JANUARY 2023

NSC

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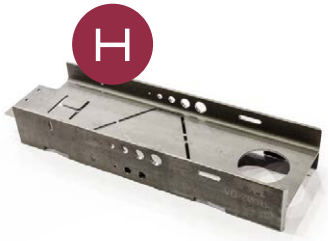

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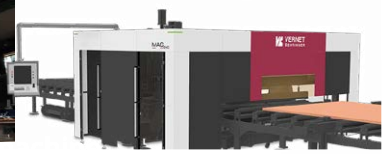

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Everton FC Statium
Main client: Everton Football Club
Architect: BDP Pattern
Main contractor: Laing O'Rourke
Structural engineer: Buro Happold
Steelwork contractor: Severfield
Steel tonnage: 12,500t

NSC

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BCSA

STEEL for life

SCI Steel Knowledge

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

Is your Steelwork Contractor a BCSA Member?

Choosing the right steelwork contractor is key to the success of your project. With close to 80 registered steelwork contractor members, BCSA provides plenty of choice to ensure a suitably qualified and competitive tender list.

By using a BCSA member you can reduce time, cost and risk. Specifying a BCSA member:

- **Is easy:** Our directories are searchable and can be tailored to meet the bespoke needs of each of your projects. BCSA members are categorised by a maximum contract value each can handle.
- **Ensures you get an appropriate contractor:** Our members are pre-assessed so you know in advance that they have they specialist skills for your steelwork construction project.
- **Shows you value quality:** Listed by their quality credentials so you know that they are likely to meet the demands of your quality management system.
- **Demonstrates that you have chosen a competent contractor:** BCSA members are assessed for health and safety/CDM regulation requirements, quality of work, specialist skills, and maximum job size.
- **Ensures a competitive price:** There are close to 80 member companies of the BCSA, and this provides users with plenty of choice to ensure a competitive tender list.
- **Ensures competence against the NSSS:** To comply with the National Structural Steelwork Specification (NSSS) it is recommended that a Steelwork Contractor be a BCSA member.

The BCSA member directories' search criteria can be tailored to ensure you select a suitably qualified steelwork contractor for your next project.

By using a BCSA member not only can you be confident that you are choosing the most appropriate steelwork contractor for your project, you are also supporting the UK economy.

Steelwork Contractor Members for buildings and bridgeworks projects are listed in fully searchable directory format, as well as for BCSA's two other membership categories; industry members and corporate members.

To view the directories please visit:

www.steelconstruction.org/member-directories

Steel's sustainability and flexibility will score with clients

Nick Barrett - Editor

At this time last year, looking ahead to 2022, we said that there was a lot of evidence suggesting that the outlook for the economy was positive for the next couple of years. Encouraging messages came from the two main official forecasters - the Office for Budget Responsibility and the Bank of England - and the Confederation of British Industry said business investment plans were strong.

A lot happened since then to dampen the optimism, notably the energy prices shock caused by Russia's unprovoked invasion of Ukraine, and the upheaval caused by the demise of one UK prime minister and the economic ructions following the short-lived appointment of his successor, whose high spending-tax cutting plans were not well received in financial markets.

The COP26 event in Glasgow was about to be held, highlighting for anyone who still needed convincing that the planet is engaged in a desperate battle to tackle climate change. The implications for construction are profound and the industry has reacted positively to the clarion calls for change.

The steel construction sector was well up with events with publication of the net zero carbon 2050 Roadmap just months before and the NSSS Annex J Sustainability Specification soon after. The story for the next few years will be how positive responses are turned into carbon reduction action, and further sustainability initiatives will be announced by the BCSA during 2023.

What can be left of last January's optimism though? Quite a lot in fact. Construction output rose in October for the fourth successive month, according to Office of National Statistics figures released in December, against the headwind of an overall fall in the economy. There was a three month fall in the wider economy's output, but for the most recent month, October, the economy was back on a growth tack. The rise in construction output and in the wider economy is small, but considering the forces against growth prospects it is encouraging that things seem to be moving in the right direction.

The headwinds are still there, generated by a wide range of factors like inflation, the end of the era of cheap money, and skills shortages. The economy looks like heading into a recession, one that it is hoped will be relatively mild and short-lived. But not a lot of smart money will be betting against an industry that has shown such strong resilience so far.

What of the steel construction sector's own prospects? In a world where employees seem increasingly to have to be coaxed into working from the office at all, building owners are understandably wary of being left with 'stranded assets' as the demands of users shift. One response to that is creating a demand for refurbishing and repurposing buildings to create more pleasing work environments. Owners of steel-framed buildings will find themselves in a relatively much more fortunate position than others due to the flexibility afforded by column-free spaces.

A lot of new build will still take place and developers will surely take note of steel's flexibility to cope with changing requirements and procure buildings accordingly. Steel's strong sustainability messages, as well as its relative cost-effectiveness, will increasingly come to the fore as procurement focusses more and more on sustainability.

STEEL for life

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Survey predicts resurgence of London office developments in 2023

A desire for high-quality office space is driving increasing demand for Grade A accommodation in 'a flight to quality', according to the latest twice-yearly Deloitte London Office Crane Survey.

Next year, the London office development pipeline is forecast to grow as 2023 is likely to be the post-pandemic 'Year of the Catch-up' on completions. As a result, refurbishments remain a strong feature of new construction activity, representing 26 of the 31 new starts during the last six months.

Margaret Doyle, Chief Insights Officer and Partner for financial services at Deloitte, said: "The past year has been characterised by an uptick in post-pandemic refurbishment activity.

Looking forward, 2023 could turn out to be the year when the highest volume of new office space is delivered for 20 years.

"However, this will depend on whether supply chain disruptions, labour shortages, financing difficulties or material price inflation cause further completion delays. Looking further forward to 2025, we anticipate it will be the 'Year of the Investor' as renewed pressure on stock stimulates rental growth, creating a wave of fresh opportunities for developers."

According to the survey, more than three quarters of developers (81%) said their new developments will achieve net zero by 2034.

SCCS extends its scope to include the Build UK Common Assessment Standard

The Steel Construction Certification Scheme (SCCS) has further extended its range of certifications and from early 2023 it will be able to offer non UKAS accredited certification to the Build UK Common Assessment Standard (CAS).

"This is a significant addition to the service that SCCS offers its clients and further develops our strategic objective of offering a one-stop-shop for certification," said SCCS Director of Certification, Stephen Blackman.

The SCCS is a wholly-owned subsidiary of the British Constructional Steelwork Association. It was established in the early 1980s to provide quality management certification for steelwork contracting organisations.

SCCS now offers a wide range of certification and monitoring services for the structural steelwork sector, including integrated or separate UKAS accredited Quality, Environmental, Welding Quality, Health & Safety management systems, Factory Production Control systems and selected National Highways Sector Schemes.

For more information about SCCS go to *www.steelcertification.co.uk*

Camberley manufacturing HQ taking shape with steel

Steelwork is enabling the construction of a new UK headquarters and distribution facility for STIHL, a manufacturer of chainsaws and outdoor power equipment, to proceed on schedule with an expected completion date set for May 2023.

Working on behalf of Glencar Construction, Adstone Construction is fabricating, supplying and erecting 770t of steelwork for the project.

Designed by Hale Architects, the project is located in Camberley, Surrey and includes a 9,000m² warehouse and an adjoining three-storey headquarters building.

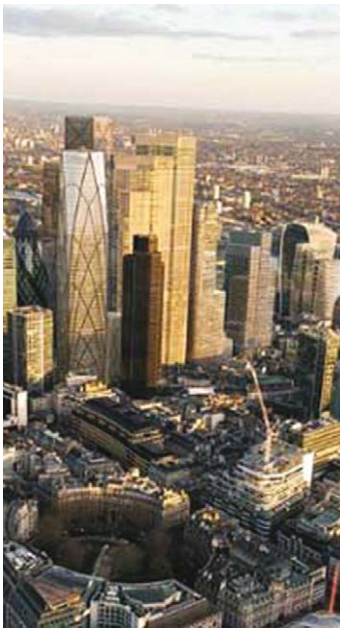
Commenting on the scheme, STIHL GB Managing Director Kay Green, said: "STIHL has enjoyed a sustained period of growth in recent years, and as a consequence, we have outgrown our existing warehouse and office facilities.

"Our new purpose-built headquarters represents a significant capital investment and is a commitment to the future for our local workforce. This cutting-edge facility will allow us to plan for many years of future growth, which will continue to benefit the local economy."

The warehouse will utilise state-of-the-art picking and storage systems to maximise productivity, efficiency and the use of space. The adjoining 2,300m² HQ will boast dedicated retailer training facilities, an on-site restaurant, flexible collaborative workspaces and a technical workshop.

The overall development will also incorporate new car parking, service yard, landscaping – featuring native shrubs and trees -and the construction of a new access route from the A331.

Plans in for innovative 63-storey City tower



The City of London has received a planning submission for a 63-storey office tower at 55 Bishopsgate.

Designed by a team that includes architect Arney Fender Katsaladis and structural engineer Robert Bird Group, the 285m-tall building will be one of the City's tallest and will feature an innovative steel-framed concept based on a 'fibonacci leaf' design.

The design team said, application of the same mathematical principles that influence the geometry of structures found in nature, combined with the use of contemporary digital design methods, has ensured the optimal placement and use of all structural elements – minimising the embodied carbon content of the building's structure.

It also claimed that the resulting mega frame steel design will provide higher lateral stiffness than achieved with a conventional structural system, as well as providing column-free floorplates.

Targeting a BREEAM 'Outstanding' rating, the building will offer in excess of 130,000m² of office space and will feature a rooftop conservatory and a public viewing gallery.

Contract awarded for Hertfordshire film studios

ISG has been awarded the contract to build a large film studio complex at Broxbourne in Hertfordshire for USA-based Sunset Studios.

The latest in a long list of TV and Film production projects that have started in the UK in recent times, the scheme includes the concurrent development of four main hubs comprising 21 sound stages and nine workshops as well as ancillary buildings.

The project also includes heritage works to restore existing Grade II-listed farm buildings and the creation of significant areas of landscaped green spaces.

The development will generate significant amounts of its own energy through a large photovoltaic installation and further reduce its consumption of resources through rainwater harvesting and re-use. Enhancements to biodiversity are also prioritised with the delivery of green space to the south of the site, with a public right of way footpath running through it.

ISG Project Director Paul Serkis, said: "Sunset Studios is a global leader responsible for shaping the world's film and TV landscape as we know it today. We're proud to be working with them and to be a part of the delivery of this transformational project, creating prosperity and real legacy for the UK's creative industry and local community. This builds on other projects ISG has delivered in the creative sector albeit on a much smaller scale until now."

Kloeckner Metals achieves Excellent Responsible Sourcing rating

Kloeckner Metals UK has achieved the BES 6001 'Excellent' certification rating for its Leeds, Westok, Thurrock and Dudley sites, which allows the company to demonstrate that its products are made with constituent materials that have been responsibly sourced.

The company said the 'Excellent' rating is an endorsement of its dedication to environmental issues, and puts it in the elite group of 8.33% of UK steel product companies that have successfully managed to raise their responsible sourcing procedures to the highest possible standard.

Kloeckner Metals UK CEO Peter Whiting, said: "Responsible sourcing is a key part of our sustainability strategy, and we are incredibly proud that we are among the first companies in the UK to achieve the highest standard for steel products.

"With sustainability being a top priority, this certification reassures our customers that in the process of sourcing high-quality products and services, we act ethically and responsibly."

NEWS IN BRIEF

Tata Steel has begun sales of certified low-CO_2 steel. Known as Optemis, the certified steel is based on savings achieved by the company in the UK and is verified by independent assurance experts DNV.

Severfield has reported strong interim results despite what it describes as a difficult macroeconomic backdrop. The company reported turnover of £234.9M for the six-month period ending 24 September 2022, up from £195.9M in the same period of 2021. Underlying profit before tax also increased by 17 per cent to £12.1M from £10.3M in the previous year.

Construction has begun on Rotherham's **Forge Island** development, which will be home to a state-of-the-art cinema, 69-room hotel and five restaurants providing food from around the world. The £47M development is being delivered by developer, Muse, in partnership with Rotherham Council.

Plans to develop the largest, highly sustainable commercial building in Greater Manchester, set within the heart of **MediaCity**, have been given the green light. The iconic, 11-storey development will be located opposite ITV and The University of Salford media campus.

The City of London Corporation's Planning Applications Sub-Committee has given the go-ahead green for updated plans from the **Museum of London** to create a new, world-class cultural destination within a series of historic buildings in West Smithfield. The approved plans mean a secure, sustainable future for the historic market buildings that make up the site, most of which date back to the Victorian Era.

PRESIDENT'S COLUMN

Many thanks for Gary Simmons for stepping into the breach to write the last column in the November/December 2022 issue. I thought his article on the over reliance on structural computer analysis was excellent and I couldn't agree more with the points raised.

It will be very interesting to see how the steelwork industry is able to adapt to structural engineers favouring an absolute minimum weight design, due to a wish to reduce embodied carbon, over a practical minimum weight design which allows for sensible connections. If the structural engineer designs purely on minimum weight, there will be problems with steelwork contractors not correctly estimating fabrication time and steel fittings costs. Estimating correctly minimum weight designs in a very competitive and challenging market can mean having the right price in the market but sadly no orders. More worryingly though is we will see more cases of steelwork contractors losing money on contracts, where they simply don't have enough money in the job to make a profit.

