimeter columns, are two rows of internal members, positioned either side of the pitched roof's apex.

These two rows of full-height internal columns support an M&E gantry, that runs the full length of building. As both floor levels feature a 4.8m-high floor-to-ceiling height, there is sufficient space for the high-level steel gantry beneath the apex.

As the gantry will accommodate the majority of the centre's M&E kit, this structure will support some heavy loads and consequently, additional support is obtained from hangars connected to the roof rafters.

As well as keeping the M&E equipment shielded from the elements, having the gantry positioned inside the building has worked on an aesthetic level, as it means there is no need to have any kit on the roof and visible to guests. Plant equipment has also been kept off the roof structure, as an additional internal plant deck is also located on the upper floor.

The first floor has been compositely formed, with steel beams supporting metal decking and 150mm-thick concrete topping. The project team looked at all flooring solutions for this job and a metal decked option was chosen as it required fewer deliveries, which meant less traffic in the resort.

Working on behalf of Amiri Construction, SMD supplied and installed 2,218m² of metal decking for the project, as well as installing the concrete topping.

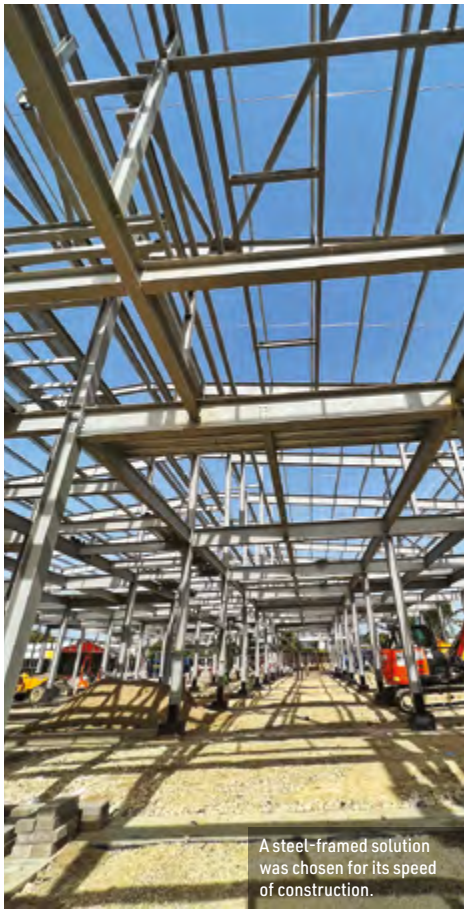
"Using a single 60t-capacity mobile crane, we completed the steel frame in seven weeks," says Snashall Steel Fabrications Project Director Mike Austin.

"However, a few minor elements, two external staircases and a canopy, had to be installed on a return visit once the cladding and glazing had been completed."

Summing up, Richard Pratt, Head of Capital Proposition at Butlin's says: "We have developed and collaborated with some of the best in the industry to deliver PLAYXPERIENCE.

"The steel construction has allowed us to create a flexible future proof space over two floors and a dedicated gantry level that will house highly efficient plant equipment. There's also the roof construction that provides sufficient space to house the mass of PV units.

"Working with industry leaders in entertainment and retail, we have created the right platform to deliver state of the art activities that can be enjoyed by our family guests and those on adult only Big Weekender breaks both day and night and whatever the weather. As the Home of Entertainment, we're continually looking to create unforgettable experiences and with PLAYXPERIENCE opening next year, we're offering the best range of activities under one roof." ■



A steel-framed solution was chosen for its speed of construction.

The steel frame is erected around a centrally-positioned concrete core.

Steel frames high-rise living

Residential schemes are currently plentiful in central Liverpool as local demand is high; one of the latest developments is One Park Lane, a 16-storey steel-framed tower.

Wholesale changes have occurred in Liverpool in recent times, as the city centre and its River Mersey waterfront have been reinvented, following the demise of the once busy port.

Numerous high-profile projects have transformed the city, including the construction of Everton FC's new stadium at Bramley Dock, which will kick-start a host of developments to the south of the city centre.

Today, Liverpool is once again viewed as one of the North West's most important economic centres and a desirable place to live and work.

To satisfy a growing demand for residential properties, a number of housing schemes are ongoing or have recently been completed. One of the most popular areas for these projects is known as the Baltic Triangle, which is close to the city centre and a stone's throw from the well-known and historic Albert Dock.

Historically, the area used to handle goods being transported via the docks as well as being a thriving industrial area. By the 1970s, with much of the port in decline, many of its former warehouses had become derelict, with some of them being demolished and replaced with small scale industrial units.

Today, the area accommodates an eclectic mix of indigenous businesses such as car repair workshops, mechanics, welders and tradespeople. These sit alongside the newer creative businesses such as digital media agencies, PR companies, architects, designers and musicians which have arrived over the last decade.

Major residential regeneration investments are also now emerging due to the area's high profile location, distinctive rich heritage and historic character. An example is One Park Lane, designed by Falconer Chester Hall, which will provide 90 apartments in a steel-framed 16-storey tower.

As well as the apartments, the scheme incorporates a spa and sauna, steam room, a fully equipped gym, a terrace at level 15, ground floor retail spaces and a 24-hour concierge and reception.

The project's design also features a raft of sustainable elements such as solar panels, an air source heat pump and a mechanical ventilation heat recovery system.

According to the developer, Legacie Developments, this combination of attractive onsite facilities and an eco-friendly design make One Park Lane stand out as a great place to live, particularly to young professional tenants.

As well as One Park Lane, Legacie currently has a number of schemes underway in the city, which will ultimately deliver 1,800 apartments.

The company regularly uses a steel-framed solution for its developments with Baltic Square (see NSC January 2022) offering a good example. On this previous scheme, Legacie Contracts delivered five Liverpool city centre steel-framed residential blocks.

As with many inner-city projects, One Park Lane is being built on a confined site, situated on a busy road junction. Next door there is another construction site and behind the project a busy hotel and car park.

Consequently, logistics and the delivery of materials have played a key role on this project. With little room for materials storage, all steelwork deliveries were made on a just-in-time-basis. Many steel elements were erected straight from the delivery truck, while the wagon was in the site's one and only pit lane.

Commenting on the choice of steelwork, Legacie

FACT FILE
One Park Lane, Liverpool
Main client: **Legacie Developments**
Architect: **Falconer Chester Hall**
Main contractor: **Legacie Contracts**
Structural engineer: **Mason Navarro Pledge**
Steelwork contractor: **EvadX**
Steel tonnage: **300t**

"Following a feasibility study and because of the site's small footprint, we went with a steel solution as it offered the most cost-effective method."

How the completed residential tower will look.

Contracts Senior Project Manager Sam Diamond says: "Following a feasibility study and because of the site's small footprint, we went with a steel solution as it offered the most cost-effective method."

Prior to the steel erection programme commencing, piled foundations were installed across the site. The piles support the steel frame, which begins at ground floor level. This lowest part of the scheme is two-storeys high in places, as it will accommodate retail units, cycle storage and a plant deck.

All of the project's steelwork, which was predominantly completed during January, was erected using the onsite tower crane, which is positioned on top of the structure's concrete core.

As well as foundations, the core was also completed prior to the steelwork programme starting. It is centrally positioned within the scheme, providing the steel frame with its structural stability, which wraps around the core.

Above ground floor, each level has been designed around a regular grid pattern, accommodating minimal internal columns. With spans of up to 6.6m-long, all of the upper levels are formed with steel beams supporting metal decking and a concrete topping creating a composite flooring solution.

Following the curvature of the adjacent pavements, the main street-facing elevation is curved. This feature element of the building is formed with a series of facetted steel beams.

The decision to use a steel-framed solution has also helped with the coordination and speed of the construction programme.

As with all construction projects, the team wanted the quickest programme possible, one that would also allow a number of trades access to the job as soon as possible.

To this end, a staggered approach was adopted, whereby the steel erection, metal decking and concrete flooring installation were all coordinated.

"We initially erected the steel frame up to the sixth floor, but then left site for a few weeks, returning once the decking and concreting had been completed on all of the floors," explains EvadX Contracts Manager Andrew Roberts.

"For the remainder of the erection, we divided the building in half and erected three floors at a time. When three floors of steel were up, we handed the area over to the flooring team, while we erected the other half of the structure.

"Once both sides were completed, we swapped sides, using the uppermost and recently finished concrete floor as a base for our MEWPS, while proceeding with the steel erection."

One Park Lane is due to complete by the end of 2024. ■

All of the steelwork was installed using the site's tower crane.

Mobility in the frame

Providing a car parking and a sustainable transport solution, the steel-framed Ancoats Mobility Hub also forms part of wider scheme to improve the local area's environment and air quality.

Here's a simple question. When is a car park not a car park? The answer is, when it's a mobility hub.

