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103 Colmore Row, Birmingham
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Architect: Doone Silver Kerr
Main contractor: BAM Construction
Structural engineer: Davies Maguire
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Pandemic raises collaboration hopes

Nick Barrett - Editor

Contractors can just about always say they live in interesting times, but with the world still mired in a pandemic and waiting for a feared second wave amid worries of a bad recession, some very interesting times could lie ahead. As ever though, it is not all doom and gloom by any means. Recovery from the lockdown-enforced collapse in economic activity is well underway and economists are reporting that we are getting closer to 'business as usual'.

It might still be too early to start talking about construction coming out of this stronger than ever, but there are some positive notes already being struck. Turner and Townsend for example captured headlines in August with a report predicting softening tender prices with a raft of projects having been cancelled or at least postponed. But the report also highlighted there was much that clients could do by way of responsible behaviour to help the industry through a deflationary period. A key action would be to seek ways to promote the collaboration that all sides of the industry have been increasingly calling for over recent years.

Don't just use a weak market as an excuse to screw your contractors down was the message. Too much of that behaviour is likely to drive some into insolvency, weakening tender lists in the future and encouraging survivors to behave accordingly when the boot is on the other foot. Contractors in their turn should avoid the temptation of following the more foolhardy in their race to the bottom on pricing, T&T warned. If the construction industry and its clients are encouraged by the harsh experience of a pandemic that has affected us all to increase collaborative ways of working in future, that would be an extremely positive outcome.

Recent surveys of industry demand are still finding some bright spots, such as health and social care, data centres and life sciences, all areas that steel construction has a long track record in serving well. Other areas of firm demand include sheds for logistics centres and industrial-related buildings.

Infrastructure investment looks like featuring more prominently than recently in the workloads of the coming period. In News this month we have an encouraging story about the first permanent structure to be installed on the HS2 railway project, a steel road bridge to carry traffic over the M42, which represents a significant project milestone. Typically for a steel bridge, it was fabricated offsite and installed without a hitch, with minimum disruption and in just two days. HS2 is the largest transport-related project undertaken in the UK for some years and will feature many steel structures along what will be its eventual 530 kilometre length.

Education has been hit hard by the country's lockdown and with schools across the UK now reopened it is encouraging to see in News a story about Tata Steel developing with industry partners highly energy-efficient schools that will be built offsite, and with all the other advantages of steel. This supports the government's plan to modernise the country's schools, with £1 billion in funding allocated to the first 50 projects. Interesting times are ahead for offsite fabrication which will be a growing feature of future workloads, one in which steel construction will be prominent.

First HS2 bridge installed over M42

Contractors working on the HS2 railway have installed a 65m-long bridge, spanning the width of the M42, in just two days and ahead of schedule.

Representing the high-speed railway's first bridge, the 2,750t structure (which includes 1,130t of weathering steel girders fabricated and assembled by Cleveland Bridge) was installed by specialist engineering contractor, Expanded and HS2 enabling works contractor, LMJV (Laing O'Rourke and J. Murphy & Sons Joint Venture).

The steel composite deck was fully assembled offsite and was carried into position along the motorway on self-propelled modular transporters.

The 448-wheel unit took just one hour and 45 minutes to move the bridge deck 150m, where it was positioned on its abutments to complete the overall bridge structure.

HS2 CEO Mark Thurston, said: "This new road bridge is the first permanent structure to be installed along the route of Britain's new railway. It represents an important milestone for the project and the West Midlands region - which is already benefiting from thousands of jobs and renewed investment as a result of HS2.

"Constructing the bridge offsite and using innovative engineering practices to install it over the motorway enabled us to carry out the work in just two days, keeping disruption to a minimum."

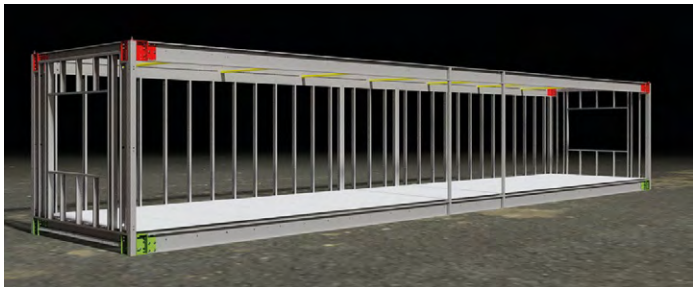
Once complete HS2 will bring the West Midlands within an hour's commute of Manchester, Sheffield, Leeds, York and London, making it one of the most connected parts in the country. HS2 is already transforming the region, spearheading regeneration and economic investment in Birmingham and surrounding towns.

Tata Steel proposes efficient steel modules for schools

Tata Steel said it is at the forefront of creating the next generation of schools in the UK, which will give thousands of children access to education in safe, purpose-designed environmentally-efficient buildings.

The company, working with construction industry experts in the UK, is developing a kit of parts allowing highly energy-efficient schools to be built offsite and then shipped to their final location. This will reduce waste created during traditional building as well as allowing the structures to be quick to build, give good value for taxpayers and be 100% recycled at the end of their life.

The news comes just weeks after the UK Government announced a scheme to modernise the nation's schools. The rebuilding programme will start in 2020-21 with the first 50 projects supported by more than £1 billion in funding.



The government aims to reduce the construction costs and whole life costs of buildings by a third, while seeing those same buildings delivered in half the time and with a 50% reduction in carbon emissions from the construction sector.

The entirely UK-designed and built solution will allow schools to grow and adapt as required. In addition, the standardised offsite construction approach can also be used to create emergency healthcare facilities in times of crisis.

Phil Clements, Tata Steel UK Technical Director, said: "Traditional building techniques using bricks, mortar and wood can be slow, wasteful and have a significant impact on the environment."