I also see problems with correctly estimating contracts where the steelwork contractor is expected to re-use steel from a previous building due to numerous unknowns regarding that material. My answer is not to re-use steel, but to recycle it. The steelwork industry has been successfully recycling steel for decades, to the tune of 98%. But the most important point is that the material can be recycled time and time again, not just once. I think the ability to recycle steel more than once is not adequately accounted for in the structural engineer's calculation of embodied carbon.

I think many of us will be glad to have seen the back of 2022, but a quote attributed to the German philosopher, Friedrich Nietzsche seems quite appropriate at the present time, "that which does not kill us, makes us stronger." Although material increases have stabilised, other problems such as ridiculous high energy prices will remain in the short to medium term as nobody is expecting the problems in the Ukraine to change anytime soon. It will be interesting to see what the government will do to help business' with energy prices from the 1st April 2023.

Salary expectations are also very high based on a shortage of staff throughout the industry. I was recently copied in on some UK employment data. Around 600,000 people aged 55 to 65 have retired early, presumably on the back of low interest rates for mortgages for the last ten years. Supply of employees has fallen by 3.6 million, the demand for new employees has increased by 1.3 million. There are 1.4 million people unemployed! The question is how many of these people are seriously looking for work or are indeed able to work. Every employer I meet states they need staff from labourers all the way up to director level. The question is how do we persuade these young people to join the construction industry rather than be employed elsewhere? With a shortage of staff and high inflation, wage expectations are artificially high. Inflation is expected to return to 5 or 6% next year so hopefully high wage expectations will dissipate to more sustainable levels. With the threat of so much industrial action in the news currently, due to unrealistic salary expectations, it does make me think back to the 1970's and that does concern me.

Mark Denham
BCSA President

Tata Steel makes energy and CO_2 savings with digital technology

Cutting-edge digital technology, which captures 1,000 data points every 10 seconds, is giving Tata Steel technicians an uninterrupted 3D view of the material being laid into the top of its two Port Talbot blast furnaces saving costs, energy and CO_2.

The market-leading 'Topscan' technology has the potential to save the company millions of pounds every year by reducing the amount of coke required in the furnaces, and will reduce CO_2 emissions by at least 50,000 tonnes annually. The technology will also play a major role in improving the furnaces' stability and efficiency.

Tata Steel UK has the ambition to reduce all CO_2 emissions by 30% by 2030 and be a CO_2 neutral steelmaker by 2045 – in support of the UK's ambition to be net-zero by 2050.

Tata Steel Blast Furnace Technical Manager, Aaron Parsons, said: "This latest £1M investment on Blast Furnace 5 complements a similar investment last year on Blast Furnace 4 and is a major step forward for us.

"The Topscan system consists of a set of radars, which take a full surface scan of the iron ore and metallurgical coke being laid into each furnace, every 10 seconds. Computer modelling then gives us a really clear, finite view of the raw materials at the start of their journey through the furnace.

"That's really important to us

because the specific way in which we lay materials in the furnace is our main method of controlling gas flow up from the hot air blast through the raw materials.

"Over time, we can make tweaks to the distribution, allowing us to make the most efficient use of the hot gases and yield really big savings, both in terms of coke usage and CO_2."

Mega shed for retailer taking shape

A huge distribution warehouse for retailer T J Morris is being constructed at the Omega Business Park near Warrington.

The £118M project is being undertaken by main contractor Bowmer + Kirkland, with Caunton Engineering fabricating, supplying and erecting 6,000t of steelwork.

The steel-framed structure is 448m-long and features a high-bay section, which encompasses 174m of the building's overall length and reaches a height of 34m. The remainder of the warehouse (low bay) has a height of 22.5m.

Offering 77,100m² of floor space, the entire structure is three spans wide, with a further span created by a lean-to.

The main spans in the high bay area are up 54m-wide and are formed with a series lattice trusses, while the low bay zone is a portal frame with spans up to 49.5m-wide.

Internal columns in the warehouse are arranged in a hit-and-miss configuration to avoid obstructing the facility's mechanical handling equipment. The building also incorporates a two-storey office block.

Straddling the M62 motorway near to Junction 8, the Omega Business Park covers an area of 775 acres and is said to be the largest mixed-use development in the North West.

The T J Morris warehouse is expected to be completed by January 2025.

Plans in for Exeter logistics park expansion

Developer Stoford has submitted a planning application for a new 3,948m² industrial/warehouse development at Exeter Logistics Park in East Devon.

Stoford is also lead developer for the Park and has a long-term site wide agreement with the Church Commissioners for England that will eventually deliver around 46,500m² of high quality industrial/logistics accommodation.

Known as DC9, the new unit will be built on behalf of an unspecified end-user and will reflect the scheme's already impressive

sustainability credentials.

Stoford will target BREEAM 'Very Good' and an EPC 'A' rating, as well as net zero carbon in construction. Features will include water and daylight saving controls, PV panels, electric vehicle charging provision and a sustainable urban drainage system, while occupiers will also benefit from outdoor gym areas, including bodyweight exercise equipment.

Stoford Director, Edward Peel said that Exeter Logistics Park has all of the attributes to become the South West's leading distribution hub, south of Bristol.

Recycled steel to be used for £200M ExCel expansion

ExCeL London has appointed McLaren Construction to deliver the build phase of its major expansion project, enhancing the venue's world-class conference, event and exhibition facilities.

The scheme will be a net zero carbon ready building, utilising 50% recycled steel, targeting BREEAM 'Excellent', with sustainability solutions including PV panels, air source heat pumps, rainwater harvesting, and hybrid ventilation.

Overall, the programme will extend the existing facilities by up to 25,000m², on a development site of 2 hectares, providing a 25% increase to the venue's existing 100,000m² events campus.

ExCel said the works will provide seamless connectivity with the existing venue, creating state-of-the art convention facilities, exhibition halls and conference rooms and improved catering amenities.

The expansion works also include outdoor spaces with external terraces, along with an enhanced public realm, creating an attractive dock edge with leisure facilities and landscaping.

Plans in for Kent surf lagoon at former colliery site

Developer Seahive has submitted a planning application for a surf lagoon resort to be located on the former Betteshanger colliery site near Deal in Kent.

Plans for the 15-acre site feature a Wavegarden Cove surf lagoon at the centre, which can generate more than 20 different wave types from 50cm-high to 2m-high.

Overlooking the lagoon there will be a clubhouse featuring a surf academy as well as a restaurant and bar, conference facility, retail outlet, chill out spaces, dedicated work area and immersive balcony.

Surrounding the lagoon, a number of interconnected 'hives' of activity are planned, including a wellness facility with yoga and fitness zones, cold water therapy and meditation pavilions, pump track and splash pool. There are also a small number of sustainably-designed holiday lodges.

Seahive also aims to create a separate area of over 28 acres dedicated to an ecologically-led regime of enhancements and management, including an ecology warden.

Green light for laboratory space at Cambridge International Technology Park

BioMed Realty has received approval to deliver 55,700m² of purpose-built laboratory space on the 15-acre Cambridge International Technology Park site, which it acquired in September 2021.

According to market data tracked by BioMed, heightened tenant demand in the UK has driven space availability to essentially zero for functional lab and office space, potentially locking out promising life science companies that are looking to grow.

In response to significant tenant demand in Cambridge, BioMed has assembled a pipeline that will deliver up to one million square feet of additional Class A space for life science companies

while helping the UK reach its potential of becoming a 'scientific superpower.'

BioMed Realty CEO Tim Schoen said: "BioMed remains committed to investing in the UK by providing the mission-critical space that is needed to bring life-saving products and therapies to market and ensure the UK's future success as a global leader in drug development."

The development is targeting a BREEAM 'Excellent' rating and a notable net gain in biodiversity. Construction could begin in early 2023, with the first phase delivered in 2024.

Diary

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

Tue 17 & Thu 19 January 2023
EC4 Composite Design Course
Online
This course will cover the design of composite beams and slabs with reference to Eurocode 4 for composite construction (BS EN 1994). Combining steel and concrete so that they act together structurally in composite elements can lead to very efficient frame solutions. Common problems and misunderstandings will also be highlighted during the course, as well as detailing recommendations.

Tue 7 February 2023
Cellular Beams
Webinar, SCI/BCSA Members only
Cellular beams use multiple circular and elongated openings for service integration. The controlling design conditions tend to be Vierendeel bending due to transfer of shear or web-post buckling. The lecture will present the latest design methods for cellular beams and beams with large web openings, including comparison with recent tests on long span composite cellular beams and the additional deflection due to web openings.

Wed 8, Thu 9 February 2023
Straight to the Point:
Steel Design using the Blue Book
Online
This four hour course contains minimum theory and maximum hands-on member design – focusing on straight to the point practical design using the Eurocode Blue Book. The course is aimed at designers of orthodox structures where the resistance tables are the preferred way of selecting members.

Steel scores for Toffees

Helping to form two stands and a continuous roof that requires a series of long trusses, structural steelwork is playing a leading role in the construction of Everton's new stadium.

Opened in 1892 and one of the oldest football stadiums in the UK, Goodison Park, will soon be consigned to the history books, as Everton Football Club (nicknamed the Toffees) is currently constructing a new home.

Sat on Liverpool's waterfront, the new stadium at Bramley-Moore Dock will reinvigorate a semi-derelict site less than two miles north of the famous Royal Liver Building, while also acting as a catalyst for further regeneration of the area.

This fully accessible venue will have a capacity of 52,888 and has been designed with a "Football First" approach, that includes having the seats as close to the pitch as current regulations permit, to enhance the fan experience.

To this end, the stadium's design also incorporates four-interlinked rectangular stands (the ground's four corners are infilled with further seats), which are topped by a continuous cantilevering roof.

Structural steelwork is playing an integral role in the construction programme, as two of the stands (north and south) are fully steel-framed structures that support precast terraces, the east and west stands have steel-framed upper tiers, while the stadium's roof is formed with a series of steel trusses that are up to 170m-long.

Constructing the new Everton stadium has presented the team with a set of unique challenges, most notably the fact that much of the facility is sat on what was previously water. The historic Bramley-Moore Dock has been drained and infilled, while its surrounding walls are Grade II listed structures and have consequently been preserved, albeit in the ground with only their tops still visible.

"One of the benefits of choosing steelwork is the material's speed of construction," explains Buro Happold Engineer Tim Finlay. "The orientation of the stadium means the east and west stands, which are predominantly concrete-framed, are positioned over the infilled dock and in areas that required more preliminary ground works.

"While this work was being completed we have been able to push-ahead and work simultaneously on building the north and south stands that are located on areas that were not infilled."

The steel-framed north and south stands are positioned behind the goals and the former is a double-tiered structure that will provide seating for away fans. The south stand will be the home end and is a single tiered structure, a design that is commonly considered to provide a more noisy and supportive atmosphere.

The south stand will feature a predominantly glazed rear façade that looks back towards the city's famous skyline, while also overlooking an adjacent dock as its slopes inwards from the roof. This architectural elevation is 42m-high and formed with a series of raking CHS columns, fabricated from 800mm-diameter sections at the base and reducing to 406mm-diameter members at the roof level.

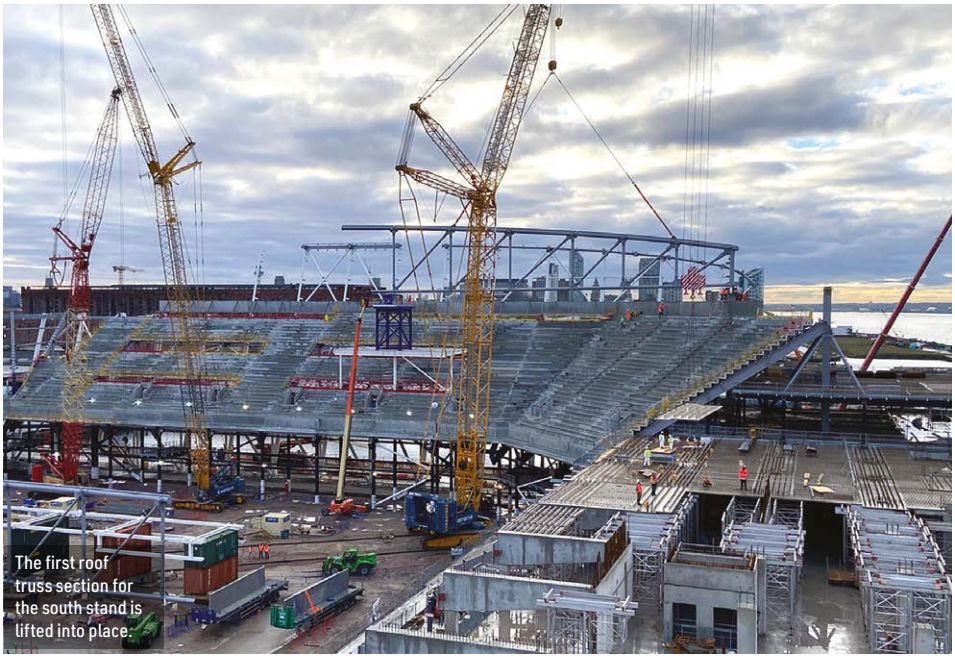
Chosen because they will be left exposed and visible behind the glazed façade, the CHS columns also support the terracing and part of the roof.