A what? You may be asking. Well, to explain, a mobility hub not only provides car parking spaces, it also promotes sustainable transport and a host of community-led initiatives.

These structures are beginning to pop-up all over the UK and one is currently under construction in Ancoats, Manchester, an area that is predicted to grow in the near future as 1,500 new homes are scheduled to be built.

The innovative scheme will support the future development of this inner-city area, creating car parking spaces for residents and visitors alike, while simultaneously taking vehicles off local roads.

Set over nine levels, the steel-framed structure will have 406 parking spaces, with 102 of those accommodating electric charging points.

Highlighting its sustainability credentials, the entire ground floor of the hub will accommodate alternative forms of transport and will include 150 secure bike spaces and charging points, alongside a parcel delivery point and a space for a café. Immediately outside of the structure, there will be 1,370m² of new public realm connected to the adjacent Ancoats Green.

Designed by locally-based architects Buttress, the company's Director Matthew Burl says: "It's a very interesting project, as the aim of the scheme is to simultaneously discourage the use of on-street parking and to make room for more public open spaces, cycling and walking routes.

"A key element of this is minimising car parking in the public realm as well as around residential buildings. This increases the possibility for more active frontage, community spaces and commercial opportunities. By promoting EV charging the Ancoats Mobility Hub will help accelerate the move away from fossil fuel vehicles and improve air quality for the local area."

Main contractor, Bowmer + Kirkland (B+K) started onsite in early 2023, inheriting a plot occupied by a number of small industrial units.


A steel-framed solution was chosen for its speed of construction.

FACT FILE
Ancoats Mobility Hub, Manchester
Main client: **Manchester City Council**
Architect: **Buttress**
Main contractor: **Bowmer + Kirkland**
Structural engineer: **Kennedy Redford**
Steelwork contractor: **Caunton Engineering**
Steel tonnage: **750t**

"The aim of the scheme is to simultaneously discourage the use of on-street parking and to make room for more public open spaces, cycling and walking routes"


The completed structure will have a living wall covering each core and a series of plant boxes on the southern facade.


The steel frame wraps around two precast cores.

These were demolished, the ground remediated and piled foundations installed before the hub's steel frame was erected.

As with many inner-city construction sites, one of the main challenges has been logistics and how to coordinate various trades on a tight and confined plot.

"Prior to the steel erection starting, we had already installed one of the hub's two precast cores, but the second was still under construction when the first load of steelwork was being delivered," says B+K Project Manager David Baker.

"Consequently, we had to manage and coordinate three cranes onsite, two 70t-capacity units erecting the initial steelwork phases and 120t-capacity unit installing the second core."

As space was at a premium, once the core was complete and the initial steelwork phase was erected, Caunton Engineering – who also designed the steel frame - completed the remainder of steel erection programme using a solitary mobile crane.

The steel frame has been designed around a regular column grid pattern for each of the ▸20


The project's tight footprint has meant coordinating the steel erection and making sure there is sufficient space for the cranes, has been a key requirement.

Steel beams support metal decking for a composite flooring solution.

▸19 floors. The perimeter, columns are spaced at 7.5m centres, while internally there are spans of 12.6m long.

Unlike many other multi-storey car parks, the hub has no need for cross bracings as the two cores, which contain lifts and stairs, also provide the structure with its stability.

However, some temporary stability and support for the steel frame was necessary during the erection programme, and before the floors had been cast. Consequently, some bays have been designed as moment frames, in order to add some stiffness to the steelwork.

The hub's internal cambered beams form the car park decks, supporting metal decking (SMD supplied 13,600m² of metal decking) and a concrete topping for a composite flooring solution. The beams also have a series of bespoke openings to accommodate the building's services.

Vehicle circulation within the hub is via an internal two-way ramp system that connects each of the floors. The structure has been designed around a split deck formation, whereby the hub is divided in half, with each side of the floor deck rising, via a ramp, by 1.5m. With the exception of the ground level, each floor has an upper and lower level. Meanwhile, the overall floor-to-ceiling height throughout the hub is 2.9m.

According to the design team, the split deck configuration was chosen instead of an external ramp because this solution better suited the project's tight site.

Erected alongside the main steel frame, the hub also contains impact barriers around the perimeter, formed with galvanized steel box sections.

Another area of galvanized steelwork is the roof, spanning over the ninth floor. This zone will support an array of more than 700 PV panels that will help minimise energy consumption. Because the roof does not support vehicles and is exposed, a galvanized solution was chosen.

Elsewhere in the hub, the steelwork's fire rating is higher and so intumescent paint for fire protection was applied offsite to the columns and beams.

In keeping with the sustainable focus of the building, the new scheme will include a green façade and two living walls, one on each core. These have been designed to remove air pollutants including carbon and improve the biodiversity of the area, while reducing the amount of visible structure.

The steel frame also supports the hub's cladding, which includes a series of plant boxes on the southern green façade, and silver anodised aluminium fins on the other three elevations.

Summing up, Leader of Manchester City Council Bev Craig says: "The redevelopment of Ancoats over the last two decades is an exemplar in urban renewal. And rightly so, the neighbourhood is internationally renowned and has been named one of the best places to live globally.

"This next phase of regeneration gives us an opportunity to think differently about how our residents occupy and interact with the space they live in. The Mobility Hub is a key part of this – helping to put the pedestrian, active travel and green public space as the focus of the neighbourhood, rather than the car."

The Ancoats Mobility Hub is due to be completed by the end of the year. ■

Car park impact barriers

After the fire at Luton Airport, the design of car parks has been the subject of much discussion. David Brown of the SCI avoids any controversy about periods of fire resistance by focussing on a particular aspect of car park construction – the impact barriers.

One small but important feature of the Ancoats Mobility Hub is the use of galvanised steel box sections as impact barriers around the permitter of the facility. The potential for impact in car parks is high and the consequence unacceptable if a barrier were to fail. Barriers – and their supports – form a very important part of open-sided car park design. Barriers are apparently simple, but demand proper attention.

Guidance on the design of barriers is given in Annex B of BS EN 1991-1-1, which should not be confused with the guidance in BS EN 1991-1-7, which covers designing other parts of a structure for various types of impact load. The calculation of the force is simple physics, depending on the vehicle mass and acceleration. In BS EN 1991-1-1 the vehicle mass to be used in barrier design is specified as 1500 kg if the car park is for vehicles not exceeding 2500 kg. The 2023 Car Park design guide from IStructE recommends an increased mass of 2000 kg as more representative of current average vehicle weights, including electric vehicles. The assumed vehicle speed is 4.5m/s (10 mph).

The formula in BS EN 1991-1-1 assumes that on impact the deformation of the car is 100 mm, and that for the purposes of calculating the design force, a rigid barrier does not deflect. This results in a design force of 203 kN, which is considered to be distributed width of 1500 mm. An impact height above deck level of 445 mm level is recommended.

The design force must be resisted in the support arrangements. The IStructE guide notes that fixing rigid barriers with non-yielding posts to the deck may be difficult as the resulting forces are too large for most holding down bolts, particularly if the impact is assumed at a post position. The guide proposes that the impacted post fails and the barrier acts in catenary, transferring load to adjacent posts.

The design of barriers quickly becomes complicated when posts are assumed to fail, or when the barrier is not supported on posts but connected directly to the supporting columns on the perimeter. The barrier will deform (and a reduced load can be calculated by iteration) but acting in catenary will apply horizontal loads in two directions at the connection to the columns.

More information is available in the IStructE guide Car park design (2023) and AD 456. ■

BCSA

Make sure your Steelwork Contractor is RQSC approved

Image courtesy of William Hare Limited

Specify an approved company from the Register of Qualified Steelwork Contractors for Buildings, to ensure your project meets the Building Safety Act requirements. As of October 3rd 2023 it will become mandatory in the NSSS 7th edition, 1st Revision that all Steelwork Contractors are RQSC approved.

Tel: 020 7839 8566
Email: postroom@bcsa.org.uk
Web: www.bcsa.org.uk/buildings-directory

RQSC

The Register of Qualified Steelwork Contractor **Buildings**

FACT FILE
Kirkstall Road pedestrian bridge, Leeds
Main client: **Latimer by Clarion Housing Group**
Main contractor: **Beaver Bridges**
Structural engineer: **Beaver Bridges**
Steelwork contractor: **Beaver Bridges**
Steel tonnage: **60t**

Steel connection

A 57m-long Warren Truss pedestrian bridge has been installed to provide a link between two parts of a large residential-led development in Leeds city centre.

Comprising more than 1,700 homes, a new district on the banks of the River Aire is taking shape in Leeds. Being delivered by Latimer, the development arm of the Clarion Housing Group, the scheme will include 11 buildings of eight to 17-storeys, townhouses, accommodation for the city's burgeoning student population and more than 4,000m² of commercial space.