The consortium behind the project is made up of: offsite building experts Blacc; the Manufacturing Technology Centre (MTC); two offsite manufacturers, Elliott Group and the McAvoy Group; Tata Steel; the Active Building Centre (ABC); and the National Composite Centre (NCC).

Steel completes for Kent retirement village

Working on behalf of main contractor Kier, H Young Structures has completed the erection of 400t of steelwork for the Ledian Gardens Retirement Village near Maidstone, Kent.

Main client for the scheme is Inspired Villages who operate six sites in England and is currently on track to deliver a further 2,500 homes in the next six years.

In a bid to lower carbon emissions and fuel bills, Ledian Gardens will use energy efficient ground source heat pumps to heat radiators and provide hot water.

A village centre and 56 apartments are housed in three conjoined steel-framed structures, while another 10 apartments will be in adjacent timber-framed buildings and a renovated oast house.

Sat on pad foundations, the three steel-framed structures are all of a similar design and all comprise three-storeys, including ground floor. Building A and B both have footprints of 22m × 50m, and accommodate apartments of various sizes on the upper two floors, while the ground level has some living spaces alongside front-of-house, a restaurant, keep-fit facilities and a 9m-long swimming pool.

Structure C is the largest, measuring 19m × 82m and it will have the Village's reception and family rooms on the ground floor with apartments above.

Kier Project Manager Ian Saunders says the scheme will offer a dozen different living space variants, from one-bedroom flats to penthouse apartments. The various room sizes and the pitched roof, which accommodates third floor living spaces, have been the main challenge, which the steel frame solution has overcome.

Ledian Gardens phase two is scheduled to begin later this year.

Updated NSSS includes new intumescent paint section

The British Constructional Steelwork Association (BSCA) has published the 7th edition of the National Structural Steelwork Specification for buildings (NSSS).

The latest edition has been extensively updated and represents the biggest change since its introduction in 1989. One of the main changes is the inclusion of a new section on intumescent paint systems.

Following the tragic Grenfell Tower fire and the call from Dame Judith Hackitt for industry not to wait for legislation, Ana Girao Coelho, BCSA Engineering Director said: "the BCSA and the wider constructional steelwork community decided to take ownership of the specification, application and inspection of intumescent paint systems."

Section 10 of the NSSS now includes comprehensive information on intumescent paint systems and in order to improve quality, it encourages the paint systems to be applied in the workshop rather than on-site.

Other significant changes include a mandatory requirement for all steelwork contractors to put in place a third party certified welding quality management system to BS EN ISO 3834.

The main body of the NSSS is limited to Execution Class 2, but this version also contains an Annex of the requirements for Execution Class 3 for static structures and an Annex giving general guidance on Execution Class 3 for buildings subject to fatigue, such as crane supporting structures.

To allow steelwork contractors time to put in place the necessary third party systems to comply with the Specification it has been decided that the NSSS will not come in to force until 1st January 2021.

Hard copies of the 7th edition of the NSSS, which now includes BCSA member listings, can be obtained from *www.steelconstruction.org* and are priced at £20 for BCSA members and £25 for non-members.

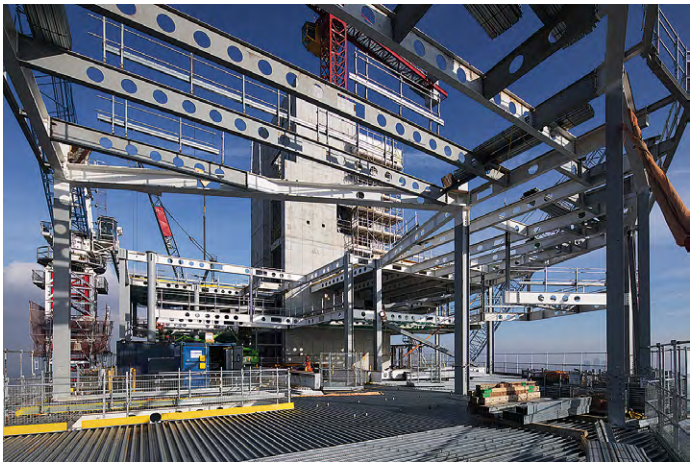
New Tekla Structural Designer update features Fabsec link

A new partnership between Trimble and Fabsec in the UK has resulted in the launch of a bi-directional link between Trimble's latest Tekla Structural Designer (TSD) 2020 update and Fabsec FBEAM software.

The link means data can flow freely between the two packages, which is said to save design time and thereby ensuring an efficient project solution.

Structural and consulting engineers, as well as steelwork contractors, are able to download the free FBEAM software from the Fabsec website, and design long span cellular beams to the Eurocode.

Commenting on the partnership, Sharon Green, Fabsec Business Development Manager said: "Fabsec started in 2001 and since then FBEAM has established itself as the industry's leading software solution for the design of plated cellular beams in ambient and fire conditions.



"With a track record of continuous development, to ensure FBEAM remains at the forefront of engineers' needs, we are pleased to announce our recent partnership with Trimble to develop this import/export regime between FBEAM and Tekla Structural Designer. This latest update allows a seamless transfer of data between the two software packages making the design and specification of FBEAM plate girders even more streamlined."

Fabsec software is only compatible with the latest Tekla Structural Designer 2020 release and can be downloaded in the UK from the company's website: *www.fabsec.co.uk*

For more information about the latest version of Tekla Structural Designer 2020 visit: *www.tekla.com/2020*

Warrington indoor market officially opens

The new steel-framed permanent home for Warrington's award-winning market has now officially opened safely and in line with government guidelines heralding the latest milestone at Time Square, the mixed-use destination in the heart of the town centre.