FACT FILE
Everton FC Stadium
Main client: **Everton Football Club**
Architect: **BDP Pattern**
Main contractor: **Laing O'Rourke**
Structural engineer: **Buro Happold**
Steelwork contractor: **Severfield**
Steel tonnage: **12,500t**

A 600t-capacity crawler crane is used to lift all of the north and south stand truss sections into place.

"In consultation with Severfield, we decided to use high-strength (S460) steel sections for the roof trusses, which meant the overall steel tonnage was streamlined and our embodied carbon was lower."

Much of the stadium is situated on land created by infilling a dock.



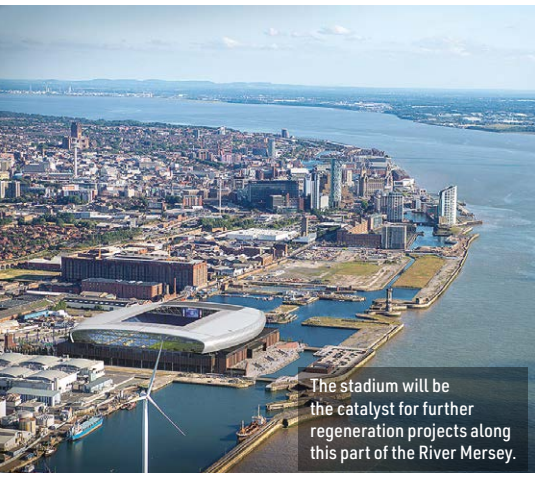
The first roof truss section for the south stand is lifted into place.

The roof trusses are installed onto temporary blue-painted steel trestles

The stadium's south stand overlooks an adjacent dock.

Meanwhile, the east and west stands, both have similar designs to each other, as they comprise a lower, mid and an upper tier, with the highest tier formed with steel rakers supporting precast terrace units. Having a steel-framed uppermost tier was a design decision that allows the roof structure to have a steel-to-steel connection with the stand.

The east and west structures are the stadium's main stands and contain changing rooms, bars, restaurants, lounges, suites and media areas, alongside the terraced seating. They also have much larger floorplates than the north and south stands and this has impacted on how the roof design alters around the stadium.



The stadium will be the catalyst for further regeneration projects along this part of the River Mersey.

"The east and west stands' floorplates provide sufficient depth and space for backspans, so these parts of the overall roof are formed with a series of cantilevering trusses, which are up to 60m-long," says Mr Finlay.

The other two stands (north and south), lack the depth for backspans, due to these parts of the site being constrained by the adjacent docks and buildings. Consequently, the roof over these stands has been constructed with a series of trusses that span the whole width of each stand.

In total, there are five of these long roof trusses; two in the smaller north stand and three atop the one-tier south stand that will eventually house 13,000 Evertonians. As these two stands, topped out first, this was the initial section of the stadium roof to be constructed.

"The primary trusses, which hold up the rafters and purlins, are typically 12m-deep with an average span of 170m and weighing up to 250t when erected," says Severfield Construction Manager Stephen Osbourne.

"They are supported at each end with pot bearings located on heavy box columns penetrating though the lower stand steel frame."

Each of the five trusses were initially installed on temporary support trestles built into the stand. The trusses each consist of three sections that were assembled at ground level and lifted into placed individually. Each of the 15 steelwork sections weighed approximately 100t and took up to two weeks to assemble and paint. The majority of the connections are bolted, but for architectural reasons, the bottom flange of each truss is welded.

The trestles form part of a large 900t temporary works package, which also includes significant bracing throughout the stadium, 400m of heavy-duty trestling for the roof and significant pre-assembly support steelwork.

When the roof steelwork has been completed and the temporary trestles are removed, the roof trusses will have clear spans of between 150m and 175m. The depth of the trusses varies from 4m-deep at their column supports, to around 12m at mid-span.

With so much activity being undertaken on the pitch, such as the assembly of roof trusses and roof infill sections, which weigh up to 20t each, the lower parts of the north and south stand's terraces have been omitted and will be completed after the roof is installed. This has created more space, particularly for the lifting equipment as Severfield used up to 12 crawler cranes for the erection of the stands.

The installation of the cantilevering trusses above the east and west stands also requires assembly work to be completed on the pitch, as well as outside of the stadium.

These 60m-long cantilevering trusses are up to 7m-deep and will be erected in pairs. They will be preassembled onsite with all of the connecting secondary steelwork in place and then lifted into

Project kicks-off with sustainability

Everton's new stadium is said to be setting the standard for sustainability, as one of the most environmentally-friendly football venues ever built.

Some of the initiatives have included, transporting all of 480,000m³ of sand required for the initial dock infill process to site by boat, thereby preventing thousands of truck movements on the city's already busy roads.

Meanwhile, main contractor Laing O'Rourke has exceeded its ambitious target to reuse 95% of materials onsite.

A full assessment of flood levels has been undertaken, while heritage assets from the Dock's heyday, including railway lines, mooring posts, cobbles and capstans, are being preserved, refurbished and integrated into the completed project.

In readiness for an increase in numbers, the club is set to upgrade facilities at the nearby Sandhills train station, following a fan survey that suggested 60% of supporters wanted to use public transport. ■

place in three sections, which on completion will each form two completed cantilevering trusses.

"The east and west roof trusses will be pre-assembled in pairs, with each pair built in three sections to suit sequence, access and weight, to aid crane efficiency," says Mr Osbourne.

"The rear sections, called the barrel, will be pre-assembled and installed from outside the stand, using 750t-capacity mobile cranes. The mid and tip sections will be pre-assembled and installed from the pitch using 600t-capacity crawler cranes."

Overall, the design team say sustainability is at the heart of the project, and there has been a significant amount of collaboration, which has resulted in less cost, a lower steel tonnage and importantly, less embodied carbon.

A number of savings were made by sharing the structural models of the roof design and continually checking for refinements and efficiencies, while the choice of steel sections also resulted in significant savings.

"In consultation with Severfield, we decided to use high-strength (S460) steel sections for the roof trusses, which meant the overall steel tonnage was streamlined and our embodied carbon was lower," sums up Mr Finlay.

Everton's new stadium at Bramley-Moore Dock, due for completion in the 2024/25 season, is recognised as the largest single-site private sector development in the country, contributing an estimated £1.3bn to the UK economy. ■

The rear of the south stand has a sloping facade created with a series of raking CHS columns.

Steel takes centre stage in Soho

Block B has three office levels situated above the theatre.

London's first new theatre in more than 50 years is at the heart of a Crossrail over-site development in the capital's West End.

FACT FILE
Soho Place, London
Main client: **Derwent London**
Architect: **Allford Hall Monaghan Morris [AHMM]**
Main contractor: **Laing O'Rourke**
Structural engineer: **Arup**
Steelwork contractor: **BHC**
Steel tonnage: **2,600t**

Having recently opened its doors, Soho Place is the capital's first new-build theatre in more than 50 years and is the culmination of a 12-year project.

Sat above Tottenham Court Road Underground and Crossrail Elizabeth Line stations, the theatre is at the heart of Derwent London's visionary £300M regeneration of a neglected corner of Soho. Totalling 26,400m², the two-building mixed-use development also contains offices, retail spaces and a new piazza.

Nimax Theatres' Chief Executive Nica Burns says: "I wanted to create a theatre which would add a different dimension to our vibrant West End landscape.

"The project team have pulled off the greatest of structural feats, building over a major underground transport hub – a challenging place to build a theatre – achieving perfect acoustics and no vibrations."

The project has been in the offing for a number of years as the site had previously been cleared in readiness for the Crossrail works. The plot was then prepared and made ready for an over-site development with the installation of a series of plunge columns and a concrete ground floor slab.

Part of the site was previously occupied by the Astoria theatre and a replacement entertainment venue was a fundamental element of the new project's planning approval.

The new theatre is contained within the project's steel-framed Block B, which occupies the southern-most part of the site bounding Charing Cross Road. This nine-storey building also accommodates three office levels above the theatre.

With no preconceived plan, as to what the over-site development might look like, the pre-installed plunge columns were set to form a traditional 7.5m column grid pattern. However, once a new theatre was designed to sit within Block B, the grid pattern proved to be unfeasible.

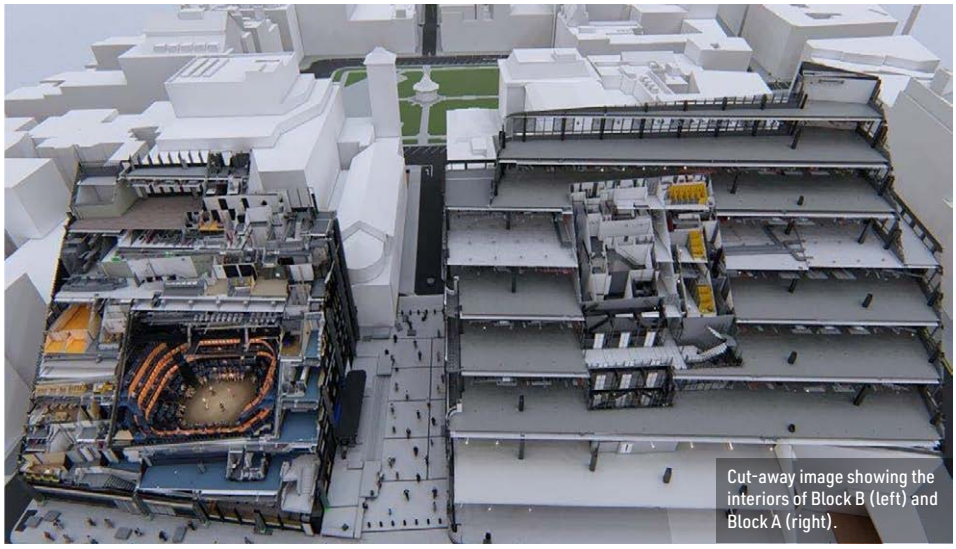
The design team's solution was to install a ground level grillage of 1m-deep box girders that act to transfer loads to the plunge columns beneath. The auditorium structure is supported on three tapered cantilevering transfer beams that bring its structural loads back to six plunge column support points below.

The box girders are sat on bearings that connect to the piles in order to isolate the entire building from the station below. Further acoustic isolation is also needed to separate the theatre from the rest of the building, thereby creating a box-in-box design and two separate independent structures.

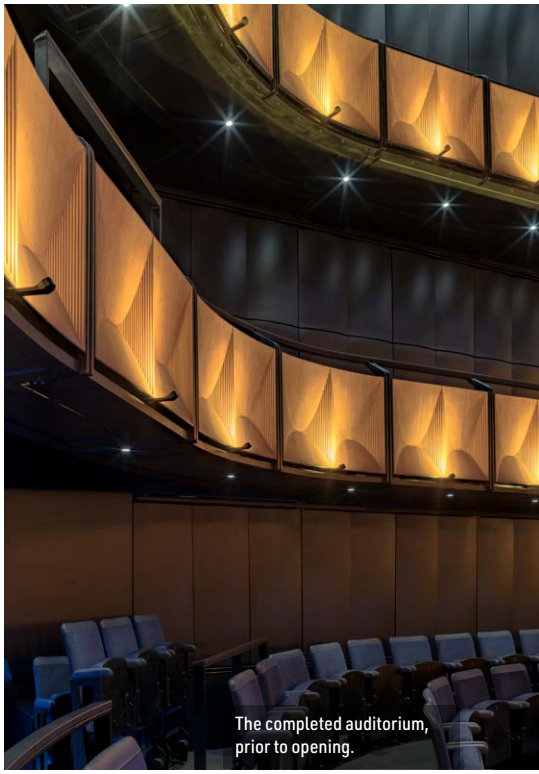
The theatre box is separated from the rest of the structure by a 100mm acoustically-isolated gap. This void extends to the theatre lid which is supported by a two 15m-long storey-high trusses, that not only create the desired open column-free space, but accommodate walkways and areas for equipment within their depth.

Surrounding the theatre box, the outer building contains, back-of-house facilities, bars, offices, circulation areas and lift and stair cores.

Sat above the theatre at level six, a rehearsal space and actor's lounges and dressing rooms



Cut-away image showing the interiors of Block B (left) and Block A (right).



The completed auditorium, prior to opening.

are further isolated with a 'floating slab that is positioned above the theatre and supported on a series of raised floor beams and bearings.

Above this, the upper three office floors of the building step back and the column grid pattern gets wider to form an open-plan layout. A series of cellular beams, with the largest measuring 22m-long × 1.2m-deep and weighing 18t, are installed to support these floors and create the desired spans.

The adjacent Block A also sits above numerous underground assets and incorporates an existing slab and an over-ground concrete box that houses a railway control room.

Block A occupies the northern part of the site, on the corner of Oxford Street and Charing Cross Road. It is separated from Block B by a new pubic plaza and Sutton Row that provides a link between Charing Cross Road and Soho Square.

This block is a 10-storey fully-let commercial scheme, which includes ground floor retail units. The design chosen for this building is a hybrid one, consisting of a centrally-positioned steel braced core, with steel perimeter RHS columns supporting post-tensioned concrete slabs.

The design for this block features an exposed soffit, while the steel core is a feature element at the heart of the building as it is a fully-exposed structure, allowing the lifts to be seen from the outside.

As the core is exposed, its detailing and paint finish was extremely important. Steelwork contractor BHC initially prepared one of the structure's many nodes in advance of its erection programme in order to show the client how the core will look and get the design team's full approval.