Commenting on the development, Richard Cook, Group Development Director at Latimer says: "We are confident that this development will be a game-changer for the Kirkstall Road corridor and Leeds as a whole, providing a high-quality mixed use, sustainable community that will attract residents, businesses and visitors. Even more encouraging is the activity we are starting to see in the surrounding areas."

Sustainability is at the heart of the scheme, as the homes will feature photovoltaic solar panels and will not use fossil fuels. There will be over 1,100 secure cycle parking spaces as well as electric car charging points for residents. New pedestrian walkways and cycle paths will improve local connections – reducing the site's carbon footprint and helping to keep cars off the nearby streets.

Nearly half of the 13-acre site's footprint will be green space, while landscaped areas, including 250 new trees, will be designed to encourage social interaction and communal 'grow-your-own' planting zones.

The scheme will also deliver 2.2 hectares of green infrastructure including a new square, a riverside park and the reinstatement of a bridge that will create a new north-south route, linking both banks of the River Aire.

Forming an important part of the overall development, the new bridge is a 57m-long Warren Truss, designed, fabricated, supplied and installed by Beaver Bridges. Working on a full turnkey build and design contract, the company also installed new abutments and completed the necessary piling.

"The only convenient position for the new bridge was on the site of the old structure, so our first task was the removal of the existing Bailey bridge and the old and redundant services it carried," explains Beaver Bridges Head of Sales Clive Evans.

Reinforced concrete abutments were then installed on both sides of the river. These are founded on a series of 300mm-diameter CFA piles, which are up to 11m-deep.

Once the preparatory works had been completed, the new bridge was installed. Manufactured at the company's Wigan facility, the Warren Truss bridge was fabricated in three sections, which allowed it to be transported to site, where it was spliced together via bolted connections and lifted into place as one complete structure.

Measuring 3.5m-wide, the bridge comprised two 21m-long pieces and one 15m-long central section. Both sides of the Warren Truss have top and bottom chords formed with 250mm x 250mm x 16mm box sections, which are linked together by 200mm x 100mm x 12.5mm diagonal members.

Between the two trusses, the 10mm-thick deck of the bridge is supported by a series of 150mm x 150mm x 6.3mm cross members.

To make sure the three bridge sections fitted together correctly, a trial erection was undertaken

Spanning the River Aire, the bridge will provide an important link between the two parts of the new development.

at the fabrication yard, before the steelwork was painted.

Using the services of coatings specialist Jack Tighe, the bridge steelwork was painted pillar box red with a Fluoropolymer coating. This has a 60-year guarantee, minimising any future maintenance and thereby reducing the need for work at height and over the river.

As the site is quite confined and surrounded by busy roads, the installation of the bridge was brought about by a co-ordinated three-day operation in conjunction with West Yorkshire Highways.

After the three parts were spliced together, a three-hour lifting operation, using a 1,000t-capacity mobile crane, installed the 60t bridge safely into position.

Beaver Bridges Chief Executive Henry Beaver, says: "With the ongoing roadworks in the centre of Leeds, it was a challenging location to bring the bridge sections into place for final splicing, but our internal logistics team did an excellent job in managing this on behalf of the client."

The bridge's installation is said to be a milestone for the overall development, creating better access to the wider area.

Work on the new development is expected to create around 270 site jobs during each year of the build programme, as well as additional opportunities for young people. Over 100 apprenticeships and work placements are likely to be available throughout construction.

Work on the Kirkstall Road site, which began in 2002, will deliver an estimated £300M in social value to the city economy. The overall scheme is expected to complete in 2029. ■

Lined up and ready to go. The three bridge sections leave Beaver Bridges' fabrication yard.

Fire protection of steelwork

In this first of two technical articles, David Brown of the Steel Construction Institute gives some general background on fire protection and demonstrates how the guidance used by designers to specify fire protection for beams has been developed. Part 2 will consider the protection of columns.

Critical temperature

According to BS EN 1991-2[1], the temperature of a so-called standard fire rises rapidly and continues to increase with time. Unprotected steel begins to lose strength above 400°C and at 1006°C (the standard fire temperature at 90 minutes) has only 4% of its original strength. Apart from some specific cases, steel will generally need protection to limit the reduction in strength. This article assumes the protection is an intumescent coating.

Protection is specified to limit the steel temperature to a maximum value, known as the critical temperature. A higher critical temperature will mean less protection is required; a lower critical temperature will mean more protection is required. The critical temperature therefore has an important influence on cost and time, since more protection often means more coats and longer time to cure between coats.

The critical temperature can be calculated, but many designers appear to use the tabulated values published by ASFP[2]. Others may use the tabulated values provided in the UK NA to BS EN 1993-1-2[3]. Others appear to leave the specification entirely to the coating manufacturer. For the critical temperatures tabulated by ASFP, manufacturers provide tables of required protection thickness, for different periods of fire protection and for different values of A_m/V (equivalent to H_p/A). For temperatures not given in the ASFP tables, the manufacturer must be consulted.

The values of critical temperature published by ASFP and in the UK NA differ and are presented in different formats. The background to the tabulated values is opaque. The aim of this article is to explain how the values in both documents were calculated, demonstrate that the values are generally (but not always) conservative and encourage designers to take proper responsibility for this important aspect of design.

Both ASFP and the UK NA provide values of critical temperatures for beams and columns. Beams are (or should be) more straightforward since in both documents they are assumed to be restrained. This important limitation in scope is however not mentioned.

Utilisation

Utilisation is a measure of how hard the beam is working (strength, not deflection), which might be referring to the situation at ambient temperatures, or at elevated temperatures – it is essential to know!

At elevated temperatures, three factors influence the degree of utilisation. Firstly, the design value of actions are reduced, secondly a non-uniform temperature through the section can be of benefit and finally the member may not have been fully utilised at ambient temperatures – it has spare resistance which can be used in the fire design situation.

Reduced effects of actions in the fire limit state.

In the fire condition, the design values of forces and moments are reduced by applying a factor, η_{fi}. The reduction factor represents the characteristic permanent actions and a reduced value of the characteristic variable actions – effectively implying that not all the variable action will be applied in a fire, which seems sensible.

If the original design combination had been calculated using expression 6.10 of BS EN 1990, the factor η_{fi} is given by:

$$\eta_{fi} = \frac{G_k + \Psi_{fi} Q_k}{\Psi_G G_k + \gamma_Q Q_k}$$, which is expression 2.5 in BS EN 1993-1-2.

There are similar expressions (2.5a and 2.5b) if the load combinations had originally been determined using expressions 6.10a and 6.10b of BS EN 1990.

The UK NA to BS EN 1991-2 specifies that $\Psi_{fi} = \Psi_1$, which is to be taken from the UK NA to BS EN 1990. Typical values of Ψ_1 for different categories of loading are:

- For offices, $\Psi_1 = 0.5$
- For shopping areas, $\Psi_1 = 0.7$
- For storage, $\Psi_1 = 0.9$

Looking at the expression for η_{fi}, it is clear that the computed answer depends on the ratio Q_k:G_k and also on the value of Ψ_1. Designers might then observe that:

1. The ASFP document provides different limiting temperatures for offices, shopping and storage categories – but does not define Q_k:G_k
2. The UK NA to BS EN 1993-1-2 offers no categorisation of loading and no definition of Q_k:G_k

BS EN 1993-1-2 offers a helpful figure showing how η_{fi} varies with the ratio Q_k:G_k and the value of Ψ_1. For the three categories of loading and values of Ψ_1 = 0.5, 0.7 and 0.9, this relationship is shown in Figure 1.

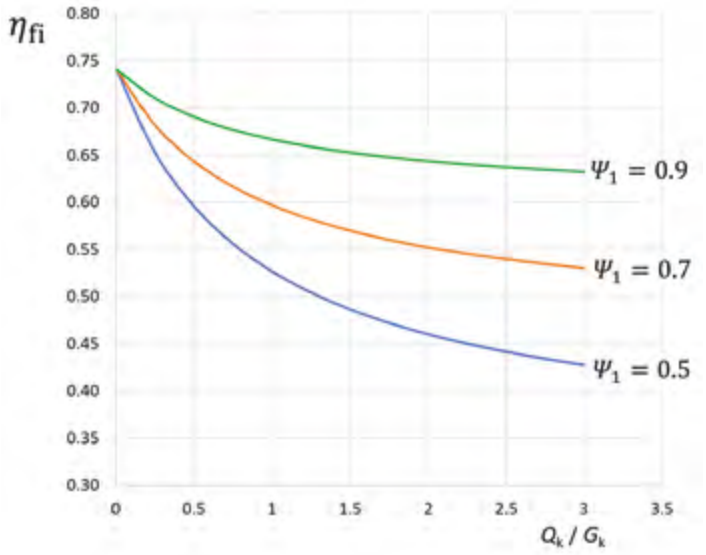


Table 1 – Reduction factor n_{fi}

NOTE 2 to Figure 2.1 in BS EN 1993-1-2 allows the use of $\eta_{fi} = 0.65$ except for storage. This conservative value should not used as it will result in unnecessary protection being specified. For a typical Q_k:G_k ratio of 1:1 and Ψ_1 (office), the value of η_{fi} is 0.53.