The £142M development is being delivered by Warrington & Co on behalf of Warrington Borough Council, with Muse Developments appointed as development manager.

Working on behalf of Vinci Construction, James Killelea erected more than 3,000t of structural steelwork for the scheme, which also includes a cinema complex, retail units and a four-storey council office block.

NEWS IN BRIEF

Willmott Dixon has been appointed by the LTE Group for a £54M contract to build the first phase of The Manchester College's ambitious estates strategy, to provide a learning centre of excellence for creative and digital industries across Greater Manchester. The four-storey development is on the site of the city's former Boddingtons brewery opposite Manchester Arena.

Work has begun on a new business park which will provide a major economic boost to the Scottish Borders and has the potential to create over 380 jobs. **Ogilvie Construction** is building the ambitious Borders Innovation Park in Tweedbank, which will see four sites developed initially as part of the first phase.

Skanska will construct a new 9,000m² office building for Zurich Insurance, forming a part of the of the Swindon Kimmerfields masterplan. The site is located on a long-vacant, cleared development plot in Swindon town centre. The project is aiming to achieve a BREEAM rating of 'Excellent' on completion.

Interserve has been named as preferred bidder for the new £15M Medicines Manufacturing Innovation Centre (MMIC) in Inchinnan, Renfrewshire. The state-of-the-art development will be located near Glasgow Airport and will be led by CPI in partnership with The University of Strathclyde, Scottish Enterprise, and founding industry partners, AstraZeneca and GlaxoSmithKline.

Canary Wharf Group has revealed plans for a 350,000m² development on the North Quay site at London Docklands' Canary Wharf. The proposals, master-planned by leading architects Allies and Morrison, have been submitted to the local planning authority, the London Borough of Tower Hamlets. It will create a vibrant mixed-use district and accommodate up to 232,000m² of commercial office space and up to 100,000m² of residential space, within a flexible framework to suit the demands of future London.

PRESIDENT'S COLUMN

John Blackwell, Rowecord Engineering's long-standing charismatic former MD, used to say "steelwork contracting is all about managing risk". John's words are as true today as they always have been, probably more so. All too often steelwork contractors are being forced into taking on the temporary stability of the steelwork during erection with no allowance being made at tender stage for this crucial part of the building's life. This is a recipe for a 'race to the bottom' and in my experience those who sometimes win this work are the least able to design the temporary stability required during erection.

The CDM Regulations make it clear that it is the designer's responsibility to provide at least one safe sequence of erection for the structure which includes consideration of any requirements for temporary stability and the safe dismantling of the structure at end of life. Safety is a crucial consideration during steel erection as part erected structures can be vulnerable to collapse.

Undoubtably the hardening of the insurance market following the tragic fire at Grenfell Tower and the general increase in professional indemnity (PI) claims has pushed up the cost of PI insurance, in some cases trebling historical premiums. This has caused some designers to reduce their risk by off-loading the temporary stability of the structure during erection to the steelwork contractor. We have all seen increases in the amount of design responsibility passed down to Tier 2 contractors from consultants, which has increased our potential liability.

For multi-storey buildings the flooring system in its final state is often intended to act as the 'magic diaphragm', 100% stiff as modelled, sometimes with very unusual aspects in length and breadth coupled with sometimes more holes in the floor plate than a Swiss cheese. Again, not much consideration as to how the structure is safe during construction. Many steelwork companies claim that this is fine, they can handle the additional responsibility. However, I haven't met many yet that charge and recover a pound for every pound expended in taking this risk on, never mind the additional design, fabrication, erection and removal of necessary temporary bracing.

A similar temporary situation occurs with precast concrete floor planks. The most critical condition here can occur during the placing of the concrete units and consideration must be given to ensuring that the asymmetric loading conditions that can arise are carefully controlled to prevent the twisting or failure of the supporting beams.

The old national standard, BS 5950, contained a clause that made it clear that issues such as temporary stability are the responsibility of the designer. Clause 2.1.1.2 on overall stability states 'The designer who is responsible for the overall stability of the structure should be clearly identified.' This applies equally to the temporary stability of the structure during erection and, taken together with the CDM Regulations, places the responsibility on the designer to provide a safe sequence of erection. Perhaps a similar statement would have been useful in the Eurocodes.

Mark Denham
BCSA President

Coatings specialist leads the way in training innovation

Working in partnership with Scunthorpe's North Lindsey College, coatings specialist Jack Tighe has successfully trialled Virtual Reality technology (VR) in order to offer the Industrial Coatings Applicator Apprenticeship Standard.

Said to be one of the first times the technology has been used in the UK, it allows users to experience blasting and spraying techniques in a safe and sustainable way, while also being economically-friendly and controlling waste management

Jack Tighe Training Manager John Whittaker said: "Technology is advancing all the time and we aim to be at the forefront. Apprentices use technology every day and have embraced the VR world of training. The potential of this programme is endless, as the course, which is in its infancy, creates a safe learning environment."

Henk van Uden of Greenday Training, who delivered the VR training sessions, added: "The demonstrations we have been delivering are to train in the virtual way for sandblasting, stripe coating and spraying. The apprentices have enjoyed using the equipment and have seen improvements already.

"Using this equipment will improve their techniques and allows them to paint without actually using products.'

The first intake of apprentices completed their 18-month apprenticeship last month (August).

Jack Tighe said a second intake are now studying for completion in April 2021, and a third intake is scheduled to begin in October.

The British Constructional Steelwork Association (BCSA) helped to develop the Apprenticeship Standard with Highways England through its Bridgework Sector Scheme Committees.

BCSA Director of Health, Safety & Training Peter Walker said: "Jack Tighe has recognised that the new Apprenticeship Standard can be implemented with the assistance of its local college and if others in the industry want to address their lack of trained young people, needed to replace an already ageing workforce, they could use this model to help resolve this potential problem."

