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NSC

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Architect: tp Bennett
Main contractor: Mace
Structural engineer: Thornton Tomasetti
Steelwork contractor: William Hare
Steel tonnage: 2,700t

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Survey shows underlying strength of steel's market share

Nick Barrett - Editor

Steel has occupied a lot of headline spaces in the past few weeks with a national debate underway over whether steel production by blast furnace or electric arc furnaces is the way for the UK to go. Without straying too far here into what is an extremely complicated debate, we can say that BCSA members are confident of continuing to supply their customers with the quality of steel that they want, at a competitive price, whichever route steel manufacturers decide to take.

The best way of avoiding price or availability issues is to engage your steelwork contractor as early as possible to ensure that the steel you want will be available when you want it - as it always has been.

The constructional steelwork sector is confidently looking forward to the more sustainable future that the move towards reducing carbon emissions from steel production is part of. Steel's sustainability advantages are many and varied, and can be seen in all the projects that we have covered in *NSC* over the years. They can also be expected to be even more appreciated in future as all parts of the supply chain tighten their sustainability performance.

More confidence for a sustainable steel future comes from the latest independent market survey from Construction Markets (see *News*) which has just been published. It shows that there was a very small decrease in consumption of structural steelwork in 2023, of just 1%, which is actually a highly creditable performance considering all the headwinds that the economy faced. Steel's market shares have been maintained or increased in the key sectors.

Last year saw what seems to have been the end of a post Covid-19 recovery, and economists are now poised to see which way investor confidence will sway next. There was a widely reported hesitancy during the year among some industry clients in the face of rising interest rates, energy prices and political uncertainty, which possibly won't go away until the next general election which is expected to be held this year. But the most recent reports suggest that consumer confidence is growing, and will be helped by an expected continued reduction in energy prices.

A forthcoming election is an easily justifiable excuse for not making any decisions and just waiting to see what happens next. There have been signs of that, but also of clients with enough confidence in the future to press on with investments. There are several sectors where growth can be expected to remain firm, like logistics buildings for online retailers and data centres. Employers reportedly struggle to get staff back to the office, and a key carrot to encourage them to return will be attractive, aesthetically pleasing offices, which steel routinely provides.

The refurbishment market has strengthened as clients consider whether that would be a more sustainable option than demolish and rebuild. Existing buildings with steel frames will always prove to be more easily reconfigured to meet changing needs than others, and we can expect this to be remembered by building owners when they make other investment decisions.

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Steelwork increases its structural frames market share

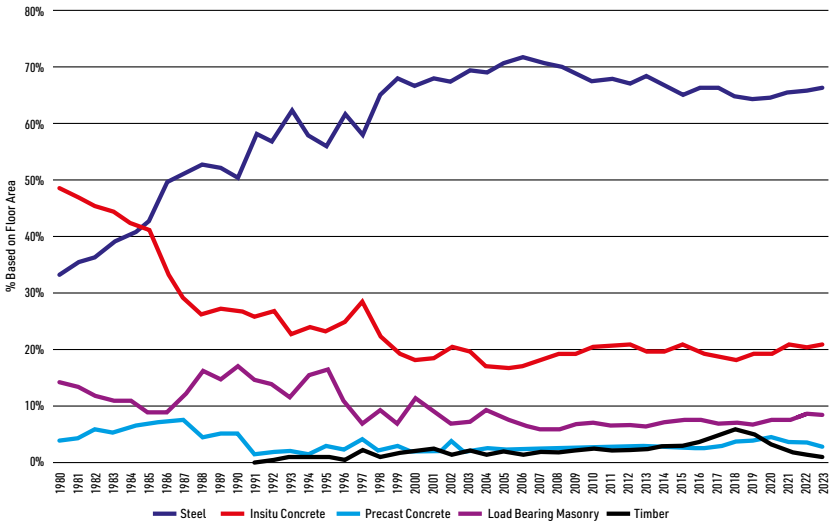
Steelwork continues to be the UK's structural framing material of choice for a number of key construction sectors, according to the latest survey from independent market research consultants Construction Markets.

The 2023 survey, commissioned by Steel for Life and the British Constructional Steelwork Association (BCSA), is the latest in a series going back to 1980 and is thought to be the biggest of its type in the UK, involving over 750 interviews with construction specifiers.

The overall structural frames market in the UK for 2023 was down 8.8% from the previous year, but steelwork's overall market share was 48.6%, the biggest share of any material and up from 45.4% in 2022.

Steelwork has traditionally dominated the single storey non-domestic building market (sheds) and in 2023 it had a 94.6% market share, compared to 94.2% in 2022. Year on year, the sector, which accounts for almost 50% of the overall structural steelwork market by tonnage, was 12,158,000m², down by 2.6% from 2022.

In the multi-storey non-domestic sector, steelwork's share for 2023 was up from 65.9% in 2022 to 66.4%. Within this sector, steel accounted for 75.3% of the private offices market.



Market Shares - Total Multi-Storey Non-Domestic Building Market, Great Britain 1980 to 2023

Steel completes on ExCeL London expansion

The final piece of structural steelwork has been bolted into place for the ExCeL London expansion, which will add 25,000m² of additional space to the eastern end of the venue.

A total 4,500t of steel have now been installed and once complete, in October, the London venue will become the largest, fully integrated, conference and exhibition centre in Europe.

Humaid Al Dhaheri, Chairman of ExCeL, said: "ExCeL London is already a world-class venue, and this expansion will further strengthen its leading position within the international events and business tourism industry.

Hosting around 400 events every year and welcoming four million visitors, one million of those from overseas, ExCeL is currently experiencing its busiest ever year – tracking 10% higher than its previous record set before the pandemic in 2019. This includes record demand for event space, record-breaking attendance figures across multiple sectors and flourishing new attractions and immersive division.

Working on behalf of main contractor McLaren Construction, Severfield has fabricated, supplied and erected the project's steelwork.

Darren Gill, Managing Director for the London & South division at McLaren Construction, added: "ExCeL's expansion is a flagship project for McLaren and illustrates our approach on a grand scale. The steel structure is one of those areas where the project was able to improve on the sustainability of a typical steel frame, using 50% recycled steel that significantly reduces the carbon footprint of the project. Working collaboratively with the client, designers, subcontractor teams and local stakeholders, we were able to overcome many challenges to deliver the monumental steel frame on programme."

Work underway on Liverpool Street over-station scheme

Structural steelwork erection has commenced on the 1 Liverpool Street project in the City of London.

Mace is delivering the scheme for Aviva Investors and Allianz Real Estate, while William Hare is fabricating, supplying and erecting approximately 3,000t of steel for job.

The project sits at the heart of the new Elizabeth Line, bookending the eastern and western entrances of the new underground railway at Liverpool Street station.

The 10-storey over-station development, which is designed by Eric Parry Architects, will provide 16,350m² of premium office and retail space when complete.

Fully electric in both construction and operation, 1 Liverpool Street has been designed to achieve significant energy and carbon savings throughout its lifespan – saving an estimated 110 tonnes of carbon per year.

Carbon savings will be achieved through a range of measures including meeting the building's heating and cooling demands through air source heat pumps, triple glazing, high-efficiency chillers and energy-efficient lighting.

Ged Simmonds, Managing Director Commercial Offices at Mace said: "We are delighted to be working once again with Aviva and Allianz Real Estate on another ambitious project. As a business that puts sustainability at the heart of what we do, I am particularly pleased with the high sustainability standards of 1 Liverpool Street, facilitating a move towards a lower-carbon future."

Steel-framed warehouse for The Range completes in Suffolk

Requiring more than 3,500t of structural steelwork and comprising a seven-span portal measuring 408m-long x 269m-wide, a new warehouse for The Range has been completed.

Delivering significant economic boost to the Mid-Suffolk region, the warehouse is the first unit on the Gateway 14 development near Stowmarket.

Adjacent to Junction 50 of the A14, Gateway 14 is said to be the largest business, innovation and logistics park in East Anglia, with plans in place for a variety of other units.

Working on behalf of main contractor Winvic Construction, Caunton Engineering fabricated, supplied and erected the project's steelwork.

Gateway 14 Chair, Sir Christopher Haworth, said: "This is a great day for Stowmarket and the surrounding region. Not only does it bring over 1,600 jobs to this prime location, but it also delivers the first building on the new highly sustainable, mixed-use Gateway 14 development. We already have further strong interest in the park and expect to be able to identify new occupiers in the near future."

Approval given for multi-storey logistics scheme in Thurrock

British Land has received planning consent for a 59,800m² multi-storey logistics scheme in Thurrock, Essex.

The project will provide occupiers with a purpose-built logistics space suitable for use as a hub for last-mile deliveries and returns. The scheme is located adjacent to Junction 31 of the M25, providing access to Central London and the South East of England.

According to British Land, the scheme will deliver two storeys of flexible, sustainable warehousing, in line with its 'Greener Spaces' philosophy. The project is also targeting a BREEAM 'Outstanding' rating.

British Land currently has a £1.3bn pipeline of urban logistics developments across London and the South East. As well as the Thurrock site, the developer has received consent to deliver new logistics space in Southwark, Paddington and Enfield.

Mike Best, Head of Logistics at British Land, commented: "We've been extremely busy working on our London urban logistics pipeline, and have received planning consents for four schemes this

year. This enables us to deliver a number of high-quality new logistics space to meet the growing demand, underpinned by the growth of e-commerce and rising customer expectations on the speed and convenience of deliveries.

"Our schemes provide occupiers with much needed future-proofed warehousing in high-demand locations, and we continue to actively explore opportunities for high-quality logistics spaces in urban markets."

Hitachi Zosen Inova bags new Walsall waste-to-energy centre

Waste management provider Encyclis has appointed Hitachi Zosen Inova (HZI) as its principal contractor to design, build and commission a new waste-to-energy (WtE) centre in Walsall.

The project, which will generate electricity for homes and businesses, is the 19th WtE scheme HZI has been awarded in the UK.

The Walsall facility will utilise HZI's enhanced combustion technology to generate electrical energy from non-recyclable waste that would otherwise be destined for UK landfill or overseas export.

Once the plant is operational, the facility will be capable of efficiently treating around 436,000 tonnes of residual (non-recyclable) waste per year, generating 49 MW of low-carbon electricity.

Executive VP of Business Development at HZI Fabio Dinale, said: "The Walsall project demonstrates the trust our clients have in our experienced staff and proven technology capabilities.

"Over the last 10 years, Encyclis has appointed HZI to build four facilities across the UK and Ireland.

Encyclis Chief Executive Owen Michaelson, said: "We are pleased to be working once again with HZI on the design and construction of this important addition to our growing fleet of energy recovery facilities in the UK and Ireland.

"The commencement of this project demonstrates our long-term vision to build and operate sustainable waste treatment infrastructure that processes non-recyclable residual waste while recovering electricity, heat and other resources for wider society."

NEWS IN BRIEF

Main contractor **Glencar** has been appointed by investment management and advisory firm Vengrove, to construct two warehouse units of 3,900m² and 5,300m² at Erdington Industrial Park in Birmingham. The units, which are being developed speculatively, will be built to a sustainable specification, which includes BREEAM 'Excellent' and EPC A ratings.

Morgan Sindall Construction has been appointed to build the new Community Diagnostic Centre at St Margaret's Hospital in Epping, Essex. Procured under the ProCure21 framework, the project will significantly improve access to important healthcare equipment and skills, shortening the amount of travel time for NHS patients in the area.

The London School of Economics and Political Science, has confirmed the **Bouygues UK-Equitix** consortium as the preferred student accommodation partner for 2,000 new student homes at Bankside in central London. The consortium will provide investment and develop plans for the build, which will be positioned behind the Tate Modern art gallery.

Working on behalf of Rangeford Villages, **Bennett Construction** has been appointed to deliver a £50M retirement village in Stapleford, Cambridgeshire. The scheme will offer 147 contemporary retirement properties with the first phase of the scheme due to be completed this year and the remainder in 2025.

The University of Cumbria has appointed **Caddick Construction** as the lead contractor to create the first university campus in Barrow-in-Furness. Once complete, this state-of-the-art facility will provide new teaching spaces, laboratory space, workshops, offices, catering facilities and new landscaping to the immediate area, along with new cycling and car parking facilities.

PRESIDENT'S COLUMN

I recently learned that my very first design office manager, a proud Geordie named Alan Walker, had sadly passed away. He managed the engineering team at William Hare for many years during the 80s and 90s and was my personal mentor when I stepped up from the drawing office to the design department.