Similar to Block B, this building's column positions do not entirely line-up with the pile locations. To transfer the column loads to the piles, BHC installed a 28t 25m-long storey-high truss within Block A's basement.

The installation of the truss was challenging as the ground floor slab was already in place. This meant the truss could not be erected in-situ and instead it was brought to site in sections and then assembled on bogies that allowed it be manoeuvred into position below the slab.

Summing up, Derwent London Chief Executive Paul Williams says: "Working alongside world-class architects and engineers, and in collaboration with Crossrail and our partner Nica Burns, we are delighted to have developed this new state-of-the-art theatre together with substantial public realm as part of a successful commercial regeneration project above the Elizabeth line." ■

Steelwork erection in progress for the development's Block B.

Columns are sat on bearings, which help isolate the theatre building from the station below.

"The project team have pulled off the greatest of structural feats, building over a major underground transport hub – a challenging place to build a theatre – achieving perfect acoustics and no vibrations."

Offices add to vibrant market

Steel construction is playing a vital role in the redevelopment of the Vaux brewery site in Sunderland. Martin Cooper reports from the site's latest scheme, which consists of two office buildings.

One of the largest regeneration projects in the north east of England is transforming a large swathe of land in Sunderland once occupied by the renowned Vaux brewery, which closed down in 1999.

Located on the south bank of the River Wear and unsurprisingly known as Riverside Sunderland, the development is already home to the city's new steel-framed Civic Hall (see *NSC September 2020*), while other planned projects include an eye hospital, library hub and a multi-storey car park.

Steel construction is playing a leading role in this large development and currently two steel-framed office blocks, known as Maker and Faber, are under construction. The buildings, which together will create 13,900m² of office space, are set to become the workplace of thousands of people employed by businesses of all sizes.

Being delivered by development manager Landid, Maker and Faber have been funded as part of Legal & General's £100M commitment to the site, which is part of the £160M that the institutional investor is ploughing into the city over the next few years.

Landid Managing Director James Silver, says: "Riverside Sunderland is a world-class urban quarter, and a place that will have a transformational impact on the wider city centre. We're enormously proud to be playing a part in this game-changing programme for Sunderland with two buildings that will add to the city's vibrant office market."

As well as the latest commercial offices, the overall development will create a vibrant, mixed-use site, comprising 1,000 new homes for up to 2,500 new residents, as well as a range of amenities, including parkland on both sides of the river. It will boost the number of people living and working in the heart of Sunderland, creating a stronger daytime and evening economy by doubling the resident population of the city centre from 2,500 to 5,000 and increasing employment by 50% to 18,000.

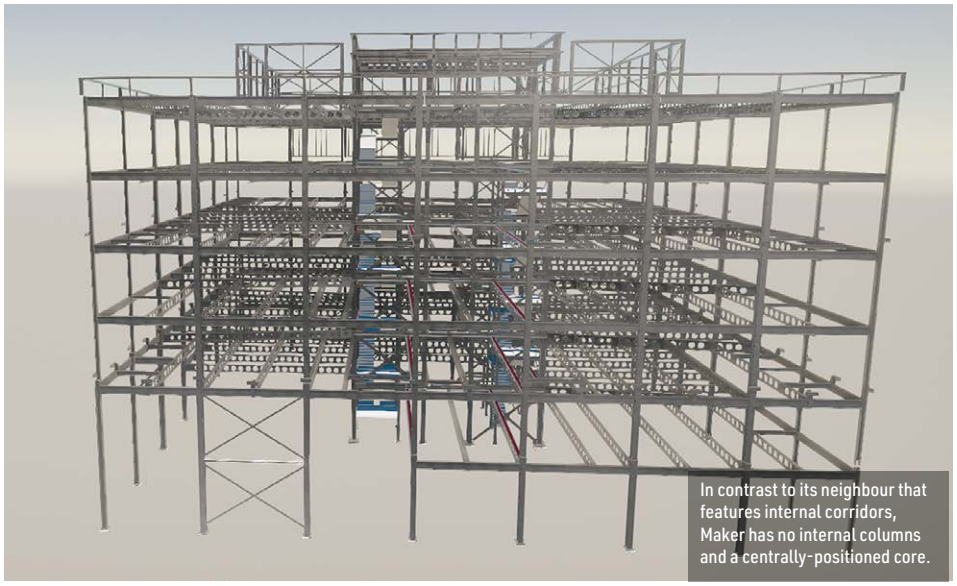
Comprising a steel tonnage of just over 1,600t, Elland Steel Structures (ESS), working on behalf of main contractor Sir Robert McAlpine, has fabricated, supplied and erected the steelwork for the two new office buildings.

As ground conditions are said to be good, both of the steel-framed structures are founded on pad foundations that bear on to the rock underlying the entire site.

The first structure to be erected was Maker, which is a six-storey building that will deliver 7,400m² of prime office space, while its neighbour, Faber, is five-storey structure with 6,500m² of

FACT FILE
Riverside Sunderland offices
Main Client: **Landid**
Architect: **Ryder Architecture**
Main contractor: **Sir Robert McAlpine**
Structural engineer: **Cundall**
Steelwork contractor: **Elland Steel Structures**
Steel tonnage: **1,600t**

Visualisation of the completed office blocks.



In contrast to its neighbour that features internal corridors, Maker has no internal columns and a centrally-positioned core.

The initial structure to be erected was the six-storey Maker office building.

space. The latter will be home to 400 staff from insurance group RSA, who announced its plans to move into Sunderland city centre a year ago.

ESS used two mobile cranes for the steel erection programme – the largest being a 100t-capacity unit - for both buildings.

"The heaviest steel sections were the building's columns, which weighed up to 4t each, while the longest elements were some of the internal beams that are 15m-long," explains ESS Commercial Director Jeremy Shorrocks.

According to the design team, which included structural engineer Cundall and Ryder Architecture, the reasoning for choosing a steel-framed solution for this scheme was based on the material's sustainability advantages and the fact that it provides a quicker construction programme compared to other framing methods.

Ryder Architecture's Project Architect Adam Fryett, says: "Maker and Faber, two steel-framed state-of-the-art office spaces at the heart of the Riverside Sunderland masterplan area, will play a significant role in rejuvenating an iconic, yet neglected site located in the city centre.

"This will enhance Sunderland's developing cityscape, providing a contemporary and vibrant new urban quarter on the historic banks of the River Wear."

As well as their different heights, each building has a distinct internal design, whereby Maker has no internal columns. A series of long-span Westok cellular beams connect the perimeter members to a centrally-positioned steel core, creating flexible column-free floorplates throughout.

In contrast, Faber has a design incorporating a central corridor on each office floor. The corridor requires internal columns and consequently the Westok beams that connect to the perimeter members on this building have a shorter span.

Kloeckner Metals UK Westok's Technical Advisory Engineer Tom Elliott comments: "We had specific beam depth limits and service integration constraints to facilitate, and for a variety of span and loading conditions across both blocks. Westok beams delivered the appropriate design solution. We continue to engage with clients, architects and engineers who are keen to exploit the sustainability benefits of a Westok ribbon-cut solution."

Creating a modern industrial-looking office environment in both buildings, all of the Westok beams and the services they accommodate within their depth, will be left exposed within the completed scheme.

Another common feature in both structures is how they gain their stability, as Cundall Engineer Samuel Mbatia explains: "Overall stability to the main frames is generally provided by utilising the concrete floor and roof plates as rigid diaphragms to transfer horizontal force to vertical steel bracing.

"The vertical bracing in Maker is generally limited to the central core area. The vertical bracing in the core of Faber is supplemented by vertical bracing in the shorter elevations."

The vertical bracing members in both buildings comprise a mix of flat and box sections.

Another architectural feature in both buildings are lower level set-backs, whereby entire elevations – two in Maker and one in Faber – are slightly inclined by 150mm from first floor level upwards.

A series of bespoke column and beam connections, that maintained the overall building stability, were designed by ESS to create these features.

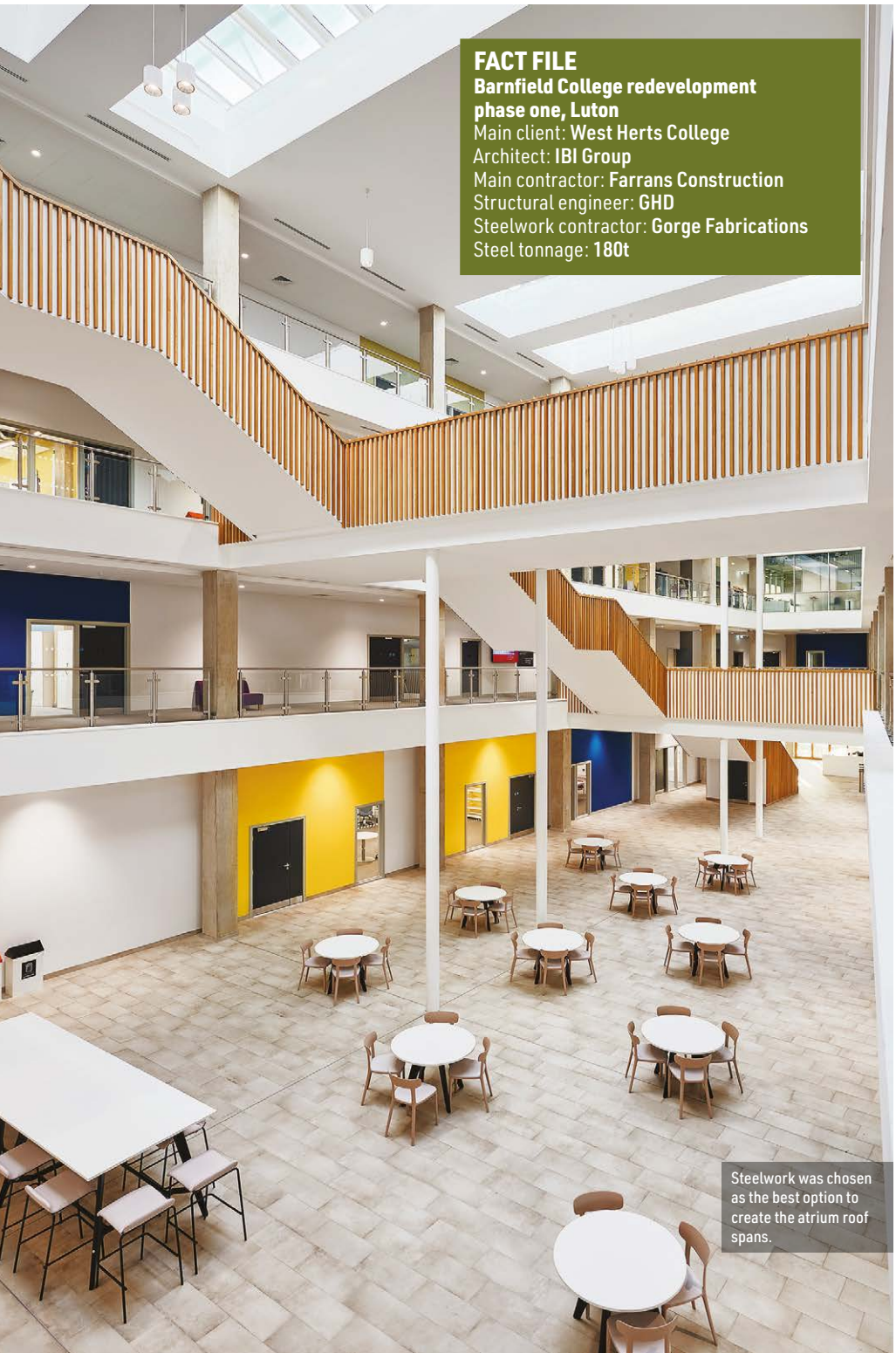
Summing up, Councillor Graeme Miller, Leader of Sunderland City Council, says: "There can be no doubt about the council's desire to transform the city centre at pace, working with partners who will raise the bar.

"As we start to see these buildings constructed, the level of ambition and determination of all partners involved is clear, and they will make their mark not only visibly, but in terms of the economic value they deliver during construction and when they welcome many hundreds of workers upon completion."

Maker and Faber are due to complete in 2024. ■

Steel highlights college redevelopment

A four-storey teaching block featuring some integral internal and external steelwork forms the initial phase of an ongoing redevelopment programme at Luton's Barnfield College.



FACT FILE
Barnfield College redevelopment phase one, Luton
Main client: **West Herts College**
Architect: **IBI Group**
Main contractor: **Farrans Construction**
Structural engineer: **GHD**
Steelwork contractor: **Gorge Fabrications**
Steel tonnage: **180t**

Steelwork was chosen as the best option to create the atrium roof spans.

Concluding phase one of a multi-million-pound redevelopment programme at Barnfield College in Luton, a new four-storey teaching block has recently been completed.

The new building offers 6,000m² of modern teaching facilities, which accommodate tuition for mainstream employment sectors and specialist skills in digital and engineering.

South East Midlands Local Enterprise Partnership (SEMLEP) provided part of the project funding as part of the Getting Building Fund (GBF) which aims to support the UK's economic recovery following the COVID-19 crisis. The programme funds local, ready to start infrastructure projects

The completed teaching block opened its doors to students during the 2022 Autumn term.


The assembled staircase represented the heaviest steelwork item on the project.

which will help local businesses, people and places to thrive.