East Lancashire Railway bridge installed

Steelwork contractor Taziker Industrial has completed a project for Rochdale Borough Council to design, build and install a new footbridge over the East Lancashire Railway.

Located at Schofield Street in Heywood, Greater Manchester, the new footbridge was constructed three miles away at Taziker's specialist fabrication facility at Birch Industrial Estate.

The previous footbridge was deemed unsafe and closed by Rochdale Borough Council 12 months ago.

Fabricated in three sections for efficient transportation and erection, the new footbridge is said to be lighter, stronger and safer than its predecessor.

A GRP open mesh grating deck means the footbridge is lighter than a structure with a concrete deck and has increased durability, while reducing its carbon footprint. The original parapets have been strengthened to provide safer access across the bridge and a steam deflector plate added to provide protection to the deck from the steam trains passing underneath.

Additional anti-suicide safety measures have also been considered on this project, with a barrier added to block unsafe access underneath the bridge.

Jarrod Hulme, Taziker's Managing Director for Engineering Services said: "We have built great relationships with those involved in the project at Rochdale Borough Council and we've collaborated effectively every step of the way. We're now in the position to offer custom-build footbridges to client's requirements going forward."

Built in the 19th Century, the East Lancashire Railway is a 20km heritage railway line which runs between Heywood and Rawtenstall.

Steel up for Doncaster distribution centre

Working on behalf of Readie Construction, Caunton Engineering has completed the erection of the steel frame for a new 38,000m² speculative distribution centre at Gateway 4 in Doncaster.

Situated adjacent to the M18 motorway, the state-of-the-art distribution centre is being developed by Trebor Developments and its partner Hillwood.

The steelwork for the scheme was designed by Caunton Engineering's technical team and comprises a four-bay warehouse with a 15m clear internal height,

The design also includes a hit and miss internal column arrangement, to create more column-free space, plus a four- storey internal office, and an external hub office.

Work on the Doncaster site commenced in February and completion is set for later this month (September).

Birmingham's Arden Cross launches £3bn masterplan

Said to be one of the country's best-connected strategic locations and home to the HS2 Interchange Station, Arden Cross in Birmingham has launched an ambitious masterplan to create a sustainable new business, leisure and residential destination and world-leading economic hub.

The 140-hectare site, to the east of the NEC campus and M42 motorway, has the potential to boost the regional economy of the Midlands by over a £1bn, create and support up to 27,000 new jobs, and deliver up to 3,000 new homes and up to 500,000m² of commercial development.

With the HS2 Interchange Station as the catalyst to create unprecedented economic growth, Arden Cross

Limited has developed the masterplan in partnership with public sector stakeholders to reflect a shared vision to unlock the site's full potential.

Arden Cross Limited Director, Ben Gray, said: "The intention for Arden Cross has always been to deliver a world-class development with the HS2 Interchange Station at its heart and by launching our masterplan, we are a step closer to delivering that ambition. The Arden Cross Limited shareholders are focused on creating a game-changing legacy that will lift the entire Midlands economy."

Andy Street, the Mayor of the West Midlands, has welcomed the launch of the masterplan. He said: "The Arden Cross masterplan is exactly the kind of vision and ambition that will help to drive both the regional and national economy forward."

New stadium plans for Sky Blues

Coventry City Football Club (Sky Blues) and the University of Warwick have announced that they have commenced planning for a partnership, which would see the University provide land for a new stadium.

While an exact site has yet to be agreed, its proximity would be on the agricultural field area of the University of Warwick land on its main campus at the southwest edge of Coventry.

Coventry City FC will own and be entirely responsible for the cost of the stadium and its operation; equally, the Club will receive all stadium revenues it generates.

Both the University and the Club have said they are committed to a visionary, environmentally friendly stadium in terms of materials, energy, noise, building and of course access.

There are also plans for a light rail station at the stadium, to connect with the city centre.

From 1899 to 2005, Coventry City played at Highfield Road, which in 1981 became the first all-seater stadium in England. The 32,000-capacity Ricoh Stadium, on the city's outskirts, was built to replace the club's former home, but Coventry City have left this ground on two occasions and there are currently no plans for them to return.

Having just been promoted back to the Championship, Coventry City will ground share at Birmingham City's St Andrews stadium for the forthcoming 2020-21 season.

Diary

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

Tuesday 15 September 2020
Seismic design of steel structures to Eurocode 8
Webinar for SCI/BCSA Members only
This webinar will give the fundamentals of seismic design of steel structures according to Eurocode 8. A short introduction about seismic actions and design options will be given. Capacity design for steel structures according to Eurocode 8 section 6 will be discussed, highlighting the differences with the common Eurocode 3 design rules.

Tue 29 September, Thu 1 & Tue 6 October 2020
Light gauge steel design
Online course
This online course, run over 3 sessions, introduces the uses and applications of light gauge steel in construction, before explaining in detail the methods employed by Eurocode 3 for designing light gauge steel members in bending and compression and the calculation of section properties. Specific design issues related to the different uses of light gauge steel are addressed.

Tuesday 13 October 2020
Corrosion protection of steel by hot-dip galvanizing
Webinar for SCI/BCSA Members only
This Guest webinar will be presented by the Galvanizers Association and will provide a detailed technical overview of hot-dip galvanizing as a method of corrosion protection of steel and will cover a range of topics.

Tue 20, Thu 22, Tue 27 and Thu 29 October 2020
Steel Building Design to EC3
Online course
This course is delivered over 4 sessions and focuses on orthodox construction, covering the primary design issues for practicing engineers. The course follows the process of determining actions, considering combinations of actions, frame analysis and the assessment of second order effects. The course will then demonstrate how the resistance of members are calculated, but also how they can be extracted immediately from resources such as the 'Blue Book'.