The reason for me starting this month's column with this somewhat personal information is twofold.

First, at the very least he deserves the recognition that is equally warranted by many engineers working for steelwork contractors, during the same era when there was a significant change in the requirement to produce structural calculations to verify a steelwork connection rather than it just being eyed in by an experienced draughtsman.

This new mandate needed an extremely quick learning curve, that many would have struggled to achieve; but not only was Alan a very clever and speedy learner, he was also very magnanimous in sharing his self-taught skills with peers and colleagues alike.

The second reason is in relation to the current ongoing debate about engineering competence brought about by the introduction of the Building Safety Act.

Alan Walker wasn't a chartered engineer, and indeed used to joke that his only recognisable qualification was a 25-yard swimming certificate, but he was extremely competent, and I certainly owe much of my subsequent career to his teaching and personal encouragement.

If you regularly read the Verulam Section of the Structural Engineer magazine, you will no doubt have noted the varying opinions around this topic and the ongoing debate about what is accepted and recognised as a competent engineer.

Becoming a chartered structural engineer is certainly one way of verifying a level of competence to produce and check structural designs and calculations. But even this requires an appropriate amount of experience that is only generated by the combination of vocational training and time. And the more complex the design, certainly the more experience is required.

The recently introduced Building Safety Act states, that 'competence' is a requirement on any appointed or prescribed person to have the necessary skills, knowledge, experience, and behaviours to perform their functions under building regulations. But the definition and validation of those necessary skills, knowledge and experience is what is at the centre of the ongoing debate, and my own concern is that this will only become even more unclear and complex as we drift into the world of AI and an over-reliance on computer software.

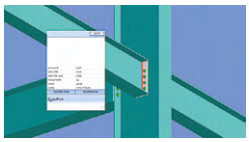
Throughout my career, I have been privileged to work alongside some outstanding and prominent structural engineers from whom I would accept and trust a pencil-drawn design solution before a complex 3D computer analysis. But where will our next Alan Walker, Joe Locke or Allan Mann come from, and how do we ensure that tomorrow's engineers are as capable and practical despite their listed qualifications and CPD records?

The term 'competence' is applicable to much more than the ability to carry out a safe and efficient structural design. Competence is also required to adequately convey that design to those who will fabricate and build it, and then equally needed by those receiving and understanding that design to deliver a safe and robust structure.

In short, competence is both difficult to measure and equally difficult to demonstrate, so we need to be extremely careful how we move forward to measure and recognise it.

Gary Simmons
BCSA President

Estimodelling feature added to latest STRUMIS release



The latest steel fabrication management information software from STRUMIS now includes the company's new Estimodelling feature.

Creating the ability to quickly import a fully connected steel project model from a 3D detailing program, such as Tekla Structures and SDS2, Estimodelling offers a host of benefits to users.

The new feature allows connection details and weld data to be detected, imported and costed accurately. Previously, industry norms only provided a 'reasonable assumption' for process times such as cutting and drilling.

Within the feature, connection details are considered with precise manufacturing cut and drill times. Each beam and plate is analysed for thickness and hole diameter, which is said to result in accurate process times, while estimating a steel project.

Estimodelling also allows weld data within the 3D model to be considered as a vital component that can be costed for time and labour.

STRUMIS Sales Manager Steve Watson said: "The new Estimodelling feature within STRUMIS V11.1, demonstrates our commitment to our customers and the wider steel fabrication industry.

"Estimodelling provides an unrivalled ability to rapidly generate supremely accurate estimates within STRUMIS, helping users ensure 100% accuracy, including true process times for welding, cutting and drilling. In addition, businesses will also benefit from knowledge retention, consistency of quotes, peace-of-mind of bid accuracy and estimate versus actual real-time job costing in an easy-to-use, user-friendly and modern interface."

Contact *sales@strumis.com* for more information.

Manchester flagship development expands with steel

Working on behalf of main contractor GMI, Billington Structures is fabricating, supplying and erecting the steel frame for 3 Circle Square in Manchester city centre.

The latest building in a much wider scheme, 3 Circle Square will have 15-storeys and feature cutting-edge workspace designed to facilitate collaboration and innovation.

The completed building will pay tribute to Manchester's Victorian and Edwardian architecture. Featuring a high-quality red brick design by Bridge Architects, the new development will include ground floor retail and leisure space, as well as a communal lounge, event space and a roof terrace.

Sustainability and green space have also been carefully considered in the design of 3 Circle Square, with the development expected to achieve net zero embodied carbon during construction and BREEAM 'Excellent' rating, a NABERS 5 Star rating and an EPC A rating once operational.

The building will benefit from an all-electric heating and cooling system with state-of-the-art air source heat pumps, as well as smart metering and roof mounted solar panels.

3 Circle Square will open onto Symphony Gardens, a new landscaped space designed to complement Symphony Park, which promotes biodiversity across the wider Circle Square development. High-quality amenities including cycle and shower facilities will also be included to encourage green travel.

Green light for major City of London office retrofit

The City of London Corporation has approved a major retrofit scheme at 65 Gresham Street, that will include a large area of public realm improvement and new retail outlets, alongside much needed, sustainable office space.

Proposals for the mixed-use scheme will see the site retain approximately 70% of the existing building's structure. The works will include numerous and extensive landscaped terraces, improvements to access and travel through and around the site, as well as the introduction of new retail spaces along Aldermanbury.

The scheme's approval builds upon a strong performance in 2023 by the City Corporation's planning team, which has overseen year-on-year increases in planning applications received and decided, since 2020.

As footfall levels into the Square Mile continue to rise back to pre-pandemic levels, the new retail units and landscaping proposals around 65 Gresham Street will be within walking distance from Liverpool Street station, which recently became the busiest station in the UK.

Chairman of the City of London Corporation Planning and Transport Committee, Shravan Joshi, said: "The 65 Gresham Street proposals represent an exemplary retrofit scheme that will provide benefits for everyone. Future office tenants and their employees will enjoy a well-connected, high-quality office space, whilst local residents' and visitors' journeys through the Square Mile will be enhanced by the public realm improvements and new retail."

Steel sector donation helps specialist college

As part of its commitment to social value and supporting local communities, Severfield has provided and erected the structural steelwork for Portland College's new manufacturing and construction training workshop near Mansfield.

Portland College is one of the country's leading specialist colleges for people with disabilities, offering vital support where it's needed most. Once complete, the new space will not only be a hub for learning essential tasks but will also offer hands-on experience of a real workshop environment.

The college has been able to carry out this project with the aid of the Towns Fund, which is part of the Government's levelling up agenda.

Unfortunately, the funds were allocated prior to the onset of the cost-of-living crisis and Portland College was faced with financial constraints detrimental to the build. In response to this, the steel contractor stepped in and offered its help.

"We're thrilled to have been part of this transformative project, and after spending time with the college, it's heart-warming to see how this building will benefit their students and create a long-lasting legacy for the future," said a spokesperson for Severfield.

The project is expected to be complete and ready to use by September 2024.

Strengthening works underway on Tame Valley Viaduct

Working on behalf of VolkerFitzpatrick, Taziker Industrial is undertaking steelwork strengthening works on the 620m-long Tame Valley Viaduct in Birmingham.

Built in the early 1970s, the viaduct forms the northern end of the A38(M) Aston Expressway near Spaghetti Junction. It is 25m-wide and carries seven lanes of traffic over its 22 spans.

The strengthening of the viaduct's superstructure is being achieved with the addition of steel plates, secured in position using a combination of welded and bolted connections.

In addition to strengthening, anti-corrosion paint is being applied to the structure, alongside other refurbishment works to help preserve the viaduct's longevity and minimise the need for future maintenance.

In order to minimise disruption, the viaduct will remain open throughout the works, which are due to complete in early 2025.

London heritage building to convert to life sciences hub

Wates has begun work to convert the Grade-II listed Victoria House in central London into a 27,800m state-of-the-art life sciences hub.

Working on behalf of Oxford Properties Group and Pioneer Group, work on the project in Bloomsbury Square is due to complete by the end of the year.

The property will feature 7,400m² of office, amenity, meeting and retail spaces to provide an exceptional employee experience for end users, highlighted by heritage meeting rooms, an eighth-floor club lounge and a roof terrace overlooking central London.

In the conversion, the main fabric of the building, including its heritage art-deco finishes and features will be retained, along with the existing original windows.

The cutting-edge development will have customer wellbeing and sustainability at its core, with the project on track to achieve a BREEAM 'Excellent' rating.

Robin Everall, Head of Development, Europe, at Oxford Properties, said: "The conversion of Victoria House into a cutting-edge life sciences hub is a testament to Wates' commitment to delivering innovative and sustainable spaces.

"We are proud to play a key role in transforming this Grade-II listed landmark into a state-of-the-art facility at the heart of London, whilst preserving and celebrating the unique heritage features it has to offer."

Diary

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

Wednesday 21 February 2024
Design of Stability Systems for Light Steel Framing
Webinar, Free to all
This webinar will give an overview of the design for stability of light steel-framed buildings, which is the subject of a soon to be released new SCI publication P437. Light steel framing can be used for the construction of buildings over 10 storeys with vertical stability provided by X-braced wall panels, integral bracing or diaphragm action of sheathing boards. The design for stability of these buildings is presented to the EN standards and considers horizontal loading, including Equivalent Horizontal Forces (EHF), structural analysis of stability systems, and proposed test regimes.

Tuesday 5 March 2024
How to Design Using Less - Webinar
Webinar, SCI/BSCA Members only
For many years a good design was one that cost the client less, financially. This philosophy resulted in choices such as using heavier steel sections to avoid stiffeners, and avoiding propping during construction to avoid delays to programme even when that resulted in more material being needed. Today, designers are thinking more-and-more about how to reduce the 'material cost' of a design, in order to reduce embodied carbon. This webinar will present designers with some options for steel building designs that they might like to consider in light of this re-evaluation of true cost.

Tue 5, Wed 7, Tue 12, Thu 14 March 2024
Steel Connection Design Course
Online course
This course is for designers and technicians wanting practical tuition in steel connection design. It will concentrate on the design of nominally pinned connections, in accordance with BS EN 1993-1-8, considering vertical shear and tying. The Eurocode approach to the design of moment resisting connections will be discussed, anticipating that software will be used for the design of these connections. Bracing connections, bases, splices, welded joints and non-standard connections will all be covered. The Eurocode rules for ordinary and pre-loaded assemblies will be discussed.

New saws give British Steel the cutting edge

The arrival of three new Behringer industrial saws at British Steel's Skinningrove Service Centre will herald a major new milestone in its development.

According to British Steel, the £2.2M equipment will play a pivotal part of the operation as it will bring increased productivity, greater accuracy and intuition to the whole process of making special profiles for customers.

The first of the three saws arrived before Christmas and the remaining two will be arriving and installed in a phased operation during this year.

The £26M Skinningrove Service Centre, which is due to open this year, will include cut-to-length lines, product milling, machining and warehousing operations.

Left to right, Behringer UK Managing Director Simon Smith; with British Steel's Stuart Webster and Nick Cann.

Centre Project Manager Stuart Webster said: "The new saws and product transportation systems that Behringer are providing for the Skinningrove Service Centre will be integral to the new facility.

"They will allow Skinningrove Special Profiles to move into the next phase of the anticipated market development in forklift mast sales, as well as significantly improving our capability to cut all products faster and meet tighter tolerances to satisfy the developing requirements of the customer base."

Digital Skills Hub provides boost to Telford regeneration scheme

Willmott Dixon has started work on the £15.8M Telford Digital Skills & Enterprise Hub that will form a central element of the wider Telford Station Quarter regeneration scheme.

Willmott Dixon is working for Telford & Wrekin Council, in collaboration with educational partners Telford College and Harper Adams University, after being procured through the Pagabo framework.

The five-storey hub's purpose is to provide a combined education and business offering, with shared spaces and start-up offices, as well as acting as a new base for Telford College and Harper Adams University.

When open for the new academic year in September 2024, the hub will accommodate 200 Telford College students aged 16 to 18, while Harper Adams University will offer a range of degrees, including Applied Data Science, Robotics, Automation & Mechatronics, Engineering Business Management, and Digital Manufacturing.

Station Quarter is a new residential-led, mixed-use regeneration project, which will deliver accessible and high-quality homes along with complementary education, hospitality and leisure uses to provide an active destination where people can live, learn, and relax.

Canterbury primary school to get new state-of-the-art facilities

Working on behalf of the Department of Education (DfE), Morgan Sindall Construction is set to build new facilities at the Pilgrim's Way School in Canterbury.