Hilary Chipping, Chief Executive at SEMLEP says: "We are delighted to have supported such an exciting new facility that will be of real benefit to the people of Luton and the surrounding areas."

The teaching block has a hybrid design featuring a concrete frame with a steel exoskeleton attached to the perimeter façades. Inside the building, further steelwork has formed infill floors around the main central atrium, link bridges, a feature staircase and landings, as well as the atrium roof.

The decision for choosing steelwork elements for this project were numerous, as IBI Group Studio Associate Director Richard Mallinson, explains:


Prior to the staircase being lifted into place, one line of handrails were installed.

"The atrium, which is trapezoidal in shape, basically knits the two concrete wings together and has a 15m roof span at its widest point. Steelwork was the best option to achieve the spans, while also providing future flexibility, especially within the atrium roof."

The final point was important, as the design for the atrium's rooflights had not been finalised when main contractor Farrans Construction were appointed. By choosing a steelwork option for the roof, Farrans were able to choose from a number of different rooflight options, compared to a concrete roof, which would have been less flexible.

The new teaching block has been constructed on a plot previously occupied by the college car park. Consequently, one of the initial tasks for Farrans to undertake was to build a temporary car park on another part of the college's land.

"Once the plot had been made good we installed piled foundations before the two college wings were constructed," explains Farrans Construction Contracts Manager Rudi Moore.

"As the concrete works were nearing completion, Gorge Fabrications were able to begin the atrium steelwork installation. With a number of other trades to work around and coordinate with, the erection programme proved to be quick and efficient."

Farrans previously completed the Hemel Hempstead campus for West Herts College and the redevelopment of Barnfield College continued this relationship. Gorge Fabrications were also the steelwork contractor for that project, and consequently lessons learnt from that scheme were brought to the table on this job.

At Barnfield College, the atrium steelwork was erected using a combination of the onsite tower crane and one mobile crane.

Containing three flights of stairs and serving each floor from ground to third, the atrium's steel feature staircase was assembled onsite and lifted into place as a complete piece. It weighed 8.5t and was the heaviest single steel item to be installed.

Once the staircase was in place, the infill floors and landings, which are up 15m-wide, were erected along with three link bridges.

The three bridges, one on each of the upper floors, are up to 14m-long. They were erected in two pieces and have supporting columns positioned at midpoint.

Gorge Fabrications Construction Director Mark Coxill, says: "Towards the end of our work, and with the objective of programme acceleration, we had multiple gangs onsite working in parallel on the atrium roof steelwork and the exoskeleton."

The exoskeleton extends around two of the building's elevations (north and south), and has dimensions of 60m-long and 40m-high on both façades.

This exterior steelwork supports the architectural design and the building's cladding system. It consists of a series of ladder frames, assembled with two vertical channels tied together by horizontal members and then tied to the main concrete façade.

The ladder frames are positioned in every bay and support brickwork piers around the structure. The frames also support two horizontal bands of GRP

▸20

"The atrium, which is trapezoidal in shape, basically knits the two concrete wings together and has a 15m roof span at its widest point. Steelwork was the best option to achieve the spans, while also providing future flexibility, especially within the atrium roof."

▸19

cladding that extend around the entire building at first and third floor level.

Explaining why an exoskeleton was installed, Mr Mallinson says: "The cladding and the brickwork piers were considered to be too high to be self-supporting.

"However, steelwork was not our initial choice, but due to the after effects of the COVID-19 pandemic, it was the only material that was readily available."

The new teaching block was completed last Autumn and is now in use by teachers and pupils who decamped from an old existing building. This old structure will shortly be demolished as part of the second phase of the Barnfield College redevelopment, freeing up land for another new teaching block. A third phase, which includes the construction of a sports hall, is also planned.

Summing up, Gill Worgan, Principal and CEO of West Herts College said: "We are pleased to continue our relationship with Farrans having recently completed the redevelopment of a new Construction and Engineering Centre in Hemel Hempstead.

"The new Barnfield College campus building will play a fundamental role in enabling the delivery of a modern curriculum targeting local skills and labour market priorities.

"While on site this project created employment opportunities for local people and enabled young people to develop skills through a range of work experience opportunities." ■

The completed atrium and its feature staircase.

Coordination was key, as the steelwork erection for the atrium was completed in and around a number of other trades.

Steel Staircases

The dynamic performance of steel staircases, such as at Barnfield College, is an important design consideration. Callum Heavens of the SCI discusses how their assessment differs from that of floors.

The feature staircase in Barnfield College's new teaching block forms an integral means of moving occupants around the building. An important consideration for any staircase accessible by the public is its dynamic performance. Building users typically have an expectation of a solid, rigid structure and the slender forms of some staircases may present issues if not properly considered.

When examining the dynamic, or vibration, performance of a floor structure it is common to utilise the 'response factor' (RF) approach in which the vibration of the floor (measured in terms of accelerations) is compared against a base value of acceleration, defined as the value that is just perceptible to building users, to give a RF value. This RF value can then be compared with acceptability limits, established by standards, guidance or agreement with the client.

Exactly the same approach can be applied to staircases, but some important modifications to the parameters of the analysis must be made. People moving up or down stairs can be clearly seen to move differently compared with when they are walking along a flat floor. Typically, they will be moving more slowly when ascending the stairs and more quickly (potentially much more quickly) when descending the stairs. For walking on floors, SCI guidance recommends considering a walking pace frequency in the range of 1.8 Hz to 2.2 Hz; for staircases this is extended up to cover 1.2 Hz to 4.5 Hz – a significant increase.

Not only does the walking pace change, but the load applied with each footstep also increases when people ascend and descend a staircase. Design coefficients in SCI guidance suggest that the force applied by a person walking on a staircase can be double the force applied when that same person walks normally along a flat floor.

Although these more onerous parameters must be considered in determining the dynamic response of a staircase, the vibration acceptability criteria for staircases is often allowed to be much higher than would otherwise be permitted for a floor in the same structure. A response factor of eight might be appropriate for much of the Barnfield College structure (in line with a typical office), but – given that people wouldn't usually be expected to be working or studying on the stairs (not to mention being in motion themselves) – response factors as high as 24 or even 32 might be appropriate on the stairs (depending on anticipated levels of use).

Further guidance can be found in SCI publication P354, as well as AD 330 & AD 406. ■

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Erection for the signature raking steel façade nears completion.

Steel creates signature support centre

The construction sector and its supply chain have joined together to support the latest Maggie's centre in the grounds of the Royal Free Hospital in Hampstead, north London.

Known for their individual architectural form as well as the outstanding care they provide to people with cancer, the latest Maggie's cancer support centre features a bespoke raking curved façade, signature external fins and an enclosed rooftop garden and pavilion.

Being built at the Royal Free Hospital in north London, the two-storey building's undulating form, which on plan has been likened to a fan being opened or even butterfly wings, has been formed with a steel frame.

After considering all framing solutions, steelwork was chosen by the project's design team as the ideal material for the building's complex shape and the requirement to have a flexible open-plan interior.

The building will contain approximately 400m² of floor space and accommodate a range of services including a large kitchen, small private spaces, a larger space for exercise and group meetings, and reflection spaces. Many of these spaces will be divided by moveable partitions, creating the desired flexibility.

The building is redeveloping a former car park site at the back of the hospital and is cut approximately 5m into a steep bank that separates the plot from neighbouring properties. The ground floor area is constrained and to maximise the available space the structure fans out at the upper levels creating more area for the first floor and the roof garden.

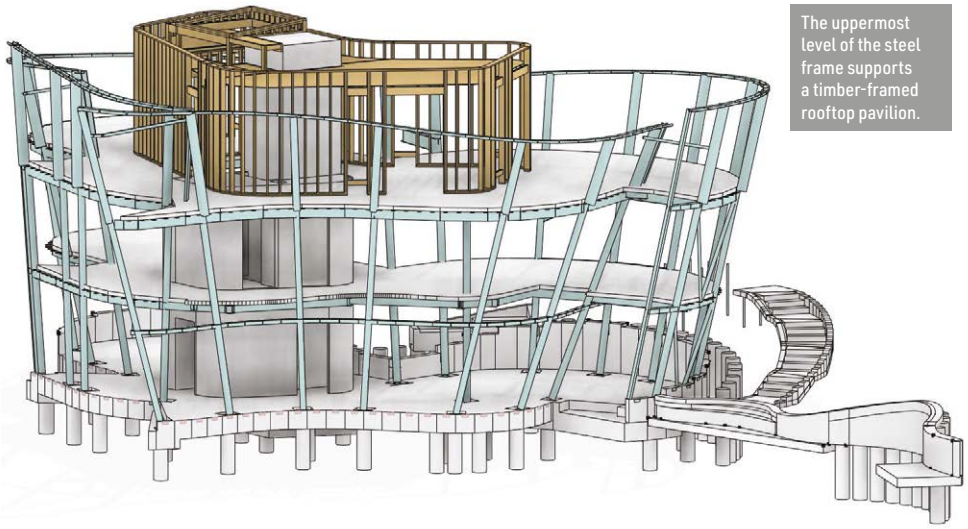
Visualisation of the completed Centre.

Working on behalf of Sir Robert McAlpine, who have been the main contractor for a number of Maggie's projects, William Hare has fabricated and erected the steel for the project.

All of the project team have supported the scheme in different ways, and this has extended to the supply chain. Approximately two-thirds of the steelwork used on this project has been donated by ArcelorMittal free of charge.

ArcelorMittal Technical Manager Neil Tilley

FACT FILE
Maggie's Cancer Support Centre, Royal Free Hospital, London
Main client: **Maggie's**
Architect: **Studio Libeskind**
Main contractor: **Sir Robert McAlpine**
Structural engineer: **Expedition Engineering**
Steelwork contractor: **William Hare**
Steel tonnage: **70t**



The uppermost level of the steel frame supports a timber-framed rooftop pavilion.

A steel-framed solution was chosen as the best option for creating the desired open-plan interior.

says: "We recognise the invaluable support Maggie's give to patients and families in such worrying times, we're very happy to support the great work they do."

The steel sections were supplied from ArcelorMittal's Differdange site in Luxembourg, which is an electric arc furnace (EAF) steelmaking plant, and is said to have saved approximately 90 tonnes of embodied carbon on this building.

The remaining one-third includes the main perimeter columns, which are Rectangular Hollow Sections (RHS). These members create the frame for the signature curving and raking façade, by leaning outwards by up to 35 degrees.

"The columns introduce a set of significant loadings as they try to pull out from the building. As the geometry is highly irregular and asymmetric, the building as a whole is being pulled and twisted, and these loads are taken back to the central core through the composite concrete deck system," says Expedition Engineering Associate Structural Engineer James Parker.

"Therefore, the building design introduces lateral loads similar to that on a 12-storey tower of the same footprint, but with greater stability required."

With only four internal columns – which are typically Circular Hollow Sections (CHS), chosen for their aesthetic value as they are the only steel members that will remain exposed – the majority of perimeter columns are connected directly to the building's main centrally-positioned concrete core, creating spans of up to 10m.

"We worked closely with Expedition to detail the building extensively in three dimensions, as every beam-to-column connection is unique," says William Hare Project Director Francisco Loureiro.

"An extensive amount of secondary bracketry had to be detailed to perfectly match the complex curved shape of the building, as it was important that no items such as bolts penetrated the façade."

As the perimeter columns are raking, and unstable until the building is complete, temporary bracing had to be installed within the steel frame, which will be removed once the floors have been cast and the structure reaches its permanent strength.

This temporary stability requirement presented a complex challenge and, using 3D modelling, William Hare developed a 40-step temporary works sequence to allow the building to be safely erected with a minimum of temporary works.

The latter point being an important criterion as too much temporary steelwork would have impeded the follow-on trades on this constrained site.

The northern part of the structure features an open double-height space for the entrance foyer, which will accommodate one of two steel staircases on the project, the other being an emergency exit located along the rear elevation.

Adjacent to the foyer, the building façade juts outwards to form one of its two feature fins. The main façade begins again 5m inside of the fin's finishing tip, with the area in between infilled with glazing.

The uppermost part of the project, consisting of the rooftop garden and timber-framed pavilion, is surrounded by a 2m-high wall that provides the space with some privacy.

The parapet frame is formed with stub members that are bolted to the top of the main steel columns, in readiness for the cladding. The top of wall has an undulating form and this is created by the parapet, which came to site as a series of prefabricated and welded sections, made from individual 800mm-long facetted channel sections, which were then bolted together onsite to form the entire rooftop surround.

Maggie's is a national charity which provides support to people with cancer, their families and friends. Maggie's centres are built in the grounds of specialist NHS cancer hospitals and offer social, emotional and practical help to anyone living with cancer.

The centre is scheduled to be open in April. ■

Use of fibre-reinforced concrete in composite slabs (part 1)

Recent years have seen increasing interest in replacing the reinforcement mesh with steel fibres in composite slabs on steel decking. In this first of two articles, Constantinos Kyprianou, Principal Engineer at the Steel Construction Institute, provides an overview of the characteristics of the different types of fibres that can be mixed in concrete. Most of the information provided here has been gathered from publications by the Concrete Society [1].