Non-uniform temperature through the cross section.

If a beam supports a slab, the top flange is protected to some degree. BS EN 1993-1-2 allows for this by introducing an adaptation factor, κ_1. The values are:

- For a beam exposed on four sides (i.e. no slab), κ_1=1.0
- For an unprotected beam exposed on three slides and a slab on side four, $\kappa_1 = 0.7$
- For a protected beam exposed on three slides and a slab on side four, $\kappa_1 = 0.85$

An additional factor κ_2, will generally be 1.0.

In the fire condition, the moment resistance of a beam is the moment resistance at ambient temperature, divided by $\kappa_1\kappa_2$. When $\kappa_1 < 1$, this produces an enhanced value of the moment resistance.

In Table NA.1 of the UK NA to BS EN 1993-1-2, the reason for three descriptions of beams should now be clear – the three categories reflect ▸26

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24 the three values of κ_1 above.

Confusingly, Table 16 of the ASFP guide has "non-composite beams carrying concrete floor slabs" and "composite beams supporting floor slabs", which both have a concrete slab. The difference between non-composite and composite in the ASFP table is discussed later.

Utilisation at ambient temperatures

Clearly, if a member has a surplus of resistance at ambient temperatures, those reserves of strength will be useful at elevated temperatures.

Calculation of the critical temperature

Reading BS EN 1993-1-2, designers might be tempted to use expression 4.22 to calculate the critical temperature (as it falls under the clause 4.2.4 "Critical temperature"). Once the utilisation μ_0 has been determined, the critical temperature $\theta_{a,cr}$ is given by:

$$\theta_{a,cr} = 39.19 \ln\left[\frac{1}{0.9674\mu_0^{3.833}} - 1\right] + 482$$

As an alternative, both the ASFP values and those in the UK NA are based on the necessary steel strength to carry the reduced design actions in the fire condition, which will of course be less than the nominal yield strength. Having determined the reduced strength required to carry the design loads, Table 3.1 of BS EN 1993-1-2 which shows reduced steel strength vs. temperature can be interrogated to determine at what elevated temperature the calculated reduction in steel strength occurs. This temperature is presented in the ASFP guide and in the UK NA as the critical temperature.

A comparison of the two alternatives is shown in Figure 2. As can be seen, the relationship between strength reduction and temperature is almost identical. If trying to reproduce the precise values in the ASFP document or the UK NA, it is important to note that the second process involving Table 3.1 is used.

Beams in the UK NA to BS EN 1993-1-1

The relevant part of Table NA.1 is reproduced below. To help understand the tabulated temperatures, the value of κ_1 has been added to the relevant row.

Description of member		Critical temperature (°C) for utilisation factor μ_0					
	κ_1	0.7	0.6	0.5	0.4	0.3	0.2
Protected beams with slabs	0.85	558	587	619	654	690	750
Unprotected beams with slabs	0.7	594	621	650	670	717	775
Beams with no slab	1.0	526	558	590	629	671	725

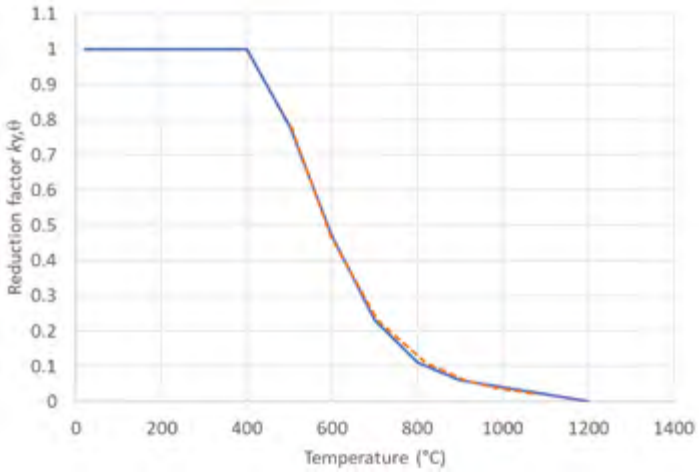

Figure 2: Reduction in steel yield strength

Example 1: Protected beam with slab, $\mu_0 = 0.6$

In this example, κ_1 is 0.85 and enhances the moment resistance in the fire condition, which is equivalent to reducing the utilisation. The effective utilisation is therefore $0.6 \times 0.85 = 0.51$

From Figure 2 it can be seen that the steel reaches 51% of its original strength at a temperature just below 600°C. The precise figure, obtained by linear interpolation from the values in Table 3.1, is 587°C, as tabulated above.

Example 1: Protected beam with slab

In this example, the value of $\mu_0 = 0.53$, as calculated above for an office with Q_k:G_k = 1:1

If it is assumed that for some reason, the beam is not fully utilised at ambient temperature, but is only utilised 90%, the effective utilisation becomes $0.53 \times 0.85 \times 0.9 = 0.41$

In this case, the critical temperature is 651°C, so the requirement for protection is reduced compared to example 1.

ASFP critical temperatures

The background to the ASFP critical temperatures is quite different to the approach in the UK NA. The UK NA requires the designer to calculate the

utilisation, μ_0. In contrast, for different loading categories, ASFP have already calculated what is considered to be an appropriate value of μ_0 (although the value is not tabulated). The ASFP approach assumes that the beam is fully utilised at ambient temperatures – there is no opportunity to allow for any under-utilisation.

The relevant part of Table 16 from the ASFP Yellow Book is shown below (critical temperature in °C).

Building type	Non-composite beams carrying concrete floor slabs	Composite beams supporting concrete floor slabs
Office / Domestic	603	576
Storage	576	544
Shopping / Congregational / Car Park	583	553

ASFP utilisations

In the "office" loading category, ASFP assume Q_k:G_k = 1:1 and use expression 2.5b for η_{fi} (which includes ξ = 0.925).

The utilisation is therefore $\frac{1 + 0.5 \times 1}{0.925 \times 1.35 \times 1 + 1.5 \times 1} = 0.546$

If the beam is protected and has a slab, then κ_1 = 0.85 and the effective utilisation becomes 0.546 × 0.85 = 0.464

From Figure 2, the critical temperature can be seen to be approximately 600°C. The precise value is 603°C, as tabulated above, under the heading "Non-composite beams carrying concrete floor slabs".

For composite beams, ASFP adopt the guidance in clause 4.3.4.2.3 of BS EN 1994-1-2, which indicates that the temperature in the steel section is assumed to be uniform, meaning that κ_1=1.0

If κ_1 is set to 1.0, the tabulated value of 576°C is calculated.

The UK NA sees no need to discriminate between composite and non-composite beams. It does seem rather odd that in the ASFP guidance a beam designed compositely is considered a more onerous condition than a non-composite design when both are supporting a slab.

Designers should note the assumed value of Q_k:G_k = 1:1 for the "office category". If the ratio was, say 0.8:1, the critical temperature reduces from 603°C to 595°C. If the ratio changes in the opposite direction ($Q_k > G_k$), the value of 603°C is conservative. The ratio assumed for shopping areas is also Q_k:G_k = 1:1.

For storage, the assumed ratio is Q_k:G_k = 1:2 and the calculation for η_{fi} uses expression 2.5a from BS EN 1993-1-2, since this is more onerous than the result from expression 2.5b.

The utilisation is therefore $\frac{1 + 0.9 \times 2}{1.35 \times 1 + 1.5 + 1.0 \times 2} = 0.644$

(the utilisation according to expression 2.5b is 0.659)

If κ_1 = 0.85, the tabulated value of 575°C is calculated and if κ_1 = 1.0, the tabulated value of 544°C.

Conclusions from Part 1

Consider a composite beam in a multi-storey office building (a very typical example).

The ASFP guidance leads to a critical temperature of 576°C. This approach has the benefit of simplicity. As demonstrated above, the (unstated) utilisation is 0.546. The UK NA invites the designer to determine the utilisation. If the same utilisation is used, interpolation in Table NA.1 leads to a less onerous critical temperature of 602°C. The difference is because ASFP assume a uniform temperature through the cross section (κ_1 = 1.0) and the UK NA takes the benefit of a protected top flange (κ_1 = 0.85).

If the ratios Q_k:G_k assumed by ASFP reduce, the critical temperatures are not conservative.