Tue 17, Thu 19 & Tue 24 November 2020
Steel Connection Design
Online course
This course is run over 3 sessions and is for designers and technicians wanting practical tuition in steel connection design. The course concentrates on the design of nominally-pinned connections, in accordance with BS EN 1993-1-8, considering vertical shear and tying. The Eurocode approach to the design of moment resisting connections will be discussed, anticipating that software will be used for the design of these connections.

Continual supply

Barrett Steel has been affected, along with many other businesses across the UK by the pandemic lockdown, but it has remained operational throughout, focussing on supplying its customers.

Barrett Steel has, for generations, been openly proud of supplying the steel construction sector and despite the challenges we all currently face, has continued to invest in supporting the industry while securing jobs for many. Long-established, as a key partner to construction businesses across the UK, this 6th generation family business prides itself on being one of the most versatile suppliers since 1866.

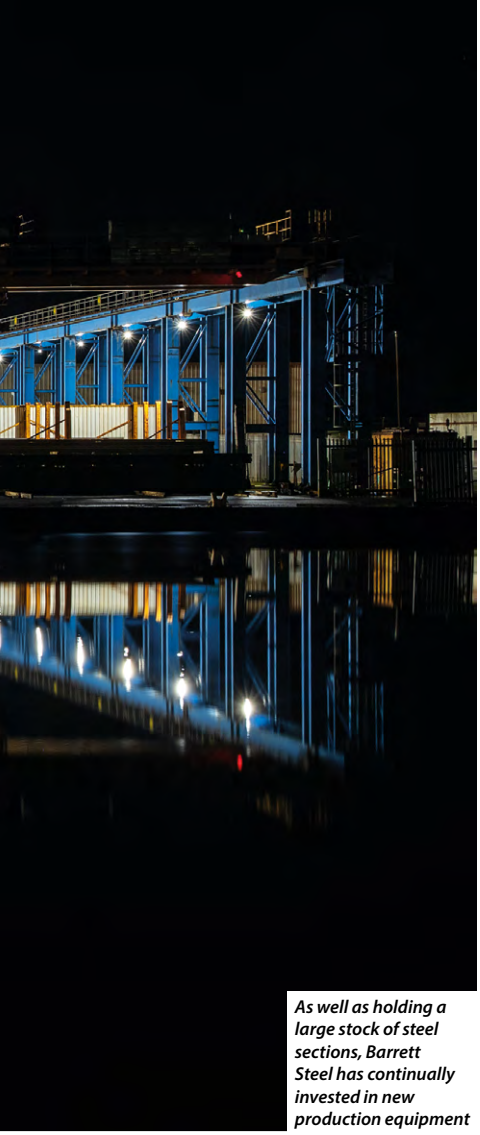
In recent times, and in particular the last two years, the number of Barrett Steel depots across the UK has risen, with the acquisition of British Steel distribution centres being the standout investment for the group. James Barrett, Group Managing Director says: "This acquisition provides a great opportunity for the Group. We are excited to welcome the British Steel teams to our business and we are positive about the future of the steel industry."

Barrett Steel has added former British Steel sites to its portfolio of distribution centres

Acquisition of the British Steel Dartford site marked a very exciting time for the Barrett Steel Group. The new Barrett Steel Dartford site has provided the group with the perfect platform to service its ever-growing customer base in the south of England and London. The depot has sawing capacity on-site and benefits from its proximity to a dedicated stock and processing facility at Shoreham-By-Sea.

Investment has continued in recent times, including the restructuring of the Barrett Steel Tubes business in Dudley, turning it into a dedicated manufacturing hub and centre of excellence for structural hollow section processing. Other enhancements have included a new 10kW ByStar Fibre Laser for the Rotherham plate profiling centre.

Commenting on the growth of the profiling centre, Tom Barrett, Group Commercial Director says: "We have recently seen extensive growth in our profiling team at Rotherham. The new ByStar Fibre machine



As well as holding a large stock of steel sections, Barrett Steel has continually invested in new production equipment

The company also has a skilled and efficient workforce

extends our plate laser profiling capacity alongside our current gas, oxy and plasma cutting options. The investment in these machines, plus our in-house Tipo drill line means we are in a better position than ever to offer a complete package to our construction customers across the UK.

This investment in plate and tube processing within stockholding allows customers to focus on design, complex fabricating operations and the erection process itself. Tubular structural steelwork has often been seen as a specialist area, with some companies reluctant to see throughput reduced by the complexities of assembling structures such as circular tube trusses. For over 20 years at Barrett Steel we have consistently provided time saving, cost effective, quality solutions to the construction sector with laser cut structural hollows.

Demonstrating its versatility, the company says it RB1500 oxygas / plasma pipe profiling machine has enabled Barrett Steel to expand its laser offering to the construction sector's largest and most challenging projects. With the ability to easily process tubes up to 1500mm diameter and 90mm thick. Recent orders have included profiled tubes to make feature Y sections and V columns, all the way through to saddle cuts for tube-to-tube connections, finished with assembly marking for ease of fabrication.

Barrett Steel's experience and continuous investment in the latest software allows it to offer repeatability, to tight tolerances, often with complex variable weld preps and even offset slots for fin plates. This has not only reduced the time needed to prepare the components, but also allows structural engineers to reconsider and change weld requirements, offering project time and cost benefits.