Introduction

The use of fibres within the concrete mix, and in particular steel fibres, is not a new technology. The concept has been in existence for many years, while the first patent was granted in 1874[1]. Despite this, commercial use only took off in the 1970s, mainly in Europe, USA and Japan. Although fibre manufacturers have been producing guidelines for the design of pile and ground-supported floors over a number of years, an agreed design approach for steel-fibre-reinforced-concrete (SFRC) was published for the first time in 2003 by RILEM[2]. This design method[2] provides a methodology for determining the material properties of SFRC, a design approach for bending and shear at ultimate limit states and crack control rules for the serviceability limit states. This method was adopted and published in 2007 as guidance in TR34[3] and TR63[4] by the Concrete Society. Design of steel-fibre-reinforced concrete is not currently covered by design standards including the Eurocodes, where the only reinforcement considered is conventional steel bars or mesh.

According to the Concrete Society[1], in the UK, several millions of square metres of steel-fibre reinforced slabs for ground-supported and pile-supported applications have been constructed over the past decade. Precast elements and suspended composite slabs on steel decking are some of the other potential applications for fibre-reinforced concrete. For composite slabs with steel fibres the same methodology as in [2,3,4] for determining the material properties of SFRC is followed, while many of the concepts in the design approach are also adopted. However, some distinctions in design philosophy exist. For example, in the design of composite slabs at normal ultimate limit state the presence of fibres is typically (and conservatively) ignored. For the accidental fire limit state, the presence of fibres is, however, recognised and considered in enhancing the bending capacity of the slab at elevated temperatures. As such, fibres can play a critical role in the behaviour of a composite slab since not only do they control cracking but also provide an alternative to mesh reinforcement in the fire situation. Before jumping into more detailed technicalities of composite slab design with fibres, which will be reported in the second article, the different types of fibre and their associated characteristics should be defined.

Types of fibre

Three main types of fibre may be used in a concrete mix: steel fibres, macro-synthetic and micro-synthetic polymer fibres. In Figure 1 typical forms for each of these three main types of fibre are illustrated with photos of similar scale to allow comparison in shape and size. In accordance with BS EN 14889[5], steel fibres and macro-synthetic fibres provide post-cracking or residual moment capacity to concrete and as such can be used in the design of elements under flexure, whereas micro-synthetic fibres do not provide any post-cracking ductility and as such cannot be considered in structural design.

The required fibre dosage, specified in kg/m³, will vary depending on the type of application, concrete mix design and the performance requirements of each particular project. The main characteristics of the three types of fibre are described in the following sections.

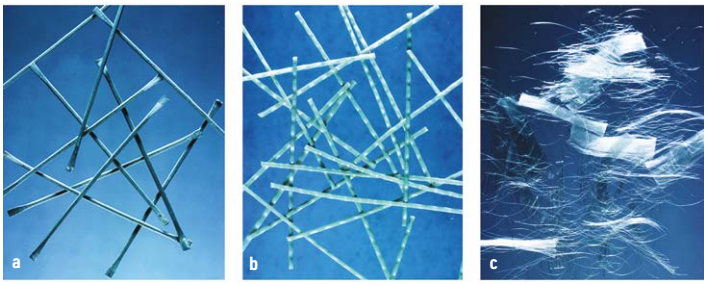


Figure 1: Various types of fibres: (a) steel fibres, (b) macro-synthetic fibres and (c) micro-synthetic fibres. Images from [1]

Steel fibres

For composite slab applications, steel fibre dosage will typically be in the range of 20 kg to 40 kg/m³.

As per BS EN 14889[5], steel fibres can be classified into five groups, according to the method of manufacture, as follows:

- Group I: Cold-drawn wire
- Group II: Cut sheet
- Group III: Melt extracted
- Group IV: Shaved cold drawn wire
- Group V: Milled from blocks

Other common methods of characterisation, which describe shape, geometry and strength are:

- Cross-section: Round, flat, crescent, etc.
- Deformations: Straight, wavy, hook-end, double hook-end, etc.
- Length: 19 – 60 mm
- Aspect Ratio (length/diameter): 30 – 100
- Young's modulus: 205 kN/mm²
- Tensile strength: 345 – 1700 N/mm²

Currently, fibre manufacturers produce steel fibres with diameters ranging between 0.5 mm and 1.0 mm and the most common lengths are between 35 mm and 60 mm; typical examples are shown in Figure 1 (a). Nowadays, the usual tensile strength range is between 1100 N/mm² and 1500 N/mm², but some examples of high-performance fibres report strengths of up to 2300 N/mm². Some of their physical characteristics directly affect key aspects of performance, such as the residual flexural tensile strength of steel-fibre-reinforced-concrete, while others are less important. A requirement set by BS EN 14889-Part 1[5] is for the supplier to declare the respective dosage in kg/m³ which achieves a residual flexural strength of at least 1.5 MPa at CMOD (crack mouth opening displacement) 0.5 mm and a residual flexural strength of at least 1 MPa at CMOD 3.0 mm, when tested in accordance with the standard notched beam test. Further information on the use of steel fibres can be found in TR34[3] and TR63[4]. ▸26

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- 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.

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Closing date for entries: Friday 24th February 2023

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▸24

Macro-synthetic fibres

Macro-synthetic fibres, illustrated in Figure 1 (b), are usually made from a blend of polymers and were originally developed to provide an alternative to steel fibres in some applications. They generally have a reasonable tensile strength (about 600 N/mm²) and a relatively high modulus of elasticity (about 10 kN/mm²), but when compared with the most modern high strength steel fibres they are lacking.

The properties of the fibres are covered by BS EN 14889-Part 2[5] and they have the same requirements for demonstrating residual strength as steel fibres. In addition, the manufacturer should demonstrate that the fibres are unaffected by the alkalis in the cement paste, and are resistant to moisture and to the substances present in air-entraining and chemical admixtures. They must also be resistant to chlorides when used in marine structures or those subjected to de-icing salts. Also, the effects of long-term creep of macro-synthetic fibres are thought to be significant and need to be considered. Further information on the use of macro-synthetic fibres may be found in TR65[6].

Micro-synthetic fibres

Micro-synthetic fibres are various types of short, thin and chopped polypropylene fibres, as shown in Figure 1 (c). Typically, they may be added to concrete at a rate of about 0.9 kg/m³ and they can be used along with steel-fibres. Their primary role is to modify the properties of fresh concrete. They increase the homogeneity of the mix, stabilising the movement of solid particles and blocking bleed water channels. This reduces the bleed capacity of the concrete and slows down the bleed rate, helping to reduce plastic settlement. Polypropylene fibres have a limited effect on the material properties of the hardened concrete and as such are not considered in design. They have been shown to reduce the spalling of concrete in a fire. One note of caution is that their use can reduce the slump of concrete as they act as a thickening agent.

Material properties of fibre-reinforced concrete

The effect of the fibres on the strength of the concrete is determined in accordance with BS EN 14845[7] using a standard notched beam test described in BS EN 14651[8]. Specimens 150 mm-wide × 150 mm-deep are tested under 3-point loading over a span of 500 mm. The specimens are notched with a 25-mm deep cut across their width at mid-length, and then tested with the notch in the tension face, as shown in Figure 2. A test set consists of at least 12 nominally identical samples, i.e. same dosage and compressive strength of concrete.

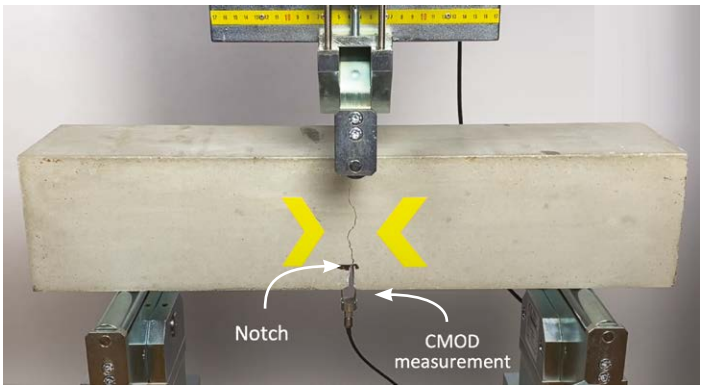

Figure 2: Notched beam tests in accordance with BS EN 14651. Images from [9]

The crack mouth opening displacement (CMOD) (i.e. the increase in width of the notch) and the load F are recorded at CMODs of 0.5, 1.5, 2.5 and 3.5 mm. A typical graph of applied load F_R against CMOD is shown in Figure 3.

Maximum applied load (F_L) is achieved at the point just before the

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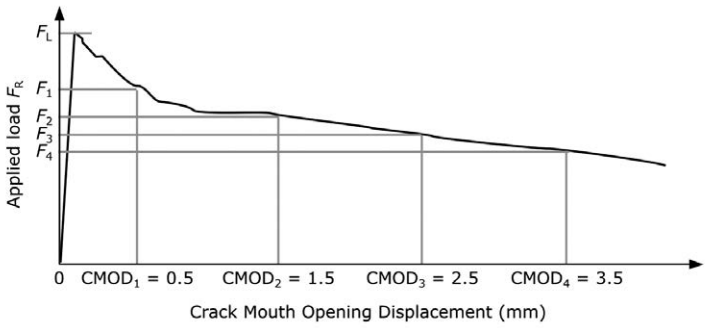

Figure 3: Typical load - CMOD curve for a beam notched test. Graph adapted from [3]

concrete beam cracks. Typically, the capacity of the section reduces as strain and crack width increases, but certain combinations of fibre type and dosage can exhibit strain hardening behaviour. Strain hardening is identified in a notched beam test when F_1 is equal to or greater than F_L and F_4 is greater than F_1.

Residual flexural strength f_R in N/mm² is derived using the following equation[2,3]:

$$f_R = \frac{3F_R l}{2bh_{sp}^2}$$

where:

F_R is the applied load at the respective CMOD stage,
i.e. for $CMOD_1$ this is F_1,
l is the span of 500 mm,
b is the width of 150 mm and
h_{sp} is the depth of the section at the notch, i.e. 150 – 25 = 125 mm.

The residual strengths f_{R1}, f_{R2}, f_{R3} and f_{R4} for each CMOD are reported as the mean values from all 12 tests of a set with the same dosage. Tests should cover the whole range of fibre dosages to be used. Interpolation between results for different dosages can be made, but not extrapolation. Also, the range between test results when interpolation is made should not be greater than 10 kg/m³[3].

Commentary

This article has reviewed the characteristics of the main type of fibres and the established test method to determine the material properties of fibre-reinforced concrete. In the second part of this two-part article, design and construction considerations will be explored. ■

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9. Matest SpA. Accessed 10/11/2022, CMOD test *www.youtube.com/watch?v=wlBFZw_bryE*

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AD 497:
NHSS 20 - SHW Series 1800 Certification Requirements

BCSA has been made aware of a number of steelwork contractors, who intend working on schemes where the National Highways Specification Series 1800 for structural steelwork applies, who are confused over the certifications that are relevant to Series 1800 requirements. The National Highways Specification Series 1800 is available at *www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/series_1800.pdf* .

In particular there is some misunderstanding over the certification requirements relating to the Register of Qualified Steelwork Contractors (RQSC) bridgeworks register and National Highways Sector Scheme 20 (NHSS 20). Some contractors believe that RQSC bridgeworks register certification (Series 1800, Cl 1800.4, 1) and NHSS 20 certification (Series 1800, Cl 1800.5.1, 1) are equivalent, and that only one is required to meet Series 1800 requirements.

This is not correct as the two relate to demonstrating different attributes of a contractor. Both certifications are necessary should a contractor choose to use these as a means of demonstrating compliance with the relevant Series 1800 requirements.

RQSC bridgeworks register certification demonstrates a contractor's general technical capability and competence to undertake the specific works required for a contract.

NHSS 20 certification demonstrates that a contractor operates an independently certified quality management system complying with BS EN ISO 9001 that is relevant to the execution of structural steelwork.

There are other certification requirements that are described in Series 1800 that a contractor should have in place and are described in the schedule below.

The schedule is primarily intended as a reference for contractors and for those supervising contracts, to help understand the various certifications that are required by Series 1800. The schedule will also help:

- auditors understand the Series 1800 certification related requirements when auditing contractors for NHSS 20, and
- in answering any queries relating to these requirements that may be raised with the auditors by contractors.