The scheme comprises the construction of a new two-form primary school, followed by the demolition of the existing 1970s-era building.

The project marks the first appointment for Morgan Sindall's Southern Home Counties business under the latest iteration of the DfE's construction framework.

The works will see the creation of a new hall, classroom spaces, kitchen and a multi-use games area (MUGA). The existing nursery will remain on site and will be connected to the new two-storey buildings.

Guy Hannell, Area Director for Morgan Sindall Construction in the Southern Home Counties, said: "With our Canterbury office just down the road from the school, we're well aware of the vital work this school does and the impact the development is going to have for the city's young pupils and families.

The school is operated by Veritas Multi Academy Trust (VMAT) and will have a capacity for 420 pupils when it is ready for occupation in September 2025.

Dr Kerry Jordan-Daus, CEO of VMAT, said: "This is a very exciting project for the school and the community. The new buildings will enable us all to continue to provide irresistible learning for all, and spaces for the wider community to use."

celebrating excellence in steel

Call for entries for the 2024 Structural Steel Design Awards

The British Constructional Steelwork Association and Steel for Life have pleasure in inviting entries for the 2024 Structural Steel Design Awards.

Now in their 56th year, the Awards celebrate the excellence of the United Kingdom and the Republic of Ireland in the field of steel construction, particularly demonstrating its potential in terms of sustainability, cost-effectiveness, aesthetics and innovation. The Awards are open to steel-based structures situated in the UK or overseas that have been built by UK or Irish steelwork contractors.

Why enter?

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

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

How to succeed?

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

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

To find out more and download an entry form visit https://www.steelconstruction.info/Structural_steel_design_awards or call Zoe Williams (BCSA) on 020 7747 8139

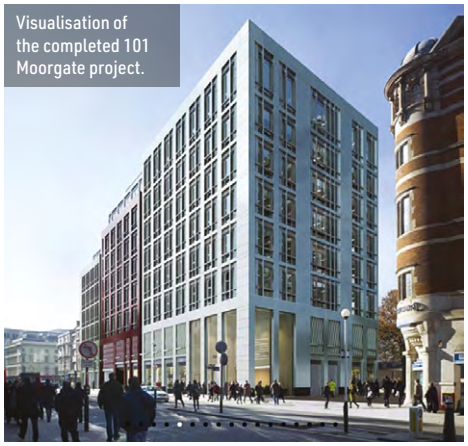
Closing date for entries: Friday 23rd February 2024

BCSA

STEEL for life

Sustainability drives office design

Structural steelwork's lightweight attributes and sustainability credentials have proven to be ideal for an over-station office development in the City of London.


Visualisation of the completed 101 Moorgate project.

The City of London's appetite for modern Grade A office space does at times seem to be insatiable, as high-rise commercial developments are continually under development.

Land for these new buildings is at a premium in the square mile and its environs, but Transport for London's (TfL) numerous assets have provided developers with a number of opportunities in recent times.

The construction of the Elizabeth Line is a case in point. As the capital's newest underground line tunnels beneath the City and the West End, it has resulted in a number of new office and retail schemes being constructed above its ticket halls, entrances and shafts.

Not strictly sitting above the Elizabeth Line, a current over-station development is 101 Moorgate, a 10-storey building that sits above the London Underground station with the same name. This new structure is also located adjacent to the new western entrance/exit to Liverpool Street Station's Elizabeth Line platforms, which are connected to Moorgate Station.

The steel-framed structure will accommodate retail units on the ground floor and approximately 70,000m² of office space on its upper eight floors.

Sandwiched between the two distinct zones is a mezzanine level with a business lounge, changing facilities and cycle storage.

The mezzanine is positioned within the depth of a transfer structure, formed by a series of trusses that span over the ground floor slab and the underground rail assets that lie beneath, as well as supporting the upper portion of the building.

The trusses form one of the architectural highlights of the project, as they will be left fully exposed in the completed scheme.

Two primary trusses, each measuring 19.5m-long × 5.2m-deep, were fabricated and then supplied to site by steelwork contractor BHC in transportable sections.

"The site is very confined, with no room for a mobile crane, so we had to supply the trusses in sections that could be lifted into place by the project's tower crane," explains BHC Drawing Office Manager Stephen Kelly.

Once onsite, the primary trusses, which each weigh 60t, were installed using two temporary trusses as a support. Because the primary trusses span the entrance lobby and will form an exposed architectural feature, each connection was welded in order to create a more aesthetically-pleasing appearance. Elsewhere on the scheme, the steel members all have bolted connections.


Surrounded by busy streets, logistics has played a key role in the construction programme.

The steel transfer structure also includes four secondary trusses, which measure 12.5m-long × 5.2m-deep. Weighing up to 18t each, these trusses were fabricated and delivered to site as complete sections.

Prior to these large steel elements being installed, main contractor Mace had completed the building's foundations which include of a series of 900mm-diameter piles, up to 44m-deep.

The building's ground floor slab sits metres above the London Underground Circle and Metropolitan Line tunnel. With construction work being undertaken in such close proximity to important transport infrastructure, monitoring equipment was installed to ensure no vibration issues would occur during the installation of the piles and the remainder of the building programme.

No adverse readings were reported, which is testament to the skill and planning, which was undertaken before and during the piling programme. Many of the piles were installed only metres from the underground assets, that also include two, much deeper, Northern Line tunnels.

"As well as the foundations, the new building is also supported by the existing concrete box of the underground station," says Waterman Structures Director Andrew Sherlock. "This includes a substation building that extends up to the first floor level, occupies the southern part of the site and sits adjacent to the trusses in this part of the scheme."

Sat on top of the trusses, the steelwork for the office floorplates is founded on acoustic bearings, isolating this part of the structure from the lower areas. The upper part of the steel frame is erected around three steel cores; one centrally-positioned main core, and two secondary ones located either side.

Perimeter columns are spaced at 6m centres and with only four internal columns, the open-plan office spaces have spans of up to 15m-long.

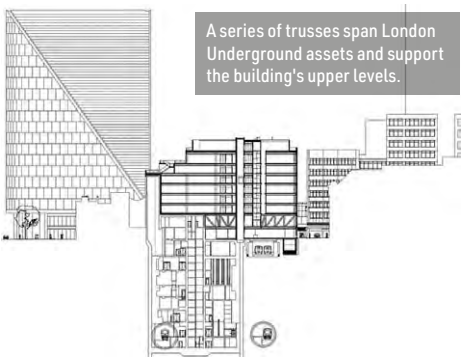
"Because the underground railway lies directly beneath the building, a lightweight structure is essential, so a steel frame with steel cores was the only option for this project," explains Mace Project Director Laura Thomas.

As well as its lightweight attributes, structural steelwork has also helped with the project's sustainability aspirations.

Aiming to achieve a BREEAM 'Outstanding' rating, the project team has sourced a high percentage of low-carbon recycled steel for the

The upper floors, above the trusses, will accommodate office space.

"Because the underground railway lies directly beneath the building, a lightweight structure is essential, so a steel frame with steel cores was the only option for this project"



A series of trusses span London Underground assets and support the building's upper levels.

FACT FILE
101 Moorgate, London
Main client: **Aviva Investors**
Architect: **ORMS**
Main contractor: **Mace**
Structural engineer: **Waterman Structures**
Steelwork contractor: **BHC**
Steel tonnage: **1,250t**

The mezzanine level, within the depth of the trusses, will feature fully-exposed steelwork.

structure. Produced using electric arc furnaces, powered by zero-carbon electricity, this is said to result in an erected steel structure that has used significantly less carbon.

Meanwhile, BHC has its own sustainability credentials, as the company has its own wind turbine within its manufacturing and fabrication facilities. Renewable energy currently fuels 72% of the company's production and office facilities, while in the near future it plans to be 100% energy self-sufficient.

All of the building's floors, except the ground floor slab, are compositely formed, with steel beams supporting metal decking and a concrete topping. Approximately 8,500m² of metal decking has been supplied and installed by BHC.

Complementing the exposed steel trusses, some of the steelwork on the upper floors will also be left exposed, namely the bottom flange of the floor beams.

Using the project's tower crane for all of the steelwork erection, the office floorplates were erected sequentially and in tandem with the decking and concreting. Installing three floors at a time, and splitting the building in half, this method ensured there was always a completed floor deck, covering 50% of the footprint on which MEWPs could be positioned for the erection process. It has been estimated that around 1,500 individual lifts were made during the steel erection.

Helping to boost wellbeing, the office floors will benefit from terraces at the fifth and eighth floors, while the roof will accommodate, alongside its plant deck, a large outdoor garden space.

Overall, the project is drawing on a number of other environmental and sustainability credentials in its design. Notably, 101 Moorgate will be a fully electric-powered building when it is completed later this year. ■

FACT FILE
Derby's new entertainment and conference venue
Main Client: **Derby City Council & St James Securities**
Architect: **Corstorphine & Wright**
Main contractor: **Bowmer + Kirkland**
Structural engineer: **Arup**
Steelwork contractor: **Shipley Structures**
Steel tonnage: **1,200t**

Steel takes centre stage

The need for long spans and large column-free spaces meant a structural steel framing solution was the obvious choice for Derby's new entertainment and conference venue.

Big changes are afoot in Derby as the wide-ranging £200M Becketwell scheme, the most significant urban regeneration project in the city for more than 30 years, is set to revitalise a large swathe of land.

Phase one of the mixed-use development saw the construction of 259 build-to-rent apartments, on the site of the former Debenhams store on Victoria Street. Forming phase two of the scheme, construction work is now underway on Derby's new £45.8M entertainment and conference venue.

Being built on a site previously occupied by a hotel, offices, multi-storey car park and a well-known city centre nightclub, the 3,500-capacity entertainment and events venue will be owned by Derby City Council. It will be leased to and operated by ASM Global, a leading venue management and services company, and producer of live experiences.

According to the Council, the new steel-framed venue is expected to significantly add to the cultural offering in the city, as it will provide a larger and more flexible space than Derby has had in the past. It will be a scalable space, capable of staging a range of concerts, such as stand-up comedy, family shows, exhibitions, and business events.

"A number of framing options were considered during the early design stage, but steelwork provided the optimum solution for this project," explains Arup Engineer Daniel Barnes.

"The material offered the most efficient way to create the required long spans and column-free spaces for the auditorium, while the acoustically resilient detailing was best achieved using steelwork."

Main contractor Bowmer + Kirkland began work on the project in June 2023, inheriting a site that had already been cleared of its previous buildings by developer St James Securities.

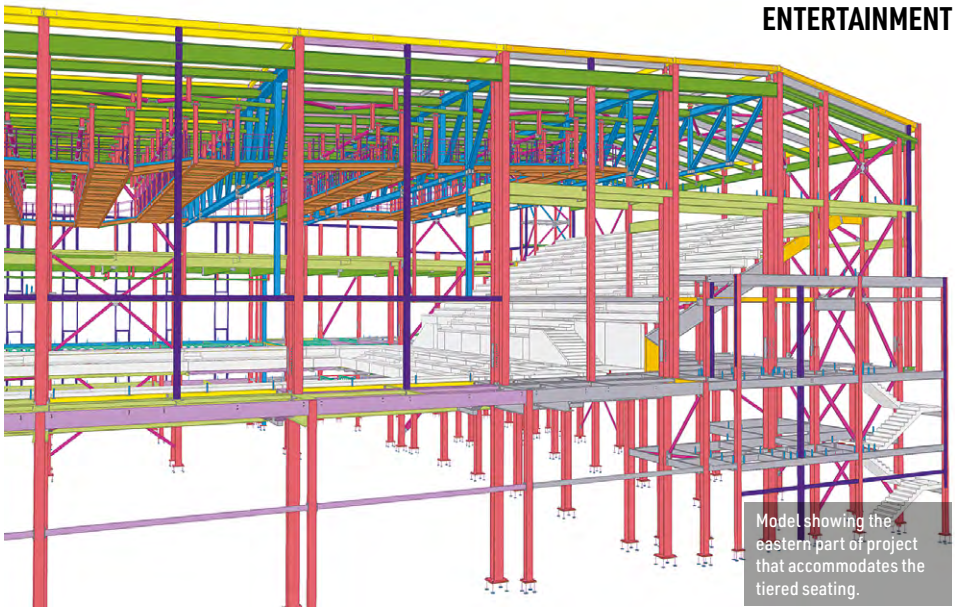
Once pad foundations had been installed, the project's large steel frame was able to commence. Steelwork contractor Shipley Structures has fabricated, supplied and erected 1,200t of steelwork for the project, with some of the largest elements forming the roof over the auditorium.