Neither the ASFP nor UK NA values are appropriate for unrestrained beams.

Best practice is to calculate the actual utilisation – including any overdesign at ambient temperatures – and the critical temperature, which is not at all difficult. Alternatively, sufficient information must be provided so that the critical temperature can correctly determined by others. This must include the Q_k:G_k ratio, the loading category and the utilisation at ambient temperature. ■

References

1. BS EN 1993-1-2:2005 Incorporating Corrigenda Nos 1 and 2 Eurocode 3: Design of steel structures – Part 1-2: General rules – Structural fire design BSI, 2006
2. ASFP Yellow Book Fire protection for structural steel in buildings 5th Edition (Volume 1 of 2) ASFP, 2018
3. UK NA to BS EN 1993-1-2:2005 UK National Annex to Eurocode 3: Design of steel structures Part 1-2: General rules – Structural fire design, BSI, 2008

New and revised codes and standards

From BSI Updates February 2024

BS EN PUBLICATIONS

BS EN 10088-1:2023
Stainless steels. List of stainless steels
supersedes BS EN 10088-1:2014

BS EN 10088-3:2023
Stainless steels. Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resistant steels for general purposes
supersedes BS EN 10088-3:2014

BS IMPLEMENTATIONS

BS ISO 19735:2023
Corrosion of metals and alloys. Corrosivity of atmospheres. Mapping areas of increased risk of corrosion
no current standard is superseded

DESIGNATED STANDARDS

BS EN 280-1:2022
Mobile elevating work platforms. Design calculations. Stability criteria. Construction. Safety. Examinations and tests

BS EN 13001-3-5:2016+A1:2021
Cranes. General design. Limit states and proof of competence of forged and cast hooks

CORRIGENDA TO BRITISH STANDARDS

PD 7974-6:2019
Application of fire safety engineering principles to the design of buildings. Human factors. Life safety strategies. Occupant evacuation, behaviour and condition (Sub-system 6)
Corrigendum, December 2023

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN ISO 14175:2008
Welding consumables. Gases and gas mixtures for fusion welding and allied processes

BRITISH STANDARDS UNDER REVIEW

BS 4449:2005+A3:2016
Steel for the reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product. Specification

PD 6688-1-7:2009+A1:2014
Recommendations for the design of structures to BS EN 1991-1-7

PD 6695-1-9:2008
Recommendations for the design of structures to BS EN 1993-1-9

PD 6695-1-10:2009
Recommendations for the design of structures to BS EN 1993-1-10

PD 6696-2:2007+A1:2012
Background paper to BS EN 1994-2 and the UK National Annex to BS EN 1994-2

NEW WORK STARTED

EN ISO 11126-1
Preparation of steel substrates before application of paints and related products. Specifications for non-metallic blast-cleaning abrasives. General introduction and classification
will supersede BS EN ISO 11126-1:2018

ISO PUBLICATIONS

ISO 15611:2024
Specification and qualification of welding procedures for metallic materials. Qualification based on previous welding experience
Will be implemented as an identical British Standard

AD 524:
Composite slabs and minimum reinforcement limits

Reinforcement in composite slabs is not only required to provide resistance to the slab but also to prevent cracking of concrete. Codified limits to the minimum amount of reinforcement often exist to avoid more complex calculation (of limiting crack widths for example). In this AD note, the reinforcement requirements for composite slabs and the reasons behind current codified minimum reinforcement limits are discussed.

Purpose of reinforcement in composite slabs

In addition to the external reinforcement provided by the profiled steel decking, composite slabs require some sort of 'internal' reinforcement (whether it is mesh, bars or fibres) to be provided for a number of reasons. The most obvious one is control of cracking under negative (hogging) bending of the slab at the supports. More reinforcement is required in propped construction because the slab is also subject to additional loads on removal of the props. The resistance of the slab in the event of fire also influences the required reinforcement, which may include additional bars in the slab ribs. During fire, the steel deck will lose most of its strength due to the development of high temperatures, and therefore tension reinforcement embedded in the concrete is required to enable the slab to maintain part of its load-carrying capacity at the fire limit state. For this purpose, either mesh or fibre reinforcement over internal supports is used to provide hogging moment resistance to compensate for the reduced sagging bending resistance. In some cases, additional bars are placed inside the troughs of the steel deck to enhance the sagging resistance, particularly when the slab is single spanning. The reinforcement remains at a lower temperature than the steel decking and so is more effective in fire.

Reinforcement is also required locally over supporting composite beams to provide resistance to the longitudinal shear force transferred into the slab via the shear connection (headed studs). In that case, reinforcement resists splitting or shearing of the concrete flange along any of the potential surfaces shear failure - see clause 6.6.6 (4) of BS EN 1994-1-1:2004 (Figure 6.16). Reinforcement also contributes to the vertical shear resistance of the slab. In cases where the steel decking is discontinuous across the top flange of a supporting beam and the steel deck is not connected to the beam with thru-deck welded studs, the use of properly anchored bars or fibre reinforcement is essential.

Other purposes served by reinforcement include the enhancement of the slab resistance in bending and shear under high locally applied loads (including those due to walls placed on the slab and plant loads), tying action for structural integrity and the distribution of strains due to concrete shrinkage and creep under sustained loads.

Codified minimum reinforcement limits

Clause 9.8.1(2) of BS EN 1994-1-1:2004 [1] requires that, for continuous slabs designed as simply supported, the 'anti-crack' reinforcement above the ribs has a minimum area of 0.2% (for unpropped construction, 0.4% for propped construction) of the area of concrete above the ribs. Clause 7.4.1(4) of BS EN 1994-1-1:2004[1] also requires that, for slabs that are continuous over beams that are designed as simply supported, the 'longitudinal' reinforcement provided over the effective width of the concrete flange has a minimum area of 0.2% (for unpropped construction, 0.4% for propped construction) of the area of concrete above the ribs. A greater reinforcement area may be required when it is necessary to control cracking.

Both the above limits refer to slabs that are physically continuous, even though slabs are designed as simply supported at ambient temperature, which is typically the case in steel framed buildings. However, there are other applications where the slab may be discontinuous over the supports (simply supported). Such applications are typically found in light-gauge steel framed construction where panel head members split the slab over light steel walls. For such applications, the limits specified in these clauses do not need to be satisfied. However, there may be other reasons that could lead to a similar or even higher amount of reinforcement.

Cases when a higher amount of reinforcement may be required

When a composite slab needs to accommodate concentrated loads of significant magnitude, a higher amount of reinforcement (higher than that required for other purposes) will normally be required, particularly in the transverse direction to the orientation of the ribs. clause 9.4.3 (5) of BS EN 1994-1-1:2004 suggests a nominal transverse reinforcement with an area of at least 0.2% the area of the concrete above the ribs may be used (without further analysis/calculation), for cases where the concentrated loads are of a certain magnitude. However, this clause is misleading because it fails to provide sufficient context. SCI has published more recent guidance [2,3] on concentrated loads, also interpreting the specific clause. It is clear that cases with concentrated loads will often require higher amounts of reinforcement (mesh or fibres).

Furthermore, a higher amount of reinforcement may be required when a slab is more vulnerable in terms of cracking and deflections due to combined shrinkage and creep of concrete. For example, slabs carrying permanent loads, such as these in storage applications, in plant rooms or heavy superimposed dead loads, would need more reinforcement, particularly at the supports. Clearly exposure conditions also influence the need to control cracking.

Conclusions

The purposes the reinforcement serves in a composite slab are many. Current codified minimum reinforcement limits are there to control cracking in continuous slabs, which are typically designed as simply supported for the normal stage, or to avoid complex calculations when a slab is loaded by moderate magnitude concentrated loads. These limits are not always applicable, as is the case with discontinuous, simply supported slabs used typically in light gauge steel framed construction. However, significant amounts of reinforcement (similar or higher to the limits) may still be required when high concentrated loads act on the slab or when high permanent loads are applied to the slab.

References

[1] BS EN 1994-1-1:2004, Eurocode 4: Design of composite steel and concrete structures. General rules and rules for buildings. BSI, 2005.
[2] AD 450: Resistance of composite slabs to concentrated loads, SCI, October 2020.
[3] AD 477: Transverse bending of composite slabs subjected to point loads, SCI, February 2022.

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50 YEARS AGO

FROM

Building with Steel

December 1973

SPIC AND SPAN ON SEVERN BRIDGE

Without maintenance few things can last. This is as true for bridges as for, say, a car. The County Surveyor's Department of Gloucestershire County Council is responsible for looking after the Severn Bridge and some aspects of this work are described in these notes by Mr Sydney Brown, a Deputy Surveyor.

The maintenance of steel bridges has always presented problems - some not adequately realised at the design stage so that, for instance, insufficient thought has been given to accessibility for the renovation of protective coatings.