"Not only do we hold over 20,000t of high yield hot and cold hollow sections, we also have the specialist equipment and experience to process these, ensuring our customers get the best service. We can produce the components for complex projects, while we can also advise at all stages of the design process on the capabilities of our machines. Recently a customer approached us to produce feature column Y sections with his design team who would have previously used templates. After consultations via Zoom, we were able to showcase our RB1500 which saved the project weeks of fabrication time compared to their traditional option. This time efficient approach has led to a substantial cash saving on the project which is particularly important during these challenging times." says Sales Director, Tony Corrie.

Barrett Steel has a long history of processing parts for the construction sector and it is now utilising that experience to advise on larger, heavier and more intricate and demanding fabrication projects.

"Over 150 years working hand-in-hand with the construction industry has enabled us to be in tune with the challenges our customers are facing daily. At Barrett's we work seamlessly with our customers to not only ensure stock availability at short notice but to ensure, where we can, that our investments in advanced processing can assist our customers to hit ever tightened and constrained schedules." James Barrett concludes.

The experience, entwined in the Barrett Steel operation, means not only does the group have the scope to supply a wide variety of stock and processed products, but additionally long-established supply chain relationships pass on an enormous amount of benefits to the customer. Whether it's sourcing different types of stock, such as non-standard specification for the nuclear construction sector, or by reducing costs for end-users thanks to single-source operation, their supply chain allows reduction in costs and transport requirements across the board.

What is for certain in these current times, is Barrett Steel's team of experts boast significant levels of technical knowledge. This knowledge and understanding allows the team to create tailored solution-based offerings to assist customers with the ever-changing challenges they face. This is strengthened with investment in stock, transport and the processing capabilities required to effectively service the construction industry for many generations to come.

Barrett Steel are proud to support Steel for Life and continue their headline sponsorship. For more information about the group visit *www.BarrettSteel.com*

"We are excited to welcome the British Steel teams to our business and we are positive about the future of the steel industry."

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

STEEL for life

Barrett Steel can undertake variable weld preps to save welding and fitting time.

Each of the two office blocks is arranged around a centrally-positioned core

Steel frames civic pride

Sunderland's new City Hall is the latest project on a large regeneration scheme, which is transforming a former brewery site into a mixed-use neighbourhood.

FACT FILE
Sunderland City Hall
Main client: Sunderland City Council
Architect: FaulknerBrowns Architects
Main contractor: Bowmer + Kirkland
Structural engineer: Cundall
Steelwork contractor: Hambleton Steel
Steel tonnage: 1,000t

Construction work is underway in Sunderland on a major element of a £500M city centre regeneration scheme, which is transforming a large swathe of land formerly occupied by the Vaux Brewery.

A new £42M City Hall scheme for Sunderland City Council represents phase two of the Vaux Brewery masterplan to regenerate this prominent site to the north west of the city centre, creating a vibrant mixed-use neighbourhood.

The steel-framed project will provide a mix of private and public uses, while consolidating a wide range of municipal services previously located across eight locations around the city, bringing them together under one roof. In addition to municipal customer services, the building will comprise a fitness room and an employment centre.

The project consists of two office blocks, one five-storeys high and the other six-storeys. Each of the office blocks is arranged around a centrally-positioned precast concrete core, from which Westok cellular beams, up to 12m in length, radiate outwards to the perimeter columns.

The long cellular beams create the desired column-free internal spaces and allow the scheme to have a minimal number of columns inside the building's perimeter.

As well as creating the long spans, the beams also support the structure's precast flooring planks, while also accommodating the building's services within their depth.

Kloeckner Westok's Technical Advisory Engineer for the region, Tom Elliott says: "Clients, architects and structural engineers are really keen to exploit the benefits realised by the clear-span Westok solution.

"Commercial developments like Sunderland City Hall, take full advantage of the pre-cambered cellular beam concept, with a continuous string of cells facilitating current as well as future service integration requirements."

The only part of the scheme with spans over 12m-long is one area on the ground floor of the five-storey block, where a 15m-span council chamber/multi-use room needed a little more column-free space.

In order to gain some more floor area, the building's core only reaches it maximum width at first floor level, with a smaller core serving the lower level. Freeing up some valuable ground floor space, the core is supported at first floor by a series of large beams that act as transfer structures.

"The beams are the heaviest steel elements on the job and they have been installed in pairs. However, they were erected individually and then tied together using a bespoke designed end-connection detail," says Hambleton Steel Contract Manager Doug Willis.

Both of the block's ground floors are double-height spaces, containing some mezzanine levels that provide some extra floor space for meeting areas. The columns supporting the mezzanines are the only internal columns on the project.

The ability to create the desired long spans and its speed of construction were the reasons for choosing a steel-framed design with precast flooring, says FaulknerBrowns Architects Senior Associate Peter Hunt.

"This solution also allowed us to leave much of the steelwork and precast elements, along with the building's services fully exposed, as a nod to Sunderland's industrial and shipbuilding heritage."

The two office blocks obtain their structural stability from their concrete cores, but they are also linked together by a central full-height covered atrium.

According to Mr Hunt, the atrium acts as a public thoroughfare to make the available services visible, legible and accessible. An activity-based work environment unfolds along this central internal lightwell, delivering an engaging, flexible workspace with an emphasis on natural daylight and wellbeing throughout the building.

A number of link bridges span the 10m-wide atrium at first, second, third, fourth and fifth floor levels, providing easy connectivity between the two separate blocks. Even more access between floors is afforded by a feature steel staircase that sits in the middle of the atrium.

Externally, the building is said to respond to its position adjacent to the recently upgraded Keel Square, an important new public space within the city and an integral part of the masterplan development.

The building is grounded on a well-defined base with an emphasis on engaging the street with an appropriate civic expression. The steel columns and beams framing the two buildings will be clad in reconstituted stone with a tone and finish that responds to the materiality of the grade II listed baroque style Magistrates Court, which also sits on the square.