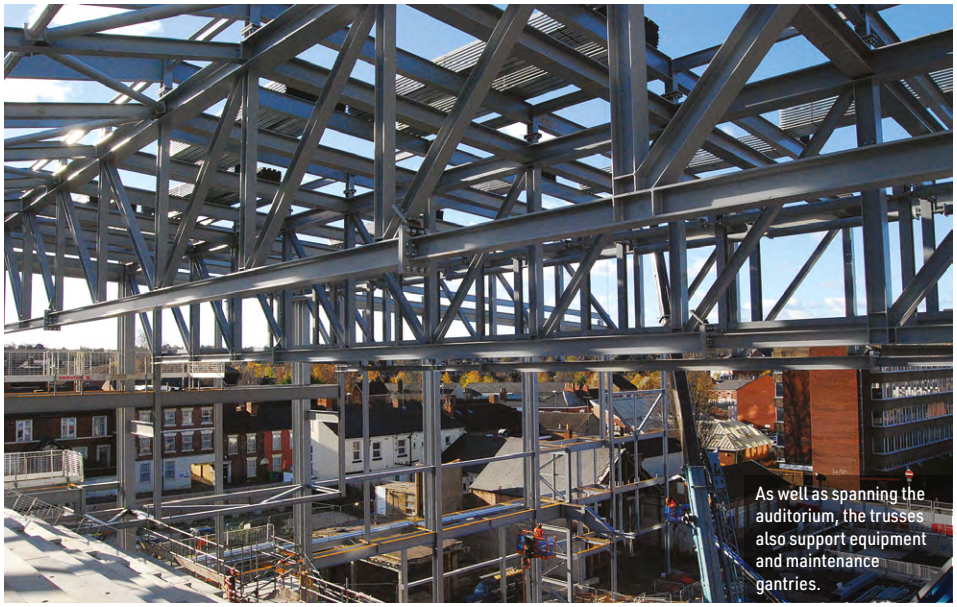
A total of six trusses, up to 36.6m-long and each weighing 15.4t, span the auditorium, creating the large and necessary column-free space below. Because of their length, the trusses had to be delivered to site in three welded sections.

Once onsite, the trusses were installed using two mobile cranes; one unit lifting a single piece and the other unit lifting two sections that had been spliced together on the ground. A central connecting splice was then made, while the sections were held aloft by the two cranes.

As well as spanning the auditorium, the trusses work very hard, as they also support steel maintenance

Steel rakers supporting precast terrace units form the upper seating tier.


Model showing the eastern part of project that accommodates the tiered seating.


As well as spanning the auditorium, the trusses also support equipment and maintenance gantries.

gantries, rigging, lighting and M&E equipment.

The loadings on the trusses varies, as the ones positioned above the stage carry more equipment than the steelwork located towards the back of the auditorium. In order to maintain a constant depth for all of the trusses, the ones supporting heavier loads have been optimised and fabricated using larger steel chords and bracings.

Hung from the trusses, the steel gantries were installed after each truss was erected. Typically, they were delivered to site as 6m-long welded frames with shop welded floor plates.

Shipley's steel erection programme was coordinated around other onsite trades, as well as the geography of the plot. With the main entrance used for the delivery of materials, located on the north-east corner of the site, the part closest to this area was the initial zone of the structure to be erected.

The eastern end of the auditorium accommodates an upper tier of seating, beginning at first floor level and extending upwards to a third-floor concourse and bar area.

Forming the tier are a series of 914UB cranked rakers, positioned at second floor level that support precast terracing. The rakers also cantilever to support a VIP balcony at the front of the tier. The longest precast units are 8m-long and weigh up 6t.

Beneath the tier there are some large bracings, formed with columns and beams weighing up to 1.2t each, that will provide the stiffness to this part of the structure.

CHS cross bracings have been used elsewhere on the project, but in this area they would have hindered the entrance doors between the concourse and a rear foyer.

Once the upper tier was complete, steelwork erection proceeded with the sides of the auditorium and its roof. The western part of the building, containing the main stage area and a delivery bay was then installed, before work commenced on the north elevation's two-storey zone. This will accommodate kitchens, back-of-house areas, offices, dressing rooms and a second floor column-free VIP zone.

The venue's main entrance (next to the site's entrance), which is a curved, facetted area, was the last section of the steel frame to go up.

As well as the main upper tier, further seating is provided by smaller balconies along the northern and southern edges of the auditorium. Meanwhile, at ground level in front of the stage, there will be retractable seating that can be moved into a store house, positioned to the south of the auditorium.

"Coordination between trades and deliveries is key to this project, as the site is confined and the venue fills up the entire site footprint," explains Bowmer + Kirkland Site Manager Joshua Bredenkamp.

The installation of the roof provides an example of this coordination. Firstly, only two trusses above the upper tier were initially installed, with the remainder lifted into place after the upper tier's precast units had been lifted into place.

"Because the terracing units are so big, we wouldn't have been able to lift them into place with all of the trusses and roof steelwork installed," explains Shipley Structures Director Chris Murphy.

A common design requirement for entertainment venues is the need to isolate the main auditorium from outside areas, in order to stop sound from entering or leaving.

To this end, a box-in-box design has been used, whereby two sets of columns surround the auditorium part of the structure, with the outer line supporting the roof steelwork.

Further acoustic isolation is provided above the auditorium, as on top of the trusses there are acoustic pads, supporting a secondary layer of steelwork that forms the roof to the venue.

The venue is due to complete by the end of 2024, but that is not the end of the story. Future plans for the adjacent plot could include a range of other complementary uses such as a hotel, further residential accommodation, and purpose-built student residences. Derby has much to look forward to. ■

FACT FILE
Subsea Cables Factory, Blyth
Main client: **JDR Cable Systems**
Architect: **Vincent + Gorbing**
Main contractor: **Galliford Try**
Structural engineer: **Waterman Structures**
Steelwork contractor: **Caunton Engineering**
Steel tonnage: **3,000t**

The large factory will have access to its own dock.

Power connection to shore

Aiding the UK Government's target of net zero carbon emissions by 2050, a cable production facility in Blyth will help underpin the growing offshore renewable energy sector.

Located on a brownfield site, once occupied by Blyth A&B coal power station, JDR Cable Systems' new production site. On completion, it will be a facility capable of producing high-voltage and extended length inter-array cables for offshore and land farms from start to finish, supporting the growing – and increasingly lucrative – renewable energy market.

The new facility, which is in the Port of Blyth, will benefit from being adjacent to a quay, allowing materials to arrive by sea and finished products to depart by the same mode of transport.

JDR Chief Financial Officer Tomasz Nowak, says: "As the energy transition gathers pace and the UK's offshore wind sector continues to thrive, turbines are growing taller and farther from shore, calling for higher voltage subsea cables.

"We are thrilled to strengthen our position as a prominent supplier of subsea cables to the energy sector through our investment in this cutting-edge facility. Additionally, we are pleased to sustain our commitment to the North East of England, contributing to job creation in Blyth and Northumberland. The proposed facility is strategically situated to take advantage of the rapidly expanding and largest renewable energy market in Europe."

Structural steelwork is playing a vital role in the construction of this important and prestigious development. Working on behalf of main contractor Galliford Try, Caunton Engineering has fabricated, supplied and erected 3,000t of the material to the structural design provided by Waterman Structures.

The main production hall for the facility is a four-span portal-framed structure supported on pad foundations. It is a sizeable building, as the two central spans are both 45m-wide and 290m-long, and because of this length, the steel structure has two movement joints.

Creating more open-plan production floor space, there is another 45m-wide span along the northern elevation, which is 127m in length, while along the southern elevation, a 28m-wide × 90m-long span completes the main building.

The two outer spans are high-bay zones with a 14m height to the underside of the haunch. The longer central spans are 12m high.

"As the production hall needed to be a large open-plan flexible space, a steel-framed portal structure was always the preferred design," says Galliford Try Operations Manager Matt Naylor.

Beyond the footprint of the building, the site has plenty of space and consequently material deliveries and their onsite storage has not been an issue.

Supported on columns, predominantly set at 9m centres, the rafters forming the pitched roofs of the portal spans each weigh 10.2t and were lifted into place in halves (5.1t each), using two 70t-capacity mobile cranes.

With each of the mobile cranes lifting one half rafter, a central and connecting splice was made while the sections were being held in place.

Comprising the main part of the overall steel frame, Caunton Engineering has erected approximately 1,800t of steelwork for the four-span hall.

The overall facility also includes two steel-framed towers, necessary for the cable production process. The Continuous Catenary Vulcanisation (CCV)

"As the production hall needed to be a large open-plan flexible space, a steel-framed portal structure was always the preferred design."

tower is positioned along the eastern elevation, attached to one of the hall's longest spans.

Although it is connected to the main hall, the CCV is structurally independent, separated by a movement joint and a double row of columns. Topping out at 44m-tall, the structure has been constructed with a traditional beam and column design, based around an 8m × 6.5m grid. Stability is derived from cross bracings, located around the perimeter of the tower.

It has five floors, each of which has been formed with steel beams supporting metal decking and a concrete topping.

The second tower is known as the Vertical Laying-up Machine (VLM). It is 50m-tall and positioned within the main production hall, half way along one of the 129m-long spans. It is another structurally-independent element of scheme, separated from the production hall by another double column movement joint.

With a footprint measuring 35m × 30m, this tower has three upper floors, which are also formed with steel beams supporting metal decking. This flooring solution was chosen for both towers as it was considered to be the easiest and most efficient solution for the site.

The tower has been designed around the VLM, which is a cable production machine to be positioned within the tower. The first floor of the tower includes a circular opening, which will accommodate an Auxiliary Deck Carousel Wheel, used to wind the completed cables up and down the tower. An 18m-diameter steel ring forms the circular opening with approximately 150 facetted channels and beams.

The ground floor of the VLM needs to be an open-plan area to allow access for the production process. To this end, there are only four internal columns supporting on the first floor.

This floor layout is not required for the upper floors of the VLM tower and so a much smaller grid pattern and more internal columns are positioned on these levels.

To accommodate the change in the column grid pattern, the first floor acts as a transfer deck, as there are seven trusses that support the columns above and create the open area on the ground floor.

"The ground level has a 16m floor-to-ceiling height, so the trusses, which are all 2.8m-deep, do not intrude into the desired open-plan area," says Caunton Engineering Contracts Manager Dean Linthwaite. "They are up 24m-long and were delivered to site as complete assemblies."

Three pitched trusses, measuring 30m-long × 2.4m-deep, top the VLM tower and form the roof. These trusses were delivered to site in halves, assembled into complete sections on the ground before being installed.

JDR Cables' investment project is supported by His Majesty's Government and the Secretary of State, as part of the DESNZ Offshore Wind Manufacturing Investment Support Scheme. ■

The completed facility and its two production towers.

The five-storey CCV tower was one of the final steel elements to be erected.

The VLM tower incorporates a facetted circular opening for a Auxilliary Deck Carousel Wheel.

FACT FILE
TBC.London
Main client: **FORE Partnership**
Architect: **ECE Architecture**
Main contractor: **Willmott Dixon**
Structural engineer: **Webb Yates Engineers**
Steelwork contractor: **Four Bay Structures**
Steel tonnage: **640t**

Roof top terraces are one of the main features of TBC.London

Reused steel aids circular economy

Adding to TBC.London's sustainability credentials, and said to be a first for UK construction, pre-Second World War steelwork from an Oxford Street redevelopment is being reused and incorporated into the project's steel frame.

Overlooking the River Thames and sitting alongside the southern approach to Tower Bridge, TBC. London is an outstanding office development in more ways than one.

With an impressive list of sustainability credentials; the scheme is targeting NABERS 5.5*, EPC A, WELL 'Platinum', Wired Score 'Platinum' and the highest BREEAM rating (Outstanding). The completed building is aiming to be one of Europe's greenest and healthiest offices.

No fossil fuels will be used to run the property as TBC.London will be all-electric and net zero in operation. Its energy use will be nearly 80% below planning requirements.

Sustainability also extends to the project's design, as much of the existing concrete-framed building, which was built in the 1980s, is being retained.

Reflecting developer FORE Partnership's commitment to retrofit first rather than rebuild, the existing five-storey building is being stripped back and renewed through a deep refurbishment, preserving the embodied carbon in the frame.

The uppermost floor of the structure has been removed and two steel-framed floors added, with a third additional floor set back from Tower Bridge, creating a new seven-storey office building.