Contact: **Pete Walker**
Email: **pete.walker@steelconstruction.org**

Certification Requirement	Source of Certification Requirement	Reason for Certification Requirement	Evidence Required to Demonstrate Compliance with the Certification Requirement	Notes
Registration to the Register of Qualified Steelwork Contractors (RQSC) Scheme for Bridgeworks or equivalent.	Series 1800 Clause 1800.4, 1	To demonstrate a constructor's general technical capability and competence for the type and value of work to be undertaken, to satisfy a general assumption in BS EN 1990:2002+A1:2005.	Registration to the RQSC Scheme for Bridgeworks, or equivalent registration or equivalent evidence of technical capability and competence.	Details of the RQSC Scheme and the RQSC Scheme bridgeworks register can be found at: *www.steelconstruction.org/member-directories/*
Registration to National Highway Sector Scheme 20 (NHSS 20) or equivalent independently certified quality management system complying with ISO 9001	Series 1800 Clause 1800.5.1, 1	To demonstrate that a constructor has an independently certified quality management system complying with BS EN ISO 9001, to satisfy a requirement relating to quality management measures in BS EN 1990:2002+A1:2005.	Certificate of registration to NHSS 20 issued by a Certification Body registered for NHSS 20 and company listing for NHSS 20 on the UKAS CertCheck website, or evidence of independently certified quality management system equivalent to NHSS 20.	The UKAS CertCheck web site can be found at: *www.certcheck.ukas.com*
Certified Welding Quality Management System.	NHSS 20 Clause 8.5.1 (iii); Series 1800 Clause 1807.1	To demonstrate that a constructor is undertaking welding in accordance with the relevant part of BS EN ISO 3834, as required by BS EN 1090-2, Clause 7.1.	Valid BS EN ISO 3834 certificate issued by a Certification Body registered for BS EN ISO 3834.	BS EN ISO 3834-3:2005 certification required for Execution Class 2. BS EN ISO 3834-2:2005 certification required for Execution Classes 3 and 4.
Certificate of Competence in Pre-loaded Bolting (required where pre-loaded bolting is not excluded as an activity in the constructor's NHSS 20 registration).	NHSS 20 Appendix C	To demonstrate that a constructor has a Level 3 Bolting Co-ordinator in place **and** has a bolting quality management system in place which includes training for bolting inspectors and bolting practitioners.	Level 3 Bolting Co-ordinator Certificate of Technical Knowledge, **and** a company Certificate of Competence in Pre-loaded Bolting.	Details of the BCSA training and certification for bolting competency can be found at: *www.steelconstruction.org/resources*

Acronyms:

BCSA: British Constructional Steelwork Association
MCHW: Manual of Contract Documents for Highway Works
NHSS 20: National Highway Sector Scheme 20 - The Execution of Steelwork in Transportation Infrastructure Assets
RQSC: Register of Qualified Steelwork Contractors

Notes:

1. MCHW Series 1800 and NHSS 20 Appendix C have requirements for the qualification of personnel employed by a constructor undertaking specific execution activities.
2. For constructors who undertake the corrosion protection of steelwork, MCHW Series 1900 (Protection of steelwork against corrosion) requires that they are registered to National Highway Sector Scheme 19A – Corrosion protection of ferrous materials by industrial coatings.

New and revised codes and standards

From BSI Updates November and December 2022

BS EN PUBLICATIONS

BS EN ISO 1461:2022
Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
supersedes BS EN ISO 1461:2009

BS EN ISO 17636-2:2022
Non-destructive testing of welds. Radiographic testing. X- and gamma-ray techniques with digital detectors
supersedes BS EN ISO 17636-2:2013

CORRIGENDA TO BRITISH STANDARDS

BS EN ISO 11125-9:2022
Preparation of steel substrates before application of paints and related products. Test methods for metallic blast-cleaning abrasives. Wear testing and performance
Corrigendum, October 2022

UPDATED BRITISH STANDARDS

BS EN 13830:2015+A1:2020
Curtain walling. Product standard
Corrigendum, September 2022; Amendment, June 2020

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN ISO 6507-3:2018
Metallic materials. Vickers hardness test. Calibration of reference blocks

BS EN ISO 9934-1:2016
Non-destructive testing. Magnetic particle testing. General principles

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

NEW WORK STARTED

EN ISO 8501-3
Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Preparation grades of welds, edges and other areas with surface imperfections
will supersede None

EN 17931
Gas welding equipment. Manual gas equipment for welding, heating and cutting. Periodic Inspection
will supersede None

ISO 16521
Design standard for concrete-filled steel tubular (CFST) hybrid structures
will supersede None

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

22/30454322 DC
BS EN 1090-2 A1 Execution of steel structures and aluminium structures. Technical requirements for steel structures
Comments for the above document were required by 22 November, 2022

CEN EUROPEAN STANDARDS

EN 1993-1-1:2022
Design of steel structures. General rules and rules for buildings

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STEEL for life

FROM
Building with Steel
February 1973

Middlewich is in an area subject to severe settlement caused by the salt workings. This Sevice Building had to be designed to accept the settlement therefore and the solution to the problems this presented are outlined in this article by Mr J.E.C. Farebrother of the consulting engineers.

The new Service Building for Messrs E.R.F. Limited, who manufacture heavy commercial vehicles, is located at Middlewich, Cheshire, approximately four miles from the company's main office and works at Sandbach. The Middlewich area is subject to settlement from brine pumping. The operation of brine pumping causes runs to form which can cause severe settlement within the area of the run. It is impossible to say where or when a run is likely to form or indeed if a run will be formed at all. After carefully considering all factors, it was decided it would be prudent to take reasonable precautions within the building on the assumption that a run may form under any part of the building. The degree of settlement likely is difficult to predict, but if settlement did occur it would in all probability, occur in a narrow band. Settlement, if it takes place, is likely to be in the order of 9in in twelve months.

The building complex consists of three main areas:

- The service/store bays, consisting of two 230ft long bays each of 100ft span, with provision for extension at the gable end of the building. Each bay is designed to carry two cranes of 2-ton or 5-ton capacity without intermediate supports.
- The ancillary area, including lubrication bays, etc.
- The office block and administration area.

The site contained a number of old bases, pits and brine-settlement tanks which had to be removed before construction could start. A number of trial pits were dug and indicated 4ft of firm clay below the top soil. Water-bearing sand was found below the clay.

The office block is located partly over the old brine-settlement tank foundation, but luckily the majority of the other obstructions were away from the main stanchion foundations.

After considering the implications of the possibility of brine settlement and the ground conditions the following decisions were made:-

- To design the structure of the main service area to accommodate differential settlements of 9in in 100ft with provision for jacking the stanchions back to their original position.
- To hang the crane rails from the underside of the main roof trusses.
- To drain the roof to both sides of the building away from the central support, to reduce the problem of backfall should settlement take place. Sufficient fall to be provided to accommodate likely settlement.
- To found the main building foundation within the clay strata to avoid problems associated with building in water-bearing sand.

Foundations to the service area were designed as isolated bases with the stanchion base-plates supported on plinths above ground-floor level, to facilitate access to the holding-down bolts for adjustment and jacking.

The ancillary buildings and office block were built on partial raft foundations of a fairly simple type capable of spanning 25ft or cantilevering 15ft should settlement occur.

Galbestos cladding was decided upon for walls and roof. It was known that sheeting at a salt works approximately half a mile from the site had corroded badly due to salt in the atmosphere, but in view of the distance of the new site from the works and the direction of the prevailing wind it was decided that the intensity of salt would not be sufficient to cause trouble.

Eight-foot-high brick impact walls are carried on mass strip foundations between the main stanchion bases with expansion joints at each of the main stanchion positions and brick reinforcement in the top course to reduce the amount of damage likely to occur if settlement takes place.

In view of the very short contract time, it was decided to use a steel frame throughout with precast floors to the office block and to the mezzanine floor of the service area.

A number of inspection pits were required within the service area. These were built of reinforced concrete to CP 2007 in view of the ground water conditions.

The ground slab within the stores area was designed as a series of adjacent road slabs having longitudinal fabric with dowell bars connecting one strip to the next. Alternate strips were cast first followed by the intermediate strips which were screeded off smooth to facilitate the use of stackertrucks. The same system could not be used within the service area owing to the layout of the pits. The slab was therefore cast in the normal way using a square fabric.

Main service and stores building

The main roof members have been designed as lattice girders with a fall from the centre row of stanchions to the outside. The girders have been designed to carry two 2-ton or 5-ton cranes. The position can be varied on the truss providing they are picked up at the node points. Cranes have only been installed in the service area at present.

In order to allow for differential movement, all connections are articulated, except for the feet of the central stanchions, which have been fixed. A similar provision has been made longitudinally, except that two stanchions have been linked

together on one base to provide a strong point to which the other members are linked. Rubber bridge bearing pads have been incorporated at each of the pin joints to allow for the anticipated rotation.

In the event of subsidence taking place, those stanchions which have settled will be jacked back to level on the extended bolts provided. If settlement of the fixed points occurs these will be jacked level and re-plumbed.

Some superficial damage may occur to the horizontal diagonal bracing during settlement, but the cost of replacement of the damaged members will be negligible compared with the cost of incorporating a complex arrangement to accommodate the movement. Settlement will be slow and is most likely to show up in the first instance through difficulties in operating the cranes. The cost of providing the precautions mentioned above was estimated to be approximately 5 per cent of the cost of the frame.

Offices

The offices are of two-storey-high construction with provision for a further storey to be added later. In view of the very short contract period, it was decided to use a steel frame with precast concrete floor units. A brick construction was required. It was decided to carry the building on a raft foundation. In order to reduce the effects of settlement, the building has been split into four units by 2in wide expansion joints and the foundations to each section have been designed as an independent raft.

Part of the foundations have been carried on to the existing brine settlement tank floor. As this slab had carried approximately 1 Oft of slurry for a number of years, it was considered that it should be capable of carrying the load from spread foundations. The edge of the tank determined the first expansion joint due to the risk of differential settlement.

General

The building which was opened by the Minister of Transport, in November 1971, used 420 tons of structural and 90 tons high tensile and mild steel reinforcement. The total value of the contract was £420,000, and the whole of the project was designed and built in twelve months, from receipt of clients instructions. The actual work on site took nine months.

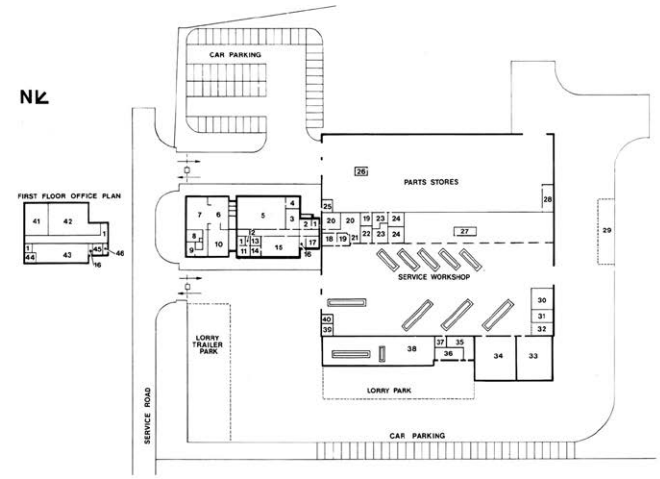
Architect: Messrs Mason and Richards & Partners

Consulting Engineer: Messrs J. E. C. Farebrother & Partners

General Contractor: Messrs S. W. Clarke (Contractors) Limited

Steelwork Supplier: Messrs Wilfred Robbins Limited

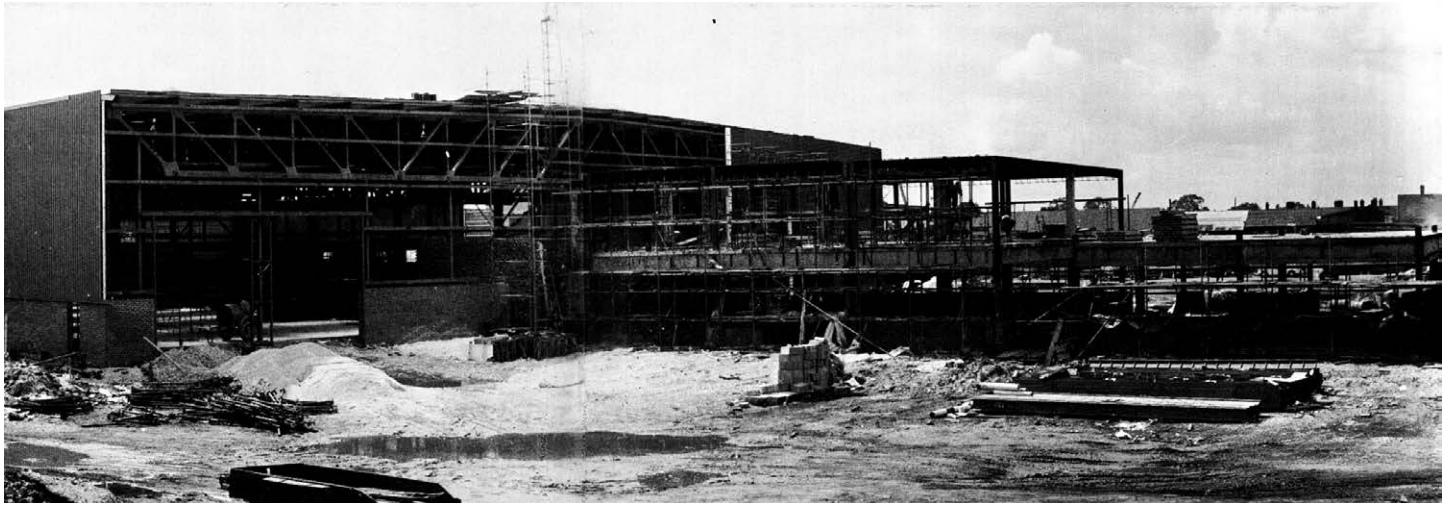
Rubber bearing pads supplied by: Messrs P.S.C. Equipment Limited



1 Stairs. Ground to First Floor (See Inset*)
2 Telephone Equipment
3 Visitors Reception
4 Parts Manager
5 Parts General Office
6 Kitchen
7 Works Dining Room
8 Drivers Waiting Room
9 Security Office
10 Staff Dining Room
11 General Service Manager
12 Secretary
13 Conference Room
14 Repairs Manager
15 Repairs General Office
16 Cloakroom
17 Toilet
18 Vehicle Reception
19 Foreman/Chargehands
20 Parts Sales
21 Parts Issue to Repair Area
22 Tools/Kit Store
23 Male Toilets
24 Locker Rooms
25 Boiler House
26 Despatch Office
27 Fuel Injection Test & Service
28 Goods Inward and Returns Offices
29 Vehicle Wash Area
30 Component Security Area
31 Vehicle Electricians
32 Welding Bay
33 Lubrication Bay
34 Body Repairs Shop
35 Compressor House
36 Sub Station
37 Switch Gear
38 Test Preparation Bay
39 First Aid
40 Methods Engineer
41 Technical Literature Store
42 Technical Services Office
43 Claims and Administration Office
44 Assistant General Service Manager
45 Female Toilet
46 Storeroom


The building in use. Note that it is light and airy and has steel storage systems.