In the early days of fabrication hot rolled sections were more prone to lamination and the ingress of moisture through coatings which had deteriorated because of inaccessibility or neglect accelerated this. Most of the early problems persist and others are inherent with present-day developments in design made possible by the production of high-quality steels and these call for a more thorough approach to maintenance, particularly in regard to large cellular bridge units in which thin stiffened plates, which have no margin for corrosion, are used.

The Severn Bridge complex is a case in point. Four structures are involved extending over a continuous length of almost two miles and having a total deck width of approximately 100ft.

The shortest of the structures, the Aust Viaduct, bridges over the foreshore from the Aust Cliff to the Severn Suspension Bridge south anchorage, a distance of 200yds; it has three spans with two longitudinal continuous box girders, 10ft deep by 7ft wide.

The three major structures have a single 10ft deep longitudinal welded box girder with cantilevered wings; the box is 75ft wide on the Suspension Bridge and reduces to 55ft on the Beachley Viaduct and cable-stayed Wye Bridge; the cantilevered wings on the latter are accordingly wider to give the same total width of decking.

The floors and sloping webs of the single box sections are of $^{3}/_{8}$in thick plates stiffened with bulb flats except in the vicinity of trestle supports where the thickness of the plates is increased; the trough stiffened plate decking on which the carriageway surfacing is laid is $^{7}/_{16}$ in thick. There are approximately 600 miles of welded joints.·

Prior to fabrication of the box girder units the external surfaces of the plate panels were grit blasted and metal sprayed (using zinc or aluminium) and a protective paint system consisting of one coat of etch primer, two coats of zinc chromate, and two coats of micaceous iron oxide was completed on erection of the girders.

The structures are exposed to high winds, salt-laden atmosphere and sulphur fumes carried on the prevailing wind from chemical works at Avon mouth.

The interior surfaces of the boxes carried heavy condensation at the time. construction of the complex was completed.

Gloucestershire County Council as agents of the (then) Ministry of Transport accepted responsibility for the maintenance of the structures when the complex was opened in 1966. Some involvement whilst construction was in hand had enabled the county to appreciate the immensity of the problems and accordingly an organisation was set up having three experienced inspectors as its nucleus. The senior inspector had been staff foreman with the consortium of contractors who had built the structures; one assistant, a skilled welder, had organised welding of the deck units at Messrs Fairfield Mabey's shipyard and the third had been an inspector concerned with workmanship on the Wye Bridge contract.

A schedule of operations was programmed and this covers examination of every part of the structures at the frequencies considered necessary. At the extremes, deck expansion joints are examined weekly, and on the Severn Bridge the main suspension cables and clamps from which the suspenders hang are inspected annually. Crash barriers are under almost continuous surveillance by the maintenance teams in their journeyings to the locations where they are working. Certain inspections are seasonal, as, for instance, the inside of the Severn Bridge towers and anchorages where work is confined to the winter or periods of stormy weather. The schedule allows some latitude for unforeseen problems arising, but diaries are kept so that, in the whole year, the programme is effectively adhered to.

To facilitate operations, each part of the structures has a reference code and number for easy identification on site and in the maintenance record system. The references are stencilled on the units on site and are shown on key plans displayed in the office; on the latter are indicated each day the locations at which operations are in hand.

Each 60ft long deck (box girder) section as fabricated for site erection is a referenced unit; for instance on the Severn Bridge the 10th deck unit from the Aust tower in the Aust side span bears the reference AS10. On the Aust tower the 5th section up from the base on the downstream leg has the reference AT5D. All suspenders and cable clamps are referenced in association with the deck units they carry.

A record card is kept for each unit and on this is noted the dates upon which inspections are made; also on it are instructions regarding points which should be observed, and where necessary a photograph is attached. Inspection sheets kept in date order record instructions given for renovation or repair and also of the work carried out; persistent faults can thus be identified.

When inspection operations commenced late in 1966, it was evident that renovation of certain areas on the underside of the wide boxes should be put in hand as soon as possible, for zinc oxide was erupting through the protective coatings. It was mainly on the units which had been kept overlong in the River Wye before being towed out for hoisting into position on the Severn Bridge. Bulb flat stiffeners on the underside of the cantilevered wings were also affected due to contamination held in condensation. Rusting was breaking through along the unsealed edges of the weld backing flats. Inside the wide box girders condensation was causing mill scale to strip and rusting was developing.

To deal urgently with the deterioration of the coatings on the external surfaces, two teams of three men who had worked as riggers on the construction of the bridges were engaged and trained in the use of grit blasting and airless spray painting equipment.

The problem of condensation inside the girders called for some investigation on the part of the consultants Freeman Fox & Partners and the firm of Joseph Crosfield. It was decided that silica gel should be placed inside the structures as an experiment in an attempt to combat this, for renovation of the paintwork could not in any case be carried out unless the surfaces were clean and dry. Accordingly silica gel provided in 10 lb bags was installed at a concentration of 1 lb per 80 cubic ft of internal volume.

Renovation of the external protective coatings is now an established routine. Dealing with one deck unit (a 60ft length of decking 100ft wide) the procedure is to grit blast a 10 ft length of the underside of the box (normally a morning's work) and to cover this with one coat of zinc chromate by roller before the end of the working day. The grit blasting is carried out to a greater or lesser degree according to the condition of the coating; with a heavy concentration of zinc oxide pustules breaking through the coatings or where rust is developing. The blasting cleans down to the surface of the steel; if the coatings are breaking down but with no sign of zinc oxide the coats of paint alone are removed and where the paint is in fair condition it is given a 'flash' blast which cleans and etches the surface to make it receptive to the application of further coats of paint. Repeating the operations described above, at the end of six working days the cleaning process and the application of a single coat of zinc oxide is completed on one deck' unit. Airless spray painting equipment is then used to apply three further coats of paint, one of zinc chromate and two of micaceous iron oxide over the whole area and these operations take a further 1½ days. Thus one deck unit is completely renovated in a period of 7½ days. This procedure is adopted because it is not worth while setting up airless spray painting equipment to coat a 1 Oft length of decking which must however be covered within four hours of cleaning or rusting will develop.

The use of silica gel to eliminate condensation inside the boxes has proved a success for although, at first, most of it required replacing after twelve months (at a cost of about £4,000) this was

partly because of the high degree of condensation in the boxes at that time, and also because there were leakages in the airtightness of the structures allowing excessive breathing. The structures, now divided into fourteen sealed sections, leak so little that replacement of the silica gel is only necessary every three years and renovation is not required. Thus the number of operatives on the complex is kept to a minimum and health hazards to men engaged in painting in confined conditions are avoided. The airtightness causes pressures to build up with rising temperatures and these are monitored. The condition of the silica gel in each section can be observed through a small window where a 10 lb bag of silica gel placed on a balance can be seen; when the scale shows the gel to have taken up 3 lb of water the gel is saturated and needs to be replaced.

Most of the maintenance work has to be done from gantries or stagings. Gantries were in position on the Severn Bridge spans before the structures were completed and these extending the full width of the decking are suspended from the edges of the cantilevered wings.

Gantries for the Aust Viaduct, the Wye Bridge and Beachley Viaduct have been designed by Gloucestershire County Council, as have also gantries in the Severn Bridge anchorages and a carriage which runs on the main suspension cables.

The Aust Viaduct gantry runs between the two longitudinal box girders and has a retractable lower platform from which the underside and outer webs of the box girders can be treated.

The Wye Bridge and Beachley Viaduct gantry is in two halves and each runs on a single rail attached to the underside of the cantilevered girders extending from each side of the wide box girders. Each has a retractable lower platform from which half of the underside of the box can receive attention.

In the Severn Bridge anchorages, the gantries provide for the suspension of cages from which the steeply sloping splayed strands of the main cable can be cleaned and coated.

The carriage on the main suspension cables has two cages which hang vertically, one on each side of the cable so that operators can sit one in each cage to renovate the cable or check accurately the lengths of the ten high strength bolts in each clamp from which the suspenders hang; the length of each of the no. 1760 bolts was measured with a large micrometer, after final tightening and recording; the same micrometer is used for checking. The carriage is winched along the cables by means of a tirfor.

The high degree of inspection on these structures is shown to be justified not only by the standard of maintenance which is being achieved with protective coatings, but also in the timely detection and rectification of faults, such as:

(a) Strand slip on the cable-stayed Wye Bridge anchorages necessitating modification of the strand couplings and resocketing (work carried out on site by British Ropes Ltd).
(b) Ineffective performance of the liquid springs cushioning the plates of main carriageway expansion joints at the Severn Bridge towers (modifications carried out by the maintenance staff).
(c) The appearance of weld cracks (repairs carried out under the direction of the welding inspector).