The steel columns start at ground floor and are founded on mass-filled concrete foundations. According to main contractor Bowmer + Kirkland (B+K), the ground conditions are not suitable for piling and the chosen method was the best solution for the site.

B+K Senior Project Manager Paul Anderson says: "We started on site in November 2019, and our first task was an earthmoving exercise, which enabled us to install the foundations.

"Once completed and after we had infilled the ground, Hambleton were able to start the steelwork erection programme in June."

As well as fabricating, supplying and erecting the project's steelwork, Hambleton is also installing the precast planks and precast stairs as part of its programme.

As planks are up to 12m in length and weigh between 2t and 3t each. Because of their length, they are installed along with each individual floor of steelwork, as manoeuvring the floor units into a completed frame would be extremely difficult.

The twin blocks are five storeys and six storeys high

"Commercial developments like Sunderland Civic Hall take full advantage of the pre-cambered beam concept."

For the buildings external finishes, a series of large glazed openings are said to promote transparency and create an active ground floor with a strong visual relationship to the public realm.

Similar to the building's internal areas, the envelope is also said to take inspiration from the advanced engineering and material craftsmanship synonymous with the city's industrial and maritime heritage. The middle and top sections of the façade incorporate lightweight aluminium profiles set within floor-to-floor glazing, arranged to provide a structured and subtly varied articulation to the envelope, orientated to passively control solar heat gain.

Sunderland City Hall is due to be complete by September 2021.

A full-height atrium connects the two office blocks

Precast flooring units are installed along with the main steel frame.

How the completed leisure centre will look

Flexible spaces created with steel

Sport, leisure and community facilities in the Buckinghamshire town of Amersham are set to get a significant boost when the steel-framed Chiltern Lifestyle Centre opens next year.

Stairs leading to the upper floor. A two-storey part of the project covers approximately 50% of the footprint

When it comes to designing, and constructing indoor sports facilities, which usually consist of large open-plan structures with no or very few internal columns, structural steelwork is invariably the framing solution of choice.

Steelwork not only provides the long-span column-free spaces required for sport and leisure centres, it also provides the project team with a quick construction programme, meaning the client gets to use its new facility in the fastest possible time.

According to Engenuiti Associate Marcos Armas, steelwork is ideally suited for sport and leisure centres for all of above the criteria, but also because these projects usually include a number of interlinked buildings, which require in-built flexibility so their uses can be seamlessly altered. A steel design ticks this box as well.

"We've designed a number of these schemes over the years and we typically adopt a steel-framed solution," he adds.

An ongoing example of this steel-dominated sector is the Chiltern Lifestyle Centre in the Buckinghamshire town of Amersham.

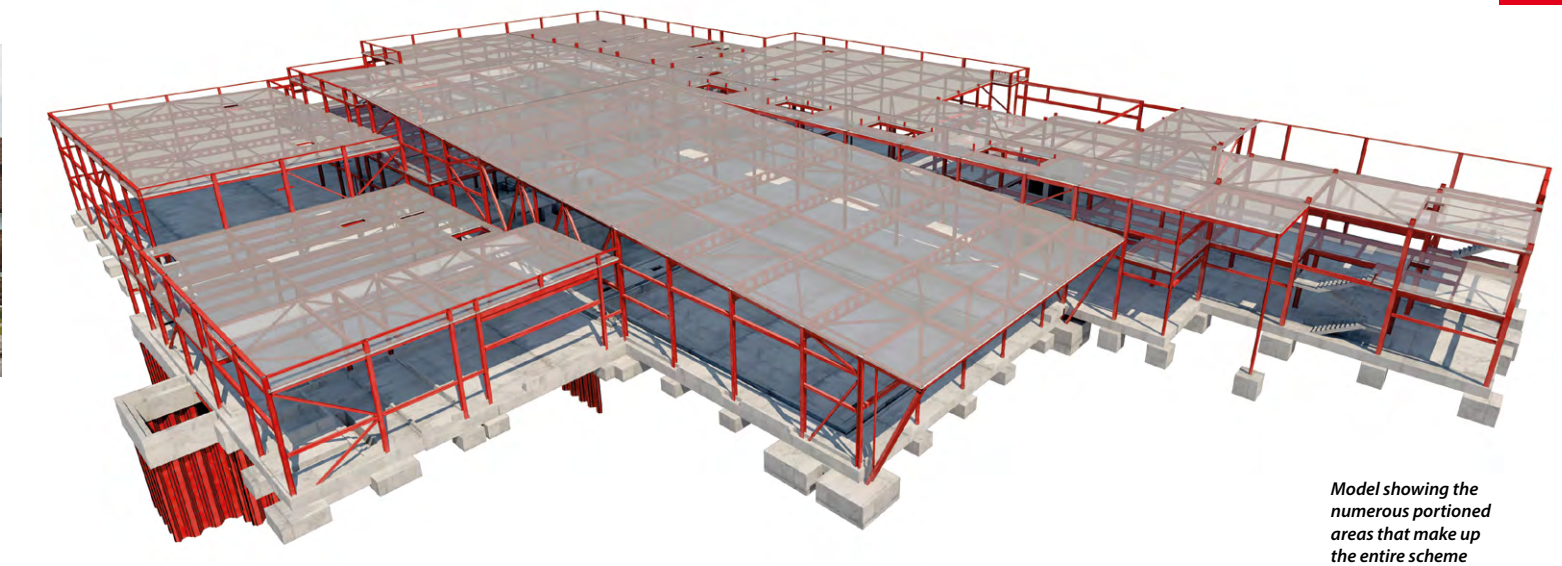
Replacing some existing and outdated facilities in the town, the new centre will include a range of indoor sports and community facilities such as an eight-lane swimming pool, a diving/teaching pool, children's splash pad area, sports hall, squash courts, soft play zone, climbing wall, library, café, exercise studios, gym, spa and a community centre.