The set-back floor creates one of three rooftop terraces within the scheme. With a total area of just under 900m², all tenants will have access to one of these outdoor spaces.

Overall, 640t of structural steelwork has been used for the project, with around 40t of this total coming from another one of developer FORE Partnership's projects; the Oxford Street House of Fraser redevelopment.

Described as 'urban mining', it highlights the benefits of the circular economy, as the reclaimed steelwork has provided the scheme with a considerable carbon saving.

Dating from the 1920s, the project design team say this is the first-time steelwork of this age has ever been used in a UK construction project.

Steel testing

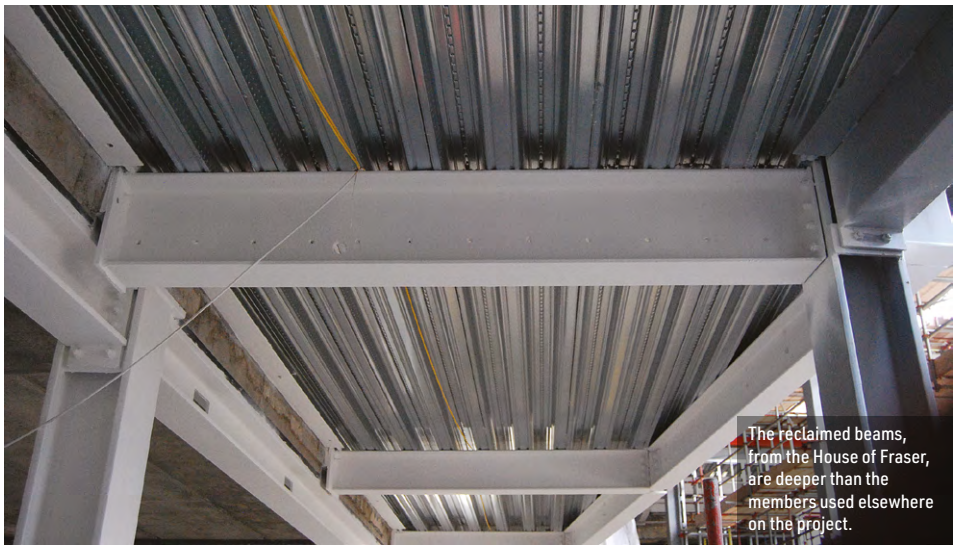
"When we took possession of the old steelwork, we had to undertake a series of tests to establish the mechanical and chemical properties of the steel," says Four Bay Structures Managing Director Simon Piper.

"We cut a sample from each member and gave it a reference for traceability. Gammax Independent Inspection Service and Southdown Material Testing completed a tensile test, a chemical analysis and a metallographic examination.

"Once the project structural engineer was satisfied the steelwork was fit for purpose, we identified useable steel lengths in order to minimise cutting and unnecessary wastage.

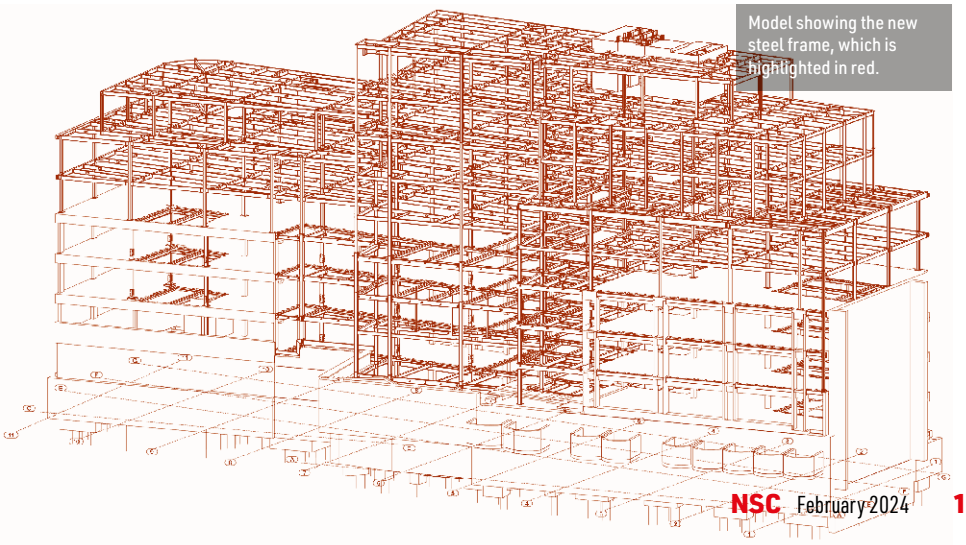
From the chemical analysis test results, our Responsible Welding Coordinator, Tim Rackham, also checked the carbon equivalent values to ensure the steel was in the correct range to enable welding, where necessary, before commencing fabrication." ■

The uppermost steel-framed floor is set back to create a terrace.



The reclaimed beams, from the House of Fraser, are deeper than the members used elsewhere on the project.

Repurposed steel has been used on the project, adding to the job's sustainability credentials.



Model showing the new steel frame, which is highlighted in red.

Within the completed offices, much of the steel frame will be left exposed, providing an architectural feature and creating a modern industrial-looking environment.

The salvaged beams that originated from the House of Fraser are slightly deeper than the new fabricated members, and will be easy to spot by those who know what to look for.

A further addition to the steel frame's sustainability is the fact that much of the uppermost floor has been formed with repurposed steelwork.

Amounting to approximately 7t, this steelwork was sourced from Cleveland Steel & Tubes, a company that specialises in supplying steel predominantly recovered from the oil and gas industry. For the most part, it is surplus stock that has been produced to a high standard, but never actually used.

Main contractor Willmott Dixon started work at TBC.London in early 2023, beginning with a partial demolition of the existing structure. As well as removing the upper floor, the central portion of the building was also demolished to make way for a new main core.

"The original core was located at the northern end of the building adjacent to the river, but this position would obstruct views in the new scheme, so moving the core to the middle of the building provides a better option for prospective tenants," says Willmott Dixon Senior Operations Manager Matthew Adams.

Once the new core was installed, steelwork was used to infill the remainder of the central portion of the structure. New steelwork was also used to strengthen the existing concrete columns in preparation for the steel erection.

"One of the main reasons for choosing a steel-framed solution for the new upper floors was because we needed a lightweight option, which ▸20

The northern elevation of TBC.London will offer views of Tower Bridge and the River Thames.

▸19 has allowed us to reuse the scheme's existing piled foundations," adds Mr Adams.

The design team were able to track down the drawings from the original 1980s scheme. This documentation allowed the team to calculate that there was sufficient capacity in the concrete frame and its foundations for the new lightweight steel-framed upper floors.

These upper floors have been compositely formed, with steel beams supporting metal decking and a concrete topping. Sat on the retained concrete columns, the steelwork is based around the same grid pattern, with internal spans of up to 8m long.

Steelwork, which was installed using the site's two tower cranes, was delivered on a just-in-time basis, as there is no room on site for materials to be stored.

No pit lane is allowed on the busy Tower Bridge Road, so all deliveries, including steelwork, are made via the site's one entrance, which is located on a narrow road on the eastern elevation. With little room to manoeuvre on site, coordination between all of the trades has been a key factor on this scheme.

Summing up, FORE Partnership Managing Partner Basil Demeroutis, says: "FORE is committed to creating developments that better reflect the way people live, work, and interact with one another.

"With TBC.London, we will deliver an exemplar transformation of an outdated office building, providing a new kind of environment designed for forward-thinking businesses that value quality, innovation, carbon reduction, and employee health and wellbeing." ■

Design guidance for reused steel

TBC.London showcases the use of both reclaimed steelwork recovered from an existing building and repurposed steel – unused steel originally intended for other uses. David Brown of the SCI discusses the design recommendations when verifying the resistance of reclaimed steel.

Most designers should be aware of P427, which provides recommendations for the reuse of steel, but is limited to steel originally used since 1970. This date was selected as it reflects the availability of comprehensive production data for steelwork, used to calibrate material factors to ensure appropriate reliability. A supplement, P440, extends the recommendations back to steel used after 1931, which was when BS 449 was first issued.

The steelwork recovered and reused in TBC.London dates from 1920, so the careful metallurgical testing is entirely understandable, as the material is an essential part of the design recommendations. When preparing P440, no comprehensive statistical data on steel production earlier than 1970 was available, so measures of reliability could not be established. A more pragmatic solution was adopted, to presume that the codes of the day combined with the steel of the day, creating structures which performed satisfactorily. The buckling curves in P440 (which are presented in a Eurocode format) are conservative compared to the most onerous curves throughout the various editions of BS 449. The buckling curves in BS 449 do vary considerably – particularly for unrestrained beams - and must reflect developing knowledge and changing practice. Most beams in buildings are restrained, so there was probably little interest in unrestrained beams in early decades.

The developments of the design code after 1931 also shows changing practice. All connections were rivetted in the first editions, bolts appeared later and welding much later. One of the recommendations in P440 is that the original methods of making bolted connections are preferable rather than welding. Older steel can of course be welded, but the carbon equivalent must be determined by test (as it was at TBC.London) when developing welding procedure specifications.

The Second World War also marked a period of considerable change for structural steel. Steel and some constituent materials were in short supply, so the code was modified with emergency changes leading to increased resistances. Perhaps the more significant change was the developing understanding of brittle fracture, particularly when associated with welded structures. The research into the failures of the so-called Liberty Ships led in due course to today's requirement to specify the correct steel subgrade. ■

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Image courtesy of William Hare Limited

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RQSC

The Register of Qualified Steelwork Contractor **Buildings**

FACT FILE
Stonecutter Court, London
Main client: **CO-RE**
Architect: **tp Bennett**
Main contractor: **Mace**
Structural engineer: **Thornton Tomasetti**
Steelwork contractor: **William Hare**
Steel tonnage: **2,700t**

Steel provides Excellent solution

Reusing existing foundations and sourcing EAF produced steelwork have helped to reduce embodied carbon on a City of London commercial scheme.

Highlighting the fact that structural steelwork is the preferred framing solution for the majority of commercial schemes in the City of London, the material is helping to create a high-quality, modern and flexible office building on Farringdon Road.

Known as Stonecutter Court, the completed project will support a hybrid workforce and incorporates the latest health and wellness features, and building systems.

Targeting a BREEAM 'Excellent' rating and WELL Gold standard, sustainability is at the core of the project's design. Reducing carbon is also a key priority, with a net zero carbon delivery strategy in place to reduce emissions from site energy and water use, embodied carbon, as well as transport and waste.

Delivering 23,225m² of floorspace, the 13-storey building includes two basement levels, a ground floor featuring a main entrance lobby and retail units, a mezzanine and a courtyard space and pavilion, which sits adjacent to a listed and retained public house (formerly called the Hoop & Grapes).

Work on the site began in 2022 with the demolition of the previous eight-storey concrete-framed office block. Having removed what was above ground, much of the substructure has been retained in order to drive the sustainability credentials of the scheme.

"We have reused most of the existing piled foundations to support a new steel-framed structure, which has the same weight as the old building but is five-storeys taller," explains Thornton Tomasetti Director Eddie Jump.

"Steelwork has also allowed the design to minimise the number of internal columns, with only three in this building, compared to seven in the previous scheme."

To create the desired open-plan office spaces, the new steel-framed building is based around a 9m × 13.5m column grid pattern, with a few zones having spans of 15m. A centrally-positioned concrete core provides the steel frame with its stability.

Further enhancing the sustainability of the project, much of the steelwork has been sourced from Electric Arc Furnace (EAF) production facilities.

Steelmaking by means of EAFs is considered to be much greener and more efficient in terms of the energy necessary for the process. This is because it requires mostly electricity instead of large quantities of non-renewable resources.

The original design envisaged plate girders being used for much of the steel frame, but having sourced the material from EAF production plants, steelwork contractor William Hare has used rolled sections (which are commonly produced via EAFs) for Stonecutter Court.

Sitting atop the concrete basement substructure, the steel frame begins at ground floor and was predominantly erected using the site's two tower cranes. The exception was one of the earliest elements to be installed; a 18m-long transfer beam positioned at first-floor level along the building's northern Stonecutter Street elevation.

Allowing one column to be omitted below first floor level, the beam creates a wide open space for the building's main entrance. The beam weighs 40t and was delivered to site in one piece, which avoided the need for a site welded splice that would have impacted the programme. During a weekend road closure, it was lifted into place using a 250t-capacity mobile crane.