1 Wye Bridge gantry with lower platform retracted. passing a trestle pier.
2 Zinc oxide appearing through the protective coating on bulb flat stiffeners under the cantilevered footway.
3 Wye Bridge gantry with lower platform extended for attention to underside of box girder.
4 Severn Suspension Bridge. Inspection of main suspension cables.
5 Patch painting from the Wye Bridge gantry with zinc chromate undercoat.
6 Painting with airless spray equipment.
7 Grit blasting underside of Severn Bridge cantilevered footway from painting gantry.
8 Painting a Severn Bridge tower leg from staging.
9 Maintenance carriage on the Severn Bridge main suspension.









RQSC | The Register of Qualified Steelwork Contractors Scheme **Buildings**

Steelwork contractors for buildings

BCSA

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

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, ● = Bronze, ● = Certificate

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	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●		✔	2			Up to £5,000,000
Adey Steel Ltd	01509 556677	●		●	●	●	●	●	●	●	●			●	●	✔	3		●	Up to £3,400,000
Adstone Construction Ltd	01905 794561			●	●	●	●							●		✔	2	✔	●	Up to £3,400,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●		●		●	●	●			●	●	✔	4		●	Up to £3,400,000
Angle Ring Company Ltd	0121 557 7241												●			✔	4			Up to £1,200,000
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2			Up to £2,400,000
Arromax Structures Ltd	01623 747466			●	●	●	●	●	●	●	●				●		2			Up to £1,200,000
ASME Engineering Ltd	020 8966 7150	●		●	●	●		●	●	●	●		●	●	●	✔	4		●	Up to £5,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●			●	●			●	●	✔	2			Up to £1,200,000
B D Structures Ltd	01942 817770			●	●	●	●				●	●		●	●	✔	2	✔	●	Up to £2,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●				✔	4	✔	●	Up to £2,400,000
Barnshaw Section Benders Ltd	0121 557 8261												●			✔	4			Up to £1,200,000
BHC Ltd	01555 840006	●	●	●	●	●	●	●	●	●	●	●		●	●	✔	4	✔	●	Above £10,000,000
Billington Structures Ltd	01226 340666		●	●	●	●	●	●		●		●	●	●		✔	4	✔	●	Above £10,000,000
Bourne Group Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £10,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●		●	●	●	✔	4		●	Up to £10,000,000
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●						●	✔	4		●	Up to £6,500,000
Caunton Engineering Ltd	01773 531111		●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £10,000,000
Cementation Fabrications	0300 105 0135	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	3		●	Up to £10,000,000
CMF Ltd	020 8844 0940				●		●	●		●	●				●	✔	4			Up to £6,500,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●	✔	4			Up to £1,200,000
D H Structures Ltd	01785 246269			●	●		●				●						2			Up to £400,000
Duggan Steel	00 353 29 70072	●	●	●	●	●	●	●	●		●				●	✔	4			Up to £10,000,000
D Hughes Welding & Fabrication Ltd	01248 421104				●	●	●	●	●	●	●		●	●	●	✔	4			Up to £1,200,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●	●	●	●	●			●	●	✔	4		●	Up to £5,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●	●	✔	4	✔	●	Up to £10,000,000
EvadX Ltd	01745 336413		●	●	●	●	●	●		●	●	●			●	✔	3		●	Up to £3,400,000
Four Bay Structures Ltd	01603 758141			●	●	●	●	●		●	●			●	●		2			Up to £1,200,000
Four-Tees Engineers Ltd	01489 885899	●		●	●		●	●	●	●	●		●	●	●	✔	3		●	Up to £2,400,000
G.R. Carr (Essex) Ltd	01286 535501	●		●	●			●			●			●	●	✔	4			Up to £1,200,000
H Young Structures Ltd	01953 601881			●	●	●	●	●			●			●	●	✔	4	✔	●	Up to £5,000,000
BCSA steelwork contractor member	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**FPC**	**BIM**	**SCM**	Guide Contract Value (1)

BCSA steelwork contractor member	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
Had Fab Ltd	01875 611711				●		●	●	●	●	●			●	●	✔	4			Up to £6,500,000
HBE Services Ltd	01525 854110				●	●				●				●	●	✔	2			Up to £800,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			Up to £3,400,000
Hillcrest Structural Steel Ltd	023 8064 1373			●	●	●	●	●		●	●			●	●	✔	3		●	Up to £3,400,000*
Integrated Water Services Ltd	01282 777739									●	●			●	●	✔	2			Up to £1,200,000
Intersteels Ltd	01322 337766	●			●	●	●	●	●	●			●	●	●	✔	3	✔		Up to £5,000,000
Jamestown Manufacturing Ltd	00 353 45 434 288		●	●	●	●	●	●	●	●		●	●			✔	4			Up to £10,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445			●	●	●	●	●		●	●	●	●	●	●	✔	4	✔	●	Above £10,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4		●	Up to £6,500,000
Leach Structural Steelwork Ltd	01995 642000			●	●	●	●	●			●					✔	3		●	Up to £6,500,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●					●	●			●	●		2			Up to £600,000
Littleton Steel Ltd	01934 311670			●	●	●				●	●			●	●	✔	3			Up to £1,200,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●			●	●	✔	4		●	Up to £1,400,000
M&S Engineering Ltd	01461 40111				●				●	●	●				●	✔	3			Up to £2,400,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✔	4			Up to £2,400,000
Maldon Marine Ltd	01621 859000				●				●	●	●			●	●	✔	3			Up to £600,000
Midland Structures Limited	01384 411201				●	●	●	●	●	●	●		●	●	●		2			up to £5,000,000
Murphy International Ltd	00 353 45 431384	●		●	●	●	●	●	●	●	●			●	●	✔	4			Up to £6,500,000
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●			●	●				✔	4		●	Up to £2,400,000
North Lincs Structures	01724 855512			●	●					●	●				●		2			Up to £600,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	Up to £6,000,000
Painter Brothers Ltd	01432 374400				●				●	●	●			●	●		3			Up to £5,000,000*
Peter Marshall (Steel Stairs) Ltd	0113 307 6730				●	●				●	●				●	✔	3			Up to £2,400,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £2,400,000
REIDsteel	01202 483333			●	●	●	●		●			●			●	✔	4		●	Up to £10,000,000
SAH Luton Ltd	01582 805741			●	●	●				●	●			●	●		2			Up to £600,000
S H Structures Ltd	01977 681931	●		●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Up to £5,000,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●			●	●			●	●	✔	4			Up to £3,400,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £10,000,000
Shaun Hodgson Engineering Ltd	01553 766499	●			●		●			●	●			●	●	✔	3			Up to £800,000
Shipley Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●	✔	3			Up to £2,400,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✔		Up to £3,400,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £1,200,000
Stage One	01423 358001				●		●	●	●	●					●	✔	2			Up to £6,500,000
Steel & Roofing Systems	00 353 56 444 1855	●		●	●	●	●				●	●		●	●	✔	4			Up to £10,000,000
Taziker Industrial Ltd	01204 468080	●		●	●		●	●		●	●		●	●	●	✔	3		●	Above £10,000,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●			2	✔		Up to £2,000,000
W I G Engineering Ltd	01869 320515				●					●	●			●	●	✔	2		●	Up to £600,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✔	4		●	Above £10,000,000
Westbury Park Engineering Ltd	01373 825500	●		●	●	●	●	●	●	●	●				●	✔	4		●	Up to £2,400,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £10,000,000

Non member	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
Eden Fabrications	02825 821000			●	●	●	●	●		●	●		●		●	✔	3			Up to £1,200,000

Non member	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)

RQSC | The Register of Qualified Steelwork Contractors Scheme **Bridgeworks**

Steelwork contractors for bridgeworks

BCSA

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

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

- **FB** Footbridges
- **CF** Complex footbridges
- **SG** Sign gantries
- **PG** Bridges made principally from plate girders
- **TW** Bridges made principally from trusswork
- **BA** Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
- **CM** Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 metre span)
- **MB** Moving bridges
- **SRF** Site-based bridge refurbishment
- **FRF** Factory-based bridge refurbishment
- **AS** Ancilliary structures in steel associated with bridges, footbridges or sign gantries (eg grillages, purpose-made temporary works)
- **QM** Quality management certification to ISO 9001
- **FPC** Factory Production Control certification to BS EN 1090-1
  1 – Execution Class 1 2 – Execution Class 2
  3 – Execution Class 3 4 – Execution Class 4
- **BIM** BIM Level 2 compliant
- **SCM** Steel Construction Sustainability Charter
  ● = Gold ● = Silver ● = Bronze ● = Certificate