Not contained in steel-framed structures, the Centre will also offer a host of outdoor activities including a skate park, an outdoor gym, street snooker and table tennis, which will be located at the rear of the new centre, along with a new play area.

Overall the Centre is one large 120m-long steel-framed structure, predominantly single-storey, but containing some two-storey elements, which is divided into a number of portioned areas.

Stability for this large steel frame is provided by diagonal bracing, which is generally located in perimeter walls – where there are no windows – and in some internal places, such as in the interface zones between different areas.

Working on behalf of main contractor BAM Construction, Elland Steel Structures



Model showing the numerous portioned areas that make up the entire scheme

(ESS) is fabricating, supplying and erecting 900t of steel for this project.

"Our scope of work also includes coordinating the supply of precast lift shafts and stairs, as well as edge protection, metal decking and aluminium roof decking," explains ESS Technical Director Paul Kitching.

The steel columns are founded on pad foundations and are generally erected in a regular spacing of between 5m and 6m. Cellular beams have been used in the long span areas of the scheme and they will be left exposed as architectural features.

"Cellular beams were also chosen as they offered us an economic and shallow solution and that allowed us to keep within the height restriction of the building," adds Mr Armas.

The longest cellular beams are a series of spliced 25.7m-long members that span the pool area. Too long to be transported as complete sections, the beams were brought to site in two pieces, which were spliced together on site, before being lifted into place.

As the pool hall contains diving facilities, its roof and consequently, the height at which the cellular beams are positioned varies from 7.5m to a highest point (diving hall) of 11m. A truss with a maximum depth of 5.8m forms the step in the roof design.

Situated adjacent to the pool, the sports hall is another significant long-span area. Here a series of spliced 20m-long cellular beams forms the required long-span column-free space.

As the roof heights of the adjoining pool hall and sports hall are different, another 11.4m-long × 1.5m-deep truss is positioned at the transition zone between the two buildings.

Over the majority of the plot, the Chiltern Lifestyle Centre's ground floor is formed with an in-situ concrete ground-bearing slab, while the first floor, which covers approximately 50% of the site's footprint is created with a composite metal decking and a concrete topping construction.

"We've designed a number of these schemes over the years and we typically adopt a steel-framed solution,"

The composite solution was chosen as the best way to negate any vibration issues, as the two-storey part of the centre contains facilities such as a gym and exercise studios on the upper floor. Meanwhile, the ground floor will contain a community hall, a new library, a café, and a nursery.

Cllr Mike Stannard, Deputy Leader of Chiltern District Council and Cabinet Member for Support Services said: "After so many years of planning, it is fantastic that we are finally at the stage where work is now on site.

"This is a really exciting development which will benefit local people for generations to come and I am delighted that we are at the stage where work is underway."

BAM's Construction Director Mick Kelly said: "These are important changes for local people and we fully appreciate the need to go about our work considerately and respectfully. How we build has always been as important to BAM as what we build.

"We'll bring our expertise in creating leisure sector developments to this scheme that will transform the facilities for people here."

The Chiltern Lifestyle Centre is due to open by the end of 2021.

FACT FILE
Chiltern Lifestyle Centre, Amersham, Buckinghamshire
Main client: Chiltern District Council
Architect: Space and Place Architects
Main contractor: BAM Construction
Structural engineer: Engenuiti
Steelwork contractor: Elland Steel Structures
Steel tonnage: 900t

Cellular beams offered the most efficient method for creating the long-span areas for the sports and pool halls

Weathering steel checks in for airport bridge

The innate beauty of weathering steel meant it was the material of choice for a new pedestrian and cycle link to Airport City Manchester.

FACT FILE
Airport City Manchester pedestrian and cycle bridge
Main client: MAG Property
Architect: 5plus Architects
Main contractor: BCEGi
Structural engineer: RoC Consulting
Steelwork contractor: Cleveland Bridge
Steel tonnage: 380t

A significant milestone was recently reached at the North West's busy air hub as a new landmark pedestrian and cycle bridge was installed over the M56 motorway spur road at Airport City Manchester.

Designed by Manchester architects 5plus and structurally designed by RoC Consulting, the bridge is 127m-long, including its north and south approaches, and 6m wide. It has been described as a striking addition to the landscape at Airport City Manchester, which is the name given to the mixed-use development adjacent to the airport.

Fabricated by Cleveland Bridge, the half-through bridge comprises two main plate girders with cross girders at regular intervals. Each main plate girder is made up of three sections varying in length, up to a maximum of 30m-long, and the webs feature more than 21,000 perforations along the bridge's length.

The entire superstructure and one of the six supporting piers have been constructed with weathering steel, which develops a rust-like aesthetic after several years' exposure to weather and eliminates the need for painting.

"We specified weathering steel for the honesty, robustness and innate beauty of the material as it will bring a subtle richness in the context of the overall masterplan as buildings develop around it.

"The detailing was undertaken in a manner to further express its construction and engineering reflecting on the industrial heritage of Manchester, with a confident design twist perforating the web of the steel plate girder to create a delicacy and engineered lightness playing on the perception of the inherent strength of the material," explains 5plus Architects Director John Barrett.

"The perforations also illustrate the stress patterns across the steel plate, subtly illustrating the method of construction and telling the story of its engineering."

The £6M bridge has been part-funded by Manchester City Council, whose 50% contribution to the project helped deliver a sustainable connection from the Airport City Manchester site directly to rail, bus and tram links, as well as providing direct access for pedestrians and cyclists travelling to and from Wythenshawe and surrounding areas.