Because the site slopes downwards from its north-

"Steelwork has also allowed the design to minimise the number of internal columns, with only three in this building, compared to seven in the previous scheme."

Stonecutter Court's rounded bullnose responds to similar features on adjacent buildings.

The Farringdon Road elevation wraps around a listed and retained former public house.

The 40t beam that creates the column-free space for the main entrance was lifted into place by a 250t-capacity crane.

western corner to the south-eastern part, some of the ground floor is a double-height space, incorporating a mezzanine. As well as the entrance lobby, the ground floor also accommodates retail units.

From first floor upwards, the building is given over to office space, with all of these upper floors formed with cellular beams that accommodate the building services within their depth. They also support metal decking and a concrete topping for composite flooring solution.

Providing outdoor space for the tenants, one of the most prominent features of the project are the three terraces, overlooking the eastern Farringdon Road elevation. These are formed by set-backs at eighth floor, tenth floor and 12th floor.

A series of three two-storey high Vierendeel transfer trusses, weighing up to 14t each, create the set-backs and support the columns above.

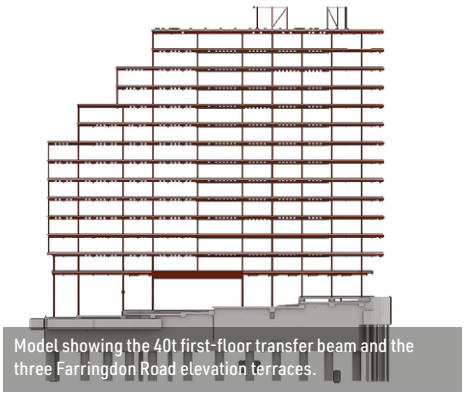
"We were able to break these trusses down into individual assemblies, enabling them to be lifted into place with the site tower cranes and then bolted together in situ," explains William Hare Project Director Richard Mosek.

A similar arrangement of terraces is located along the western St Bride Street elevation, although these spaces are much shallower and consequently don't require large transfer structures.

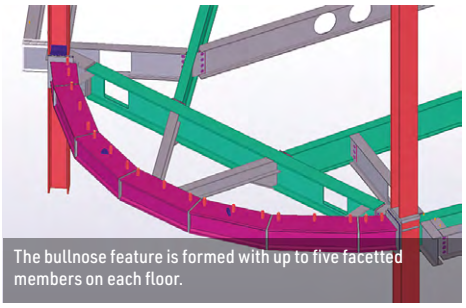
Another noticeable feature is located on the north-western corner, where the building has a rounded bullnose that responds to similar details on nearby buildings. This curved element required at least five facetted box sections on each floor and these members also support a diagrid glazing system that will create a stand-out highlight to the building.

Due to complete in late 2024, the nine upper floors of Stonecutter Court have been leased to UK law firm Travers Smith, as its new headquarters.

Summing up, Travers Smith Managing Partner Edmund Reed says: "We are a successful and dynamic firm, with ambitious plans. The move to Stonecutter Court shows our confidence in the future - an opportunity to build on our success and allow for growth in the coming years. With its modern, sustainable and inclusive design, this building reflects the vision for our business and will provide an exciting and vibrant working environment which will appeal to both our people and our clients." ■



Model showing the 40t first-floor transfer beam and the three Farringdon Road elevation terraces.



The bullnose feature is formed with up to five facetted members on each floor.

Atmospheric corrosivity classifications for weathering steel

Weathering steel has an increased resistance to atmospheric corrosion, compared to conventional steel, and a distinctive appearance which make it attractive for use in bridges. However, the decision to specify weathering steel in bridge projects often depends on the environmental conditions and more specifically on the proximity of a bridge to the coast. In the UK, corrosivity testing in accordance with BS EN ISO 9223 for a minimum of 12 months is mandatory at distances of less than 15 km from the coast. Typically, UK procurement routes do not give adequate time to undertake and assess the results of this testing. In other countries testing may be required in specific situations.

This article discusses the findings of a study commissioned by SCI's Steel Bridge Group and carried out by Arup[1]. The objective of the study leading to this article was to provide an evidenced based approach for the classification/assessment of environments and propose scientifically justified limitations on the use of weathering steel in bridges (or requirements for site specific corrosivity testing) within a certain distance from the coast for the UK.

Introduction

Weathering steel is a low-alloy steel that under normal atmospheric conditions gives an enhanced resistance to corrosion compared with that of ordinary carbon manganese steel. Weathering steel is specified to BS EN 10025-5[2] and has similar mechanical properties to conventional steel. In the presence of moisture and air, a rust layer is formed that adheres to the base metal due to the specific alloying elements used in the manufacturing process. This rust 'patina', which develops under conditions of alternate wetting and drying, acts as a protective barrier, impeding further access of oxygen, moisture and contaminants and effectively reducing the rate the steel corrodes.

Weathering steel bridges are generally suitable for use in most locations. However, as with other forms of construction, there are certain environments which can lead to durability problems. The performance of weathering steel in such extreme environments as marine environments and/or environments with very high levels of atmospheric pollution may not be satisfactory, and this should be considered.

Exposure to high concentrations of chloride ions, originating from sea water spray, salt fogs or coastal airborne salts, is detrimental. The hygroscopic nature of salt adversely affects the 'patina' as it maintains a continuously damp environment on the metal surface.

The scope and outcomes of the investigation leading to this article are summarised below:

- UK and international standards and guidance on the use of weathering steel near the coast was assessed.
- Data on chloride deposition with distance from the coast including those from ISOCORRAG[3] program, EUR 7433 Report[4], site specific test data and other relevant sources were collated.
- Available site-specific data were reported on a map and data were plotted as curves for a range of UK locations.
- The overall corrosivity of UK sites (based on categorisation of BS EN ISO 9223[5]) at increasing distances from the coast was estimated.

The methodology, data sets, plots and recommendations are reported in the following paragraphs.

Review of standards and international guidance

Weathering steel is widely used for bridge fabrication in the UK, continental Europe, North America, Australia, and New Zealand. Highway and Rail authorities in these countries have standards and guidance relevant to the use of weathering steel. The standards and guidance cover all aspects of steel fabrication, but this article only considers those parts relevant to durability and the potential need for assessment when a bridge is located near the coast. A summary of the requirements and limitations on the use of weathering steel in bridges in the UK, Germany, France, North America, Australia, and New Zealand is presented in Table 1.

Country	Minimum distance from the coast	Additional requirements
UK[6]	No minimum distance but not permitted in a corrosivity category of C5	For locations less than 15 km inland from the coast the salinity shall be determined via monitoring/testing for 12 months, and if found to be S3 (to BS EN ISO 9223[5]), i.e. chloride deposition rate Sd > 300 mg/(m².day), weathering steel cannot be used.
Germany[7]	0.5 km	
France[7]	1 km to 2 km	1 km refers to coasts in the Mediterranean, 2 km from the North Sea, English Channel and Atlantic Ocean.
North America[8]	2 miles (3.2 km) to 4 miles (6.4 km)	Depends on individual State Department of Transport (DOT)
Australia[9]	2 km	Corrosivity category C3 or lower according to ISO 9223†
New Zealand[10]	5 km	Corrosivity category C3 or lower according to ISO 9223; <5 km from the coast permitted provided site-specific assessment is undertaken for a minimum of 1 year; 'Coastal' weathering steel with addition of 1% or 3% Nickel may be used in C4 and C5 environments, respectively.

†Corrosivity categories are to Australian Standard AS 4312 but they are consistent with ISO 9223

Table 1 – Limitations of use of weathering steel in bridges

Chloride deposition data in the UK

The presence of chloride ions on the surface of steels increases the risk of corrosion. Chlorides are deliquescent and will absorb moisture from the atmosphere. This increases the time of wetness on the surface and the total period when corrosive processes are active. Chloride ions are present in natural water sources (particularly the oceans) and are made airborne by a combination of wave action and the wind blowing over the water. Airborne chlorides are then transported to and can deposit on surfaces at distance from the source.

A research report published in 1981 by the European Commission (EUR 7433[4]), summarises the results of a joint research project to provide directives for selection of atmospheric corrosion test sites and collect environmental data on the maritime atmospheric environment. Among other data presented, the chloride deposition rates were measured at 36 sites across Europe up to 5 km inland from the coast, 18 of these sites were in the UK. The aim of this element of the research was to gain an understanding of how rapidly the airborne salinity decreases with increasing distance from the coast.

Airborne salinity was monitored monthly using the wet candle method (the method now used in BS EN ISO 9225[11]) over a period of two years. The data from the EUR 7433 report[4], plotted as a line graph, shows the measured values for the chloride deposition rates at increasing distance from the coast. Figure 1 and Figure 2 show the data for UK sites split into those that fall west and east, respectively, of a central line of the UK. Lines in blue and red show the distance at which the chloride deposition rate falls below 150 and 300 mg/(m².day), respectively.

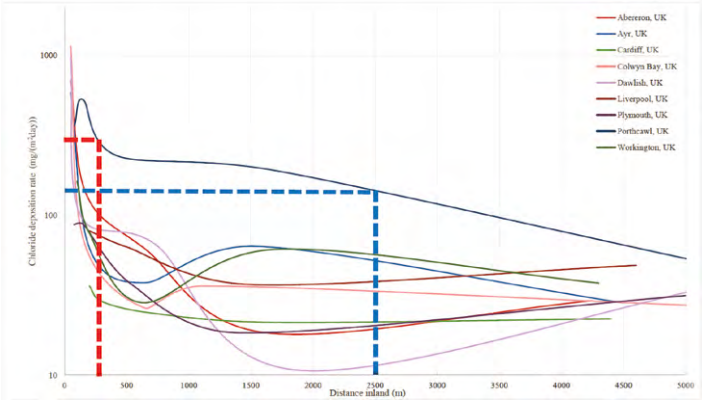


Figure 1 – Westerly UK site data collected in [4] of the chloride deposition rate with distance inland from the coast, plotted on a logarithmic scale

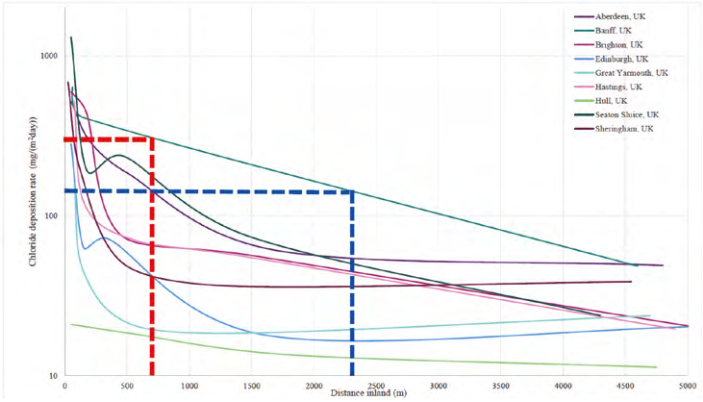


Figure 2 – Easterly UK site data collected in [4] of the chloride deposition rate with distance inland from the coast, plotted on a logarithmic scale

Some chloride deposition data points from EUR 7433[4] are higher/lower than expected at specific sites. These anomalies are caused by site specific conditions which affect the local (micro) environment at the measured distance. As an example, the chloride deposition may be lower than expected due to the monitoring site being in a sheltered location (by vegetation or adjacent buildings). Another example is the data presented in Figure 2 for Banff, which show that the chloride deposition varies linearly (as opposed to the exponential trend typically seen) between 150 and 4600 m and this is because no site monitoring took place between these points for the specific case.

Further site-specific chloride deposition data has been obtained from different data sources which include:

- Transport and Road Research Laboratory (TRRL) report[12] on 'The corrosion performance of weathering steel in highway bridges' published in 1978, in which corrosivity assessments were carried out for weathering steel at various locations across the UK.
- ISOCORRAG 'International Atmosphere Exposure Program'[3], which formed the basis of BS EN ISO 9223 standard.
- Project specific data from previous Arup projects in the UK.

This data was found to sit within the extremes of the data reported in the EUR 7433 report[4] for the UK sites which was plotted in Figures 1 and 2.

The plots in Figure 1 and Figure 2 show that air-borne chloride deposition decreases with distance from the coast:

1) At 200 m inland the chloride deposition rates are less than the limit defined in BS EN ISO 9223 for an S3 category.
2) At 2500 m inland the chloride deposition rate falls below 150 mg/m².day.
3) Beyond 2500 m from the coast the deposition rate continues to decay.

All the data demonstrate that chloride deposition rates rapidly decrease with increasing distance from the coast. At < 2500 m inland, the chloride deposition rate is less than half that of the criteria given in DMRB CD 361[6].