Notes

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

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

BCSA steelwork contractor member	Tel	FB	CF	SG	PG	TW	BA	CM	MB	SRF	FRF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
Adey Steel Ltd	01509 556677	●	●	●	●	●	●			●	●	●	✓	3			✓	●	Up to £3,400,000
AJ Engineering & Construction Services Ltd	01309 671919	●		●	●	●	●	●	●	●	●	●	✓	4				●	Up to £3,400,000
Beaver Bridges Ltd	01204 668773	●		●	●	●	●	●	●	●	●	●	✓	4					Up to £3,000,000
Billington Structures Ltd	01226 340666	●		●	●	●	●					●	✓	4	✓	✓	✓	●	Above £10,000,000
Bourne Group Ltd	01202 746666	●		●	●	●				●		●	✓	4	✓		✓	●	Above £10,000,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £10,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●	●	●	●		●	●	●	✓	4			✓	●	Up to £6,500,000
Cementation Fabrications	0300 105 0135	●	●	●	●	●	●	●	●	●	●	●	✓	3			✓	●	Up to £10,000,000
D Hughes Welding & Fabrication Ltd	01248 421104	●		●		●			●	●	●	●	✓	4			✓		Up to £1,200,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●		●			●	✓	4				●	Up to £5,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●	●	●		●	●	●	●	✓	3			✓	●	Up to £2,400,000
Jamestown Manufacturing Ltd	00 353 45 434 288	●	●	●	●	●	●					●	✓	4			✓		Up to £10,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●		●	●	●						●	✓	4	✓		✓	●	Above £10,000,000
M&S Engineering Ltd	01461 40111	●		●		●	●	●		●	●	●	✓	3					Up to £2,400,000
M Hasson & Sons Ltd	028 2957 1281	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £1,400,000
Millar Callaghan Engineering Services Ltd	01294 217711	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓		Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●	●	●	●	●	●			●	●	●	✓	4			✓		Up to £6,500,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £6,000,000
REIDsteel	01202 483333	●			●	●	●		●			●	✓	4				●	Up to £10,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £5,000,000
Severfield plc	01204 699999	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £10,000,000
Taziker Industrial Ltd	01204 468080	●	●	●	●	●	●	●	●	●	●	●	✓	3		✓	✓	●	Above £10,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £10,000,000
Non-BCSA member																			
Allerton Steel Ltd	01609 774471	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £5,000,000
AmcoGiffen	01226 243413	●	●	●	●	●	●		●	●	●	●	✓	4					Up to £1,200,000
Carver Engineering Services Ltd	01302 751900	●		●	●	●	●		●	●	●	●	✓	4			✓		Up to £5,000,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £10,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●	●	●		●	●	✓	4			✓		Up to £600,000
Donyal Engineering Ltd	01207 270909	●		●						●	●	●	✓	3		✓	✓		Up to £2,400,000
Harrisons Engineering (Lancashire) Ltd	01254 823993	●	●	●	●	●	●	●	●	●	●	●	✓	3		✓	✓		Up to £3,400,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £10,000,000*
HS Carlsteel Engineering Ltd	020 8312 1879			●						●	●	●	✓	3			✓		Up to £1,200,000
J&D Pierce Contracts Ltd	01505 683724	●	●		●	●	●	●	●			●	✓	4			✓		Above £10,000,000
Kelly's Welders & Blacksmiths Ltd	01383 512 517											●	✓	2			✓		Up to £350,000
Lanarkshire Welding Company Limited	01698 264271	●	●	●	●	●	●	●	●	●	●	●	✓	4					Up to £5,000,000
North View Engineering Solutions Ltd	01325 464558											●	✓	3					Up to £1,200,000
Shaw Manufacturing Ltd	01642 210716			●						●	●	●	✓	4			✓		Up to £1,200,000
Smulders Projects UK Ltd	0191 295 8700	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £10,000,000
Total Steelwork & Fabrication Ltd	01925 234320	●		●		●				●	●	●	✓	4			✓		Up to £5,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £10,000,000

BCSA

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
Bonham and Brook North Ltd	020 3523 9125
Gene Mathers	0115 974 7831
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	0300 123 5000

Company name	Tel
Keiths Welding Limited	07791 432 078
MMCEngineer Ltd	01423 855939
Paul Hulme Engineering Ltd	07801 216858
Sandberg LLP	020 7565 7000

Company name	Tel
Solent Commercial Management Limited	07852 309104
Structural & Weld Testing Services Ltd	01795 420264
SUM ADR Ltd	07960 775772

Industry Members

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

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

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

SCM
Steel Construction Sustainability Charter
● = Gold ● = Silver
● = Bronze ● = Certificate

SfL
Steel for Life Sponsor

Structural components

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Albion Sections Ltd	0121 553 1877	✓	M	4			
BW Industries Ltd	01262 400088	✓	M	3			
Cellbeam Ltd	01937 840600	✓	M	4	20		
Composite Profiles UK Ltd	01202 659237		D/I				
Construction Metal Forming Ltd	01495 761080	✓	M	3			
Daver Steels Ltd	0114 261 1999	✓	M	3			
Farrat Isolevel	0161 924 1600	✓	N/A				
Hadley Industries Plc	0121 555 1342	✓	M	4		●	
Hi-Span Ltd	01953 603081	✓	M	4		●	
Kingspan Structural Products	01944 712000	✓	M	4		●	
MSW UK Ltd	0115 946 2316		D/I				
Prodeck-Fixing Ltd	01278 780586	✓	D/I				
Structural Metal Decks Ltd	01202 718898	✓	M	4			
Stud-Deck Services Ltd	01335 390069		D/I				
Tata Steel - ComFlor	01244 892199	✓	M	4			
voestalpine Metsec plc	**0121 601 6000**	✓	**M**	4		●	**Gold**

Computer software

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Autodesk Ltd	01252456600		N/A				
Fabsec Ltd	01937 840641		N/A				
IDEA StatiCa UK Ltd	**02035 799397**		**N/A**				**Silver**
StruMIS Ltd	01332 545800		N/A				
Trimble UK Limited	0113 887 9790		N/A				

Steel producers

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
British Steel Ltd	01724 404040	✓	M		3B		
Tata Steel - Tubes	01536 402121	✓	M		3B		

Manufacturing equipment

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

Membership services

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Deconstruct UK Ltd	02035 799397	✓	N/A				
Keltbray Holdings Ltd	0207 643 1000	✓	N/A				

Protective systems

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
Forward Protective Coatings Ltd	01623 748323	✓	N/A				
Hempel UK Ltd	**01633 874024**	✓	**N/A**				**Silver**
Highland Metals Ltd	01343 548855	✓	N/A				
International Paint Ltd	0191 469 6111	✓	N/A				
Jack Tighe Ltd	01302 880360	✓	N/A		19A		
Joseph Ash Galvanizing	**01246 854650**	✓	**N/A**				**Silver**
PPG Architectural Coatings UK & Ireland	01924 354233	✓	N/A				
Sherwin-Williams UK Ltd	01204 521771	✓	N/A			●	
Vale Protective Coatings Ltd	01949 869784		N/A				
Wedge Group Galvanizing Ltd	**01902 601944**	✓	**N/A**				**Gold**

Safety systems

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
easi-edge Ltd	01777 870901	✓	N/A				
TRAD Hire & Sales Ltd	01614 304666	✓	N/A				

Steel stockholders

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
AJN Steelstock Ltd	01638 555500	✓	M	4			
Arcelor Mittal Distribution - Scunthorpe	**01724 810810**	✓	**D/I**	**4**	**3B**		**Headline**
Barrett Steel Services Limited	**01274 682281**	✓	**M**	**4**	**3B**		**Headline**
British Steel Distribution	01642 405040	✓	D/I	4	3B		
Cleveland Steel & Tubes Ltd	**01845 577789**	✓	**M**	**3**	**3B**		**Gold**
Dent Steel Services (Yorkshire) Ltd	01274 607070	✓	M	4	3B		
Dillinger Hutte U.K. Limited	01724 231176	✓	D/I	4		●	
Duggan Profiles & Steel Service Centre Ltd	00 353 567722485	✓	M	4			
European Metal Recycling Ltd	01925 715400	✓	N/A				
Kloeckner Metals UK	0113 254 0711	✓	D/I	4	3B	●	
Murray Plate Group Ltd	0161 866 0266	✓	D/I	4	3B		
NationalTube Stockholders Ltd	**01845 577440**	✓	**D/I**	**4**	**3B**		**Gold**
Rainham Steel Co Ltd	01708 522311	✓	D/I	4	3B		
The Alternative Steel Co Ltd	01942 826677	✓	D/I				

Structural fasteners

Company name	Tel	QM	CA	FPC	NHSS	SCM	SfL
BAPP Group Ltd	01226 383824	✓	M		3		
Cooper & Turner Ltd	0114 256 0057	✓	M		3		
Lindapter International	01274 521444	✓	M				

Welding equipment and consumables

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

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