The welded main girders



Steelwork contractors for buildings

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland. Details of BCSA membership and services can be obtained from

Lorraine MacKinder, Membership Manager
The British Constructional Steelwork Association Limited, Unit 4 Hayfield Business Park, Field Lane, Auckley, Doncaster DN9 3FL
Tel: 020 7747 8121 Email: *lorraine.mackinder@steelconstruction.org*

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

- **C** Heavy industrial platework for plant structures, bunkers, hoppers, silos etc
- **D** High rise buildings (offices etc over 15 storeys)
- **E** Large span portals (over 30m)
- **F** Medium/small span portals (up to 30m) and low rise buildings (up to 4 storeys)
- **G** Medium rise buildings (from 5 to 15 storeys)
- **H** Large span trusswork (over 20m)
- **J** Tubular steelwork where tubular construction forms a major part of the structure
- **K** Towers and masts
- **L** Architectural steelwork for staircases, balconies, canopies etc
- **M** Frames for machinery, supports for plant and conveyors
- **N** Large grandstands and stadia (over 5000 persons)
- **Q** Specialist fabrication services (eg bending, cellular/castellated beams, plate girders)
- **R** Refurbishment
- **S** Lighter fabrications including fire escapes, ladders and catwalks

FPC Factory Production Control certification to BS EN 1090-1
1 – Execution Class 1 2 – Execution Class 2
3 – Execution Class 3 4 – Execution Class 4

BIM BIM Level 2 assessed

QM Quality management certification to ISO 9001

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●		✔	2			Up to £3,000,000
Adey Steel Ltd	01509 556677	●		●	●	●	●	●	●	●	●			●	●	✔	3		●	Up to £3,000,000
Adstone Construction Ltd	01905 794561			●	●	●	●							●		✔	2	✔	●	Up to £3,000,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●		●		●	●	●			●	●	✔	4		●	Up to £3,000,000
Angle Ring Company Ltd	0121 557 7241												●			✔	4			Up to £1,400,000*
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2		●	Up to £1,400,000
Arromax Structures Ltd	01623 747466			●	●	●	●	●	●	●	●				●		2			Up to £800,000
ASME Engineering Ltd	020 8966 7150			●	●	●		●		●	●			●	●	✔	4		●	Up to £4,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●			●	●			●	●	✔	2			Up to £1,400,000
B D Structures Ltd	01942 817770			●	●	●	●				●	●		●	●	✔	2	✔	●	Up to £1,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●			●	✔	4	✔	●	Up to £1,400,000
Barnshaw Section Benders Ltd	0121 557 8261												●			✔	4			Up to £1,400,000
BHC Ltd	01555 840006	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £6,000,000
Billington Structures Ltd	01226 340666	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Border Steelwork Structures Ltd	01228 548744			●	●	●	●			●	●				●		4			Up to £3,000,000
Bourne Group Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●		●	●	●	✔	4		●	Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●						●	✔	4		●	Up to £6,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £6,000,000
Cementation Fabrications	0300 105 0135	●			●		●	●	●	●	●		●	●	●	✔	3		●	Up to £6,000,000
CMF Ltd	020 8844 0940				●		●	●		●	●				●	✔	4			Up to £6,000,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●		●	●	●			●	●	✔	4			Up to £1,400,000
D H Structures Ltd	01785 246269			●	●		●				●						2			Up to £200,000
D Hughes Welding & Fabrication Ltd	01248 421104				●	●	●	●	●	●	●		●	●	●	✔	4			Up to £800,000
Duggan Steel	00 353 29 70072	●	●	●	●	●	●	●	●		●				●	✔	4			Up to £6,000,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●	●	●	●	●			●	●	✔	4		●	Up to £3,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●	●	✔	4	✔	●	Above £6,000,000
EvadX Ltd	01745 336413		●	●	●	●	●	●		●	●	●			●	✔	3		●	Up to £4,000,000
Four Bay Structures Ltd	01603 758141			●	●	●	●	●		●	●			●	●		2			Up to £1,400,000
Four-Tees Engineers Ltd	01489 885899	●			●		●	●	●	●	●		●	●	●	✔	3		●	Up to £2,000,000
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●	●	✔	3			Up to £1,400,000
G.R. Carr (Essex) Ltd	01286 535501	●		●	●			●			●			●	●	✔	4			Up to £800,000
Company name	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**FPC**	**BIM**	**SCM**	Guide Contract Value (1)

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
H Young Structures Ltd	01953 601881			●	●	●	●	●			●			●	●	✔	4	✔	●	Up to £3,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✔	4			Up to £4,000,000
HBE Services Ltd	01525 854110				●	●				●				●	●	✔	2			Up to £800,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			Up to £3,000,000
Hillcrest Structural Steel Ltd	023 8064 1373			●	●	●	●	●		●	●			●	●	✔	3		●	Up to £3,000,000
Intersteels Ltd	01322 337766	●			●	●	●	●	●	●			●	●	●	✔	3	✔		Up to £3,000,000
J & A Plant Ltd	01942 713511				●	●									●		4			Up to £40,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●				●	●					4			Up to £6,000,000*
Kiernan Structural Steel Ltd	00 353 43 334 1445	●		●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4		●	Up to £6,000,000
Leach Structural Steelwork Ltd	01995 642000			●	●	●	●	●			●					✔	2		●	Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●				●	●	●			●	●		2			Up to £800,000
Littleton Steel Ltd	01275 333431				●					●	●			●	●	✔	3			Up to £1,400,000
Loaninghill Fabrications Ltd	01506 858466				●				●	●	●			●	●		3			Up to £400,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●			●	●	✔	4		●	Up to £1,400,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		3			Up to £2,000,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✔	4			Up to £1,400,000
Maldon Marine Ltd	01621 859000				●	●			●	●	●				●	✔	3			Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●			●		●	●	●		●				●	✔	4			Up to £2,000,000
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●			●	●				✔	4		●	Up to £2,000,000
North Lincs Structures	01724 855512			●	●					●	●				●		2			Up to £400,000
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	Up to £6,000,000
Painter Brothers Ltd	01432 374400	●			●				●	●	●				●	✔	3			Up to £6,000,000*
Peter Marshall (Steel Stairs) Ltd	0113 307 6730				●	●				●	●				●	✔	3			Up to £2,000,000
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £1,400,000
REIDsteel	01202 483333			●	●	●	●	●	●	●	●	●	●		●	✔	4		●	Up to £6,000,000
SAH Luton Ltd	01582 805741			●	●	●				●	●			●	●		2			Up to £400,000
S H Structures Ltd	01977 681931	●		●	●	●	●	●	●	●	●	●	●		●	✔	4	✔	●	Up to £3,000,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●			●	●			●	●	✔	4			Up to £2,000,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Severfield Infrastructure Ltd	01377 271843	●		●	●	●		●	●	●	●			●		✔	4			Up to £6,000,000
Severfield Nuclear and Infrastructure Limited	01204 528393	●		●	●	●	●	●	●		●					✔	4			Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499	●		●	●		●			●				●	●	✔	3			Up to £800,000
Shipley Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●	✔	2			Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✔		Up to £2,000,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £1,400,000
Steel & Roofing Systems	00 353 56 444 1855	●		●	●	●	●				●	●		●	●	✔	4			Up to £4,000,000
Taziker Industrial Ltd	01204 468080	●		●	●		●	●		●	●		●	●	●	✔	3		●	Above £6,000,000
Temple Mill Fabrications Ltd	01623 741720			●	●					●	●				●	✔	2			Up to £400,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●			2	✔		Up to £2,000,000
W I G Engineering Ltd	01869 320515				●					●	●			●	●	✔	2		●	Up to £400,000
Walter Watson Ltd	028 4377 8711			●	●	●	●	●				●				✔	4			Above £6,000,000
Westbury Park Engineering Ltd	01373 825500	●		●	●	●	●	●	●	●	●				●	✔	4		●	Up to £800,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Company name	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**FPC**	**BIM**	**SCM**	Guide Contract Value (1)

Steelwork contractors for bridgeworks

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

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

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

Notes

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

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

BCSA steelwork contractor member	Tel	FB	CF	SG	PG	TW	BA	CM	MB	SRF	FRF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
Adey Steel Ltd	01509 556677	●		●	●	●	●				●	●	✓	3			✓	●	Up to £3,000,000
AJ Engineering & Construction Services Ltd	01309 671919	●			●	●	●	●	●	●	●	●	✓	4				●	Up to £3,000,000
Billington Structures Ltd	01226 340666	●		●	●	●	●					●	✓	4	✓	✓	✓	●	Above £6,000,000
Bourne Group Ltd	01202 746666	●		●	●	●				●		●	✓	4	✓		✓	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓	●	Up to £6,000,000
Cairnhill Structures Ltd	01236 449393	●	●	●	●	●	●	●		●	●	●	✓	4			✓	●	Up to £6,000,000
Cementation Fabrications	0300 105 0135	●		●	●	●	●					●	✓	3			✓	●	Up to £6,000,000
D Hughes Welding & Fabrication Ltd	01248 421104	●		●		●			●	●	●	●	✓	4			✓		Up to £800,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●		●			●	✓	4				●	Up to £3,000,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●	●	●		●	●	●	●	✓	3			✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●			●	●				●	●	●	✓	4	✓		✓	●	Above £6,000,000
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 £2,000,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £6,000,000
REIDsteel	01202 483333	●		●		●	●	●				●	✓	4				●	Up to £6,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £3,000,000
Severfield plc	01204 699999	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499											●	✓	3					Up to £800,000
Taziker Industrial Ltd	01204 468080	●	●	●	●	●	●	●	●	●	●	●	✓	3		✓	✓	●	Above £6,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●		●	✓	4	✓	✓	✓	●	Above £6,000,000
Non-BCSA member																			
Allerton Steel Ltd	01609 774471	●	●	●	●	●	●	●			●	●	✓	4	✓		✓	●	Up to £3,000,000
Beaver Bridges Ltd	01204 668773	●		●	●	●	●	●	●	●	●	●	✓	4					Up to £3,000,000
Carver Engineering Services Ltd	01302 751900	●		●	●	●	●		●	●	●	●	✓	4			✓		Up to £3,000,000
Centregreat Engineering Ltd	029 2046 5683	●		●	●	●	●	●	●	●	●	●	✓	4					Up to £3,000,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●	●	●		●	●	✓	4			✓	●	Up to £1,400,000
Donyal Engineering Ltd	01207 270909	●		●						●	●	●	✓	3		✓	✓	●	Up to £1,400,000
Eiffage Metal	00 33 388 946 856	●	●	●	●	●	●	●	●			●	✓	4					Above £6,000,000
Harrisons Engineering (Lancashire) Ltd	01254 823993			●	●	●	●	●	●	●	●	●	✓	3		✓			Up to £3,000,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000*
HS Carlsteel Engineering Ltd	020 8312 1879									●	●	●	✓	3			✓		Up to £800,000
In-Spec Manufacturing Ltd	01642 210716									●	●	●	✓	4			✓		Up to £800,000
J&D Pierce Contracts Ltd	01505 683724	●		●	●	●	●	●	●		●	●	✓	4			✓		Above £6,000,000
Kelly's Welders & Blacksmiths Ltd	01383 512 517											●	✓	2			✓		Up to £200,000
Lanarkshire Welding Company Ltd	01698 264271	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £3,000,000
Malin Group	0141 370 5467	●			●	●	●			●	●	●	✓	4			✓		Up to £4,000,000
North View Engineering Solutions Ltd	01325 464558											●	✓	3					Up to £800,000
Smulders Projects UK Ltd	0191 295 8700	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000
Tecade S.A.U.	00 34 955 833 811		●	●	●	●	●	●	●			●	✓	4		✓	✓		Up to £6,000,000
Total Steelwork & Fabrication Ltd	01925 234320	●		●		●				●	●	●	✓	3			✓		Up to £3,000,000
Underhill Engineering Ltd	01752 752483	●	●	●	●	●				●	●	●	✓	4	✓		✓	●	Up to £3,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000

Corporate Members

Corporate Members are clients, professional offices, educational establishments etc which support the development of national specifications, quality, fabrication and erection techniques, overall industry efficiency and good practice.

Company name	Tel
Gene Mathers	0115 974 7831
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	0300 123 5000
Keiths Welding Limited	07791 432 078

Company name	Tel
MMCEngineer Ltd	01423 855939
Paul Hulme Engineering Ltd	07801 216858
QHSE-Interspect Ltd	07438 413849
Sandberg LLP	020 7565 7000

Company name	Tel
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		●	
Jamestown Manufacturing Ltd	**00 353 45 434288**	✓	**M**	4	20		**Gold**
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				
StruMIS Ltd	01332 545800		N/A				
Trimble Solutions (UK) Ltd	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				

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				
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			
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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