Overall corrosivity of UK sites

Methodology

The atmospheric corrosion assessment for several UK sites was done according to BS EN ISO 9223[5], which uses data and statistical models developed as part of a global corrosion study to estimate corrosion rates. The ISOCORRAG study[3] used standardised samples and measurement methods to estimate corrosion rate over time and correlated those rates with environmental parameters. Corrosion rates were evaluated by weight loss at annual intervals. Samples were exposed at sites around the world.

The BS EN ISO 9223 standard is concerned with the classification of corrosivity of atmospheres based on the first-year corrosion rate for various metals. Such classification requires twelve-month exposure of relevant test specimens. The standard also includes other methodologies to estimate atmosphere classification, i.e. with\out a twelve-month exposure trial. In this report, estimation of corrosivity uses a semiquantitative interpretation of the BS EN ISO 9223 Dose Response Function (DRF) using environmental input parameters.

Four environmental parameters are used to assess likely corrosion rates:

- Average annual air temperature (T)
- Average annual relative humidity (RH)
- Average annual deposition rate for sulphur dioxide (P_d)
- Average annual deposition rate for chloride (S_d)

These parameters permit the estimation of a corrosion rate for the first year of exposure using a statistical model specified in BS EN ISO 9223. An additional environmental parameter to consider is wind direction. Wind influences the transport and deposition rate of sulphur dioxide and chlorides. Where site specific values for these are not known, the wind data can be used in predicting likely exposures.

The methodology provides an overall, or macro, assessment of corrosion risk based on the general corrosion rate i.e. uniform loss of section over the surface exposed to the natural environment. There is a degree of uncertainty associated with the estimation of atmospheric corrosivity, which BS EN ISO 9223 estimates as - 33% and +50% for zinc, carbon steel and copper, and -50% and +100% for aluminium. The corrosion rate calculated in accordance with BS EN ISO 9223 assumes uniform corrosion.

▸26

▸25 Site locations

The 36 sites considered are shown in Figure 3. Those in red are from EUR 7433[4] and those in blue are from the TRRL report[12], ISOCORRAG[3] and other project specific reports.

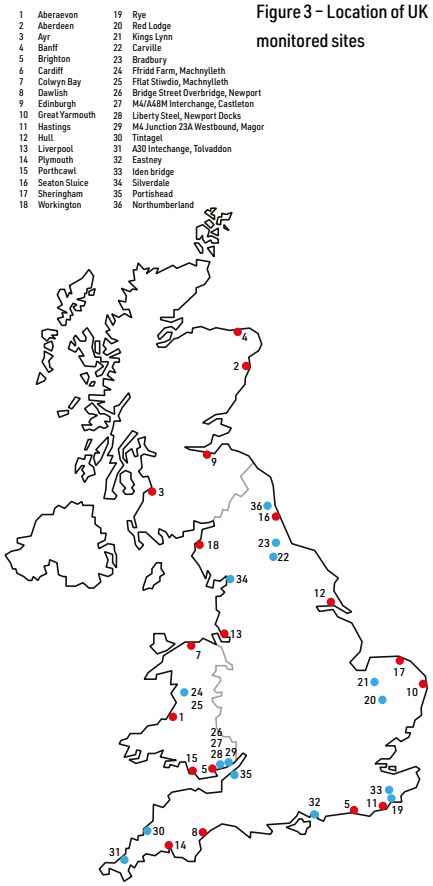


Figure 3 – Location of UK monitored sites

Average annual temperature and relative humidity

The BS EN ISO 9223 standard uses annual average temperature and humidity as its temperature and humidity parameter. The average annual temperature and relative humidity for the sites considered was obtained from UK Met Office[13] where climate averages over a rolling 30-year period with the most recent averaging period being 1991-2020 are reported.

Average annual deposition rate for sulphur dioxide

Historically, the most common source of SO_2 emissions were from coal fired power plants, refineries, heavy industry, vehicle exhaust emissions and shipping in ports. Following UK and European emission control legislation in the late 20th Century atmospheric SO_2 concentrations have dramatically declined in recent decades. DEFRA routinely collected sulphur dioxide concentrations in the air in various parts of the UK until circa 2005 when the concentrations had declined to concentrations that were nearly undetectable with the conventional measurement technique. It was recommended as a result that the measurements ceased.

SO_2 deposition rates were used from monitoring data where possible. When data was not available, sites were qualitatively assessed for any nearby SO_2 sources and SO_2 deposition was defined based on the relative distance, topology and wind direction. In general, for sites near ports, harbours and industrial facilities an upper bound urban atmosphere (P_1) was conservatively assumed. Sites located in urban areas with no nearby SO_2 sources, were classified on the boundary of a rural (P_0) and urban (P_1) atmosphere. Rural areas assumed a lower bound rural (P_0) atmosphere, the value of which is defined by the Dose Response Function equation. BS EN ISO 9223 groups pollution by sulphur dioxide into four categories (P_0 to P_3).

Average annual deposition rate for chlorides

The average annual chloride deposition for the assessed sites at distances of 300 to 5000 m were obtained from the EUR 7433 data[4]. At 5000 m and greater the chloride deposition has fallen to S1 category of BS EN ISO 9223.

Atmospheric corrosion assessment

BS EN ISO 9223 provides a model that uses the location and the previously mentioned environmental parameters (temperature/humidity and deposition rates for sulphur dioxide and chlorides) to estimate the corrosion rate at a site for the first year of exposure, by use of a statistical dose response function. The first-year corrosion rate also defines the site's corrosivity category.

BS EN ISO 9223 groups corrosion rates into a series of corrosivity categories that reflect the severity of the exposure environment, as shown in Table 2.

Using the location and environmental data collected for each site, the corrosion rate for UK sites was estimated for distances of 300, 1000, 2500, 5000, 10000 and 15000 m inland, with the corresponding corrosivity category. This is plotted in Figure 4, conservatively adding 50% uncertainty in the calculation.

Corrosivity Category	First year corrosion rate (mm/year)
C1	<1.3
C2	1.3-25
C3	25-50
C4	50-80
C5	80-200

Table 2 – Corrosivity categories according to BS EN ISO 9223

As shown in Figure 4, C5 corrosivity categories only occur at sites of very short distances from the coast (< 2 km, and in the majority of cases < 0.5 km to 1 km) and C4/C3 at > 2 km conservatively assuming 50% uncertainty in the calculations.

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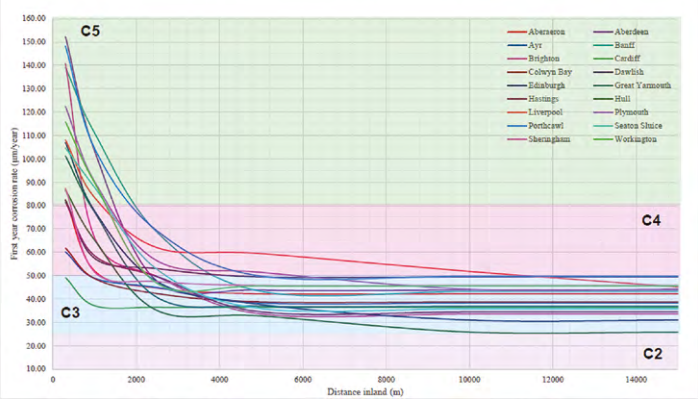

Figure 4 – Calculated first year corrosion rate (+50% uncertainty) with increasing distance from the coast for UK sites [4]

Conclusions

1) Review of international guidance on the use of weathering steel shows the UK approach to requirements for testing for both salinity and corrosivity is conservative.
2) All data indicates that air borne salinity, measured as dry deposition to BS EN ISO 9225, decays rapidly with distance from coast. At a distance of 2.5 km inland from the coast the deposition rate is less than half the S3 value. At distances greater than 2.5 km inland from the coast the chloride deposition continues to decay. These conclusions are supported by site specific data measured in accordance with BS EN ISO 9225 at various distances inland from the coast.
3) Estimation of corrosivity categories with distance from the coast, using the equation for carbon steel given in BS EN ISO 9223, show the highest corrosivity class (C5) only occurs very close to the coast (< 2 km) and that within a short distance, typically 1 km, the corrosivity category is generally C3 or in some cases C4, where the +50% uncertainty is included in the estimation of loss.
4) The data provides evidence that full corrosivity testing using coupons and salinity testing should be a mandatory requirement only if the proposed structure is less than 2.5 km from the coastline.

In addition to the findings and conclusions of the study reported above, the Steel Bridge Group has been gathering data from its members and from bridge owners on the performance of weathering steel bridges that have previously been constructed within 15 km of the UK coastline. This data is being added onto an online map[14]. This data suggests that existing weathering steel bridges are performing well, and where problems have been encountered they were not significant and they have been the direct result of poor detailing and specific faults such as leaking deck joints, rather than any general inadequacy in corrosion performance. ■

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BS EN 1992-1-1:2023
Eurocode 2. Design of concrete structures. General rules and rules for buildings, bridges and civil engineering structures
supersedes BS EN 1992-1-1:2004+A1:2014, BS EN 1992-2:2005 and BS EN 1992-3:2006

BS EN 1992-1-2:2023
Eurocode 2. Design of concrete structures. Structural fire design
supersedes BS EN 1992-1-2:2004+A1:2019 which remains current

BS EN ISO 15614-13:2023
Specification and qualification of welding procedures for metallic materials. Welding procedure test. Upset (resistance butt) and flash welding
supersedes BS EN ISO 15614-13:2021

BS EN 16687:2023
Construction products: Assessment of release of dangerous substances. Terminology
supersedes BS EN 16687:2015

BS EN ISO 52016-3:2023
Energy performance of buildings. Energy needs for heating and cooling, internal temperatures and sensible and latent heat loads. Calculation procedures regarding adaptive building envelope elements
no current standard is superseded

BS IMPLEMENTATIONS

BS ISO 7539-12:2023
Corrosion of metals and alloys. Stress corrosion testing. Requirements for atmospheric stress corrosion cracking testing
no current standard is superseded

PUBLISHED DOCUMENTS

PD CEN/TS 1317-7:2023
Road restraint systems. Performance characterisation and test methods for terminals of safety barriers
supersedes DD ENV 1317-4:2002

PD CEN/TS 1317-9:2023
Road restraint systems. Impact tests and test methods for removable barrier sections
supersedes DD ENV 1317-4:2002

PD CEN/TS 17991:2023
Statistical verification of partial factors for buildings according to Eurocode EN 1993-1-1 Annex E
no current standard is superseded

CORRIGENDA TO BRITISH STANDARDS

BS EN ISO 3506-5:2023
Fasteners. Mechanical properties of corrosion resistant stainless steel fasteners. Special fasteners (also including fasteners from nickel alloys) for high temperature applications
Corrigendum, November 2023

UPDATED BRITISH STANDARDS

BS EN 1993-1-6:2007+A1:2017
Eurocode 3. Design of steel structures. Strength and Stability of Shell Structures
Corrigendum, December 2023; Corrigendum, February 2010

BRITISH STANDARDS REVIEWED AND CONFIRMED

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

BS 7000-4:2013
Design management systems. Guide to managing design in construction

BS 7121-2-4:2013
Code of practice for the safe use of cranes. Inspection, maintenance and thorough examination. Loader cranes

PD 6680:2002
Guidance on the new European Standards for thermal insulation materials

PD 6687-2:2008
Recommendations for the design of structures to BS EN 1992-2:2005

NA+A2:18 to BS EN 1991-1-3:2003+A1:2015
UK National Annex to Eurocode 1: Actions on structures. General actions. Snow loads

NA+A2:2022 to BS EN 1997-1:2004+A1:2013
UK National Annex to Eurocode 7. Geotechnical design. General rules

BRITISH STANDARDS WITHDRAWN

BS EN ISO 15614-13:2021
Specification and qualification of welding procedures for metallic materials. Welding procedure test. Upset (resistance butt) and flash welding
Superseded by BS EN ISO 15614-13:2023

NEW WORK STARTED

EN ISO 898-1
Mechanical properties of fasteners made of carbon steel and alloy steel. Bolts, screws and studs with specified property classes. Coarse thread and fine pitch thread
will supersede BS EN ISO 898-1:2013

EN IEC 60974-10:2020/A1
Arc welding equipment. Electromagnetic compatibility (EMC) requirements
will supersede BS EN IEC 60974-10:2021

EN ISO 19443:2018/A1
Quality management systems. Specific requirements for the application of ISO 9001. 2015 by organisations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS)
will supersede BS EN ISO 19443:2022

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

23/30439301 DC
BS EN ISO 19650-6 Organisation and digitisation of information about buildings and civil engineering works, including building information modelling (BIM) Information management using building information modelling. Health and safety information
Comments for the above document were required by 21 January, 2024

23/30446474 DC
BS EN ISO 3506-3 Mechanical properties of corrosion-resistant stainless steel fasteners. Set screws and similar fasteners not under tensile stress
Comments for the above document were required by 21 January, 2024

23/30446478 DC
BS EN ISO 3506-4 Mechanical properties of corrosion-resistant stainless steel fasteners. Tapping screws
Comments for the above document were required by 21 January, 2024

23/30447782 DC
BS ISO 4931-1 Buildings and civil engineering works Principles, framework and guidance for resilience design. Adaptation to climate change
Comments for the above document were required by 13 January, 2024

23/30473034 DC
BS EN ISO 17635 Non-destructive testing of welds General rules for metallic materials
Comments for the above document were required by 22 January, 2024

DOCUMENTS NOT ISSUED AS DPCs

EN ISO 19443:2018/A1
Quality management systems. Specific requirements for the application of ISO 9001:2015 by organisations in the supply chain of the nuclear energy sector supplying products and services important to nuclear safety (ITNS). Quality manage

CEN EUROPEAN STANDARDS

EN 1991-2:2023
Eurocode 1. Actions on structures. Traffic loads on bridges and other civil engineering works

EN 1992-1-1:2023
Eurocode 2. Design of concrete structures. General rules and rules for buildings, bridges and civil engineering structures

EN 1992-1-2:2023
Eurocode 2. Design of concrete structures. General rules. Structural fire design

EN 1996-3:2023
Eurocode 6. Design of masonry structures. Simplified calculation methods for unreinforced masonry structures

EN ISO 15614-13:2023
Specification and qualification of welding procedures for metallic materials. Welding procedure test. Upset (resistance butt) and flash welding
ISO 15614-13:2023

CEN TECHNICAL SPECIFICATIONS

CEN/TS 19102:2023
Design of tensioned membrane structures

ISO PUBLICATIONS

ISO 17607-6:2023
Steel structures. Execution of structural steelwork. Bolting
Will be implemented as an identical British Standard

AD 520:
Amendment to Table 8 in the MPS-Bolts (issue 14)

The BCSA has reviewed the requirements for *impact test for machined test pieces* in Table 8 of the *Model specification for the purchase of structural bolting assemblies and holding down bolts* (MPS-Bolts) following discussions with bolt suppliers. Currently Table 8 requires a sample size of three bolts, per manufacturing lot, for property classes up to and including 8.8, and five bolts for property class 10.9, see table, top right.

For bolts used in normal UK temperatures (T), (i.e. minimum -15°C), a sample size of one bolt, per manufacturing lot, for any property class, was found to be more appropriate. This is in line with Table 9 of the MPS-Bolts. For bolts used in temperatures below -15°C but above -50°C, a sample size of three bolts, per manufacturing lot, for all property classes should be specified. For bolts used below -50°C, the purchaser should discuss the sample size with a bolt metallurgist and consider increasing the sample size. The new sample size should be communicated to the bolt supplier on the purchase order.

It is the responsibility of the purchaser to confirm the sample size at the time of order, otherwise it will be assumed that the fasteners will not be used at service temperatures below -15°C.

The revised Table 8 for evaluation of the impact strength should read as the table bottom right.

Property (see Table 3 of BS EN ISO 898-1:2013)		Test method	Reference	Sample size	
No.				≤8.8	10.9
18	Impact strength, K_v	Impact test for machined test pieces	Clause 9.14 of BS EN ISO 898-1:2013	3	5

Table 8 – Inspection and testing requirements for bolts of property class 4.6 in all diameters and property class 8.8 and 10.9 up to M39

Property (see Table 3 of BS EN ISO 898-1:2013)		Test method	Reference	Sample size		
No.				T (°C)	≤8.8	10.9
18	Impact strength, K_v	Impact test for machined test pieces	Clause 9.14 of BS EN ISO 898-1:2013	-15	1	1
				-50<T -15	3	3
				≤ -50	Seek advice	

Table 8 –Inspection and testing requirements for bolts of property class 4.6 in all diameters and property class 8.8 and 10.9 up to M39 (revised)

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FROM
Building with Steel
December 1973

This house built over 10 years ago near East Grinstead in Sussex has vitreous enamel steel panels which give it its colourful appearance.
Architects: Katz Vaughan & Partners.

one-offs

There will always be houses designed exclusively for their occupiers- one-off design in fact. Among the architects who have handled this work is Michael Manser who writes about his approach in this article. He has been particularly successful with steel components.

There is a quotation, attributed to Emile Coignier, that "Enduring architecture is created when the imperatives of a structural technique are mastered", and it is true. There is no special magic in any particular building material. Architecture can be made from pressed seaweed and matches if necessary. It is the skill and sensitivity of the designer that creates a successful building. There is no safety in using stone, brick or timber. More terrible buildings are made of mellow brick than any other material, nothing is more forbidding and gloomy than mishandled stone, and timber has been the cause of many shanty towns. Although no building type is more vulnerable to architectural failure than a house, it is in the housing field that architectural innovation usually occurs and to date there have been some spectacularly successful houses built in steel- particularly in the 'one-off luxury end of the market.

The reason is probably that steel is a material of great intrinsic character and it imparts a rigorous discipline on the designer. It is one thing to use bits of steel to hold up awkwardly large spans in a conventional structure. It is quite another matter to accept the rigid grid of a steel frame and form within it a comfortable home. To do this is to accept a degree of formality, to design in straight lines - the 'regular lines' of Palladian architecture – to accept regular spacings of columns and be prepared to choose all other materials for their ability to fit within the frame of steel. Used well, a steel frame can give a house the simple formal excellence of the best of Georgian domestic architecture- but opened up and out by large spans and glass walls to achieve a scale and drama technically far beyond eighteenth-century capability.

Apart from the aesthetic possibilities of steel there are practical advantages, largely to do with speed and labour saving, which as building costs rise become more and more important.

The steel frame does not require labour intensive strip foundations. The load of the building can be gathered up and taken into the ground on perhaps six or eight 'legs' and these only need concrete ground pads. If the subsoil is poor and requires piles then the saving is greater. There needs to be no over-site concrete and screed and therefore internal services and plumbing can be attached to the underside of the steel frame and remain accessible without excavation for later maintenance.

If the land has a slope - stepped foundations and walls are avoided because the length of each 'leg' can be adjusted so that the building floats just above the highest part of the land. Once the frame is up, which takes a few days, the roof can be placed and the enclosing wall cladding fixed. From then on the building becomes its own workshop and all bad weather working is avoided. Earlier on the use of steel was inhibited by its cost – which is now more than offset by labour and weather savings and also by its need for fire protection which again is now overcome by patent dry column claddings of asbestos and pressed steel and the use of intumescent paints. These are paints which foam up to one or two inches thickness when exposed to heat and protect the steel.

Another advantage of steel as a building material is that it is comparatively light to handle and can be erected dry. It is also easy to dismantle and alter and re-erect- virtually impossible in a conventional masonry construction. In the latter half of the twentieth century

when the rate of change has accelerated far beyond that of any previous generation it seems inconceivable that we are now building in the prefabricated concrete systems the heaviest and most enduring mass housing that has ever been known. It seems extraordinary that anyone thinks of 8in of solid concrete or brick is still necessary to protect a family from the weather when the same family fly to their summer holiday at 600 miles per hour 30,000 feet above the ground in an aeroplane offering only about 2in of assorted aluminium and insulating quilt protection between them and certain and instant death.

Steel is an ideal construction material of great permanence, and easy to maintain. It is ironic that many families who lived in great comfort in post-war steel prefabricated houses were transferred to traditional homes as soon as they could be built. There was really nothing wrong with the prefabs except that they were conceived on minimal accommodation standards. They were designed to last ten years, but twenty-five years later they were superseded, not technically, but because their scale of accommodation was inadequate. If a little more thought had been put into their initial design to make them larger and less boxlike in appearance, if their creation had not been inhibited by irrelevant considerations of permanence or impermanence and if they had been laid out in less barrack-like estates - they could have been made part of the permanent housing stock and the double effort of re-housing avoided. After all, what is permanent. The prefabricated home with a planned life of ten years lasted twenty-five and was clearly good enough for thirty or thirty-five years. Obviously only a marginal upgrading of quality would have given them a minimum effective life of sixty years, which is all that is required. From this point on, it is a question of quality of maintenance that extends the useful life of any structure.

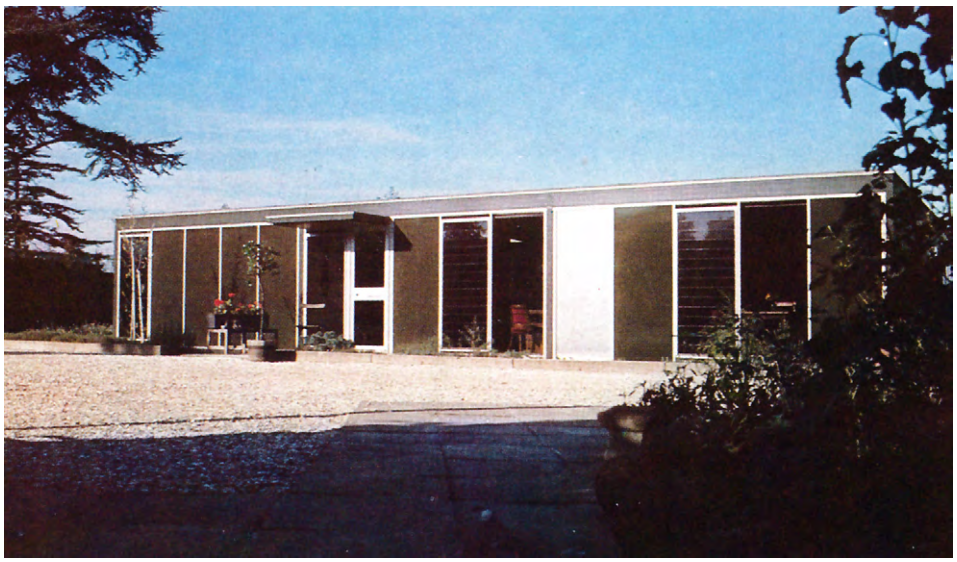
But the interesting thing about the prefabricated houses was that they were delivered half at a time on two lorries and each half was factory completed. When replacement time came, some were even dismantled the same way and re-erected. They were designed nearly thirty years ago and although there are some similarly constructed timber houses now on the market there is nothing available in steel - which has a much greater potential.

Even the old corrosion bogey of steel has been over stated. All building materials are vulnerable to deterioration by the weather and the longevity of each is dependent upon the way each is detailed to diminish the effects of weathering.

Steel is no exception. It is possible to detail bare steel so that the run off is quick and the rate of corrosion extremely slow. Comparatively recently, weathering steels have been introduced, the most well known being Cor-Ten. These are steels whose specification is such that a protective patina of rust forms over the steel which then corrodes at an enormously diminished rate. Aesthetically they have great appeal as the final appearance settles at a nutmeg brown colour. Galvanizing is another way of protecting construction steel but steelwork treated with an ordinary paint finish can be a minimum maintenance liability. Provided the details are such that rainwater cannot lie in pockets and steel surfaces are recessed to be protected from direct weathering, by projecting roofs, etc.

Despite the practical and economic justification, as far as I am concerned it is the aesthetic qualities of steel that are so interesting. Only steel housing seems to properly reflect the precision working which is the main achievement of our generation.

House components should be made in a factory and quickly assembled on site and for this they need to be lightweight and erected dry. This aim poses problems - but as Coignier pointed out - when you overcome the technical difficulties you produce a new aesthetic - an enduring architecture. None of the houses shown here could have been built a hundred years ago and they do not look like the houses of a hundred years ago, but there is no doubt they have the basic qualities of architecture.



Above and left: A house at Ashtead in Surrey constructed on 'legs' with heating-ducts and services suspended in void beneath. Walls are glass panels in patent glazing.
Architect: Michael Manser Associates.

Below: This steel framed house is near Horsmonden and was built over the cellar of a demolished Victorian house.
Architect: M. Manser & Partners.

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
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
Had Fab Ltd	01875 611711				●		●	●	●	●	●			●	●	✔	4			Up to £6,500,000
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)
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*
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
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

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.

BCSA

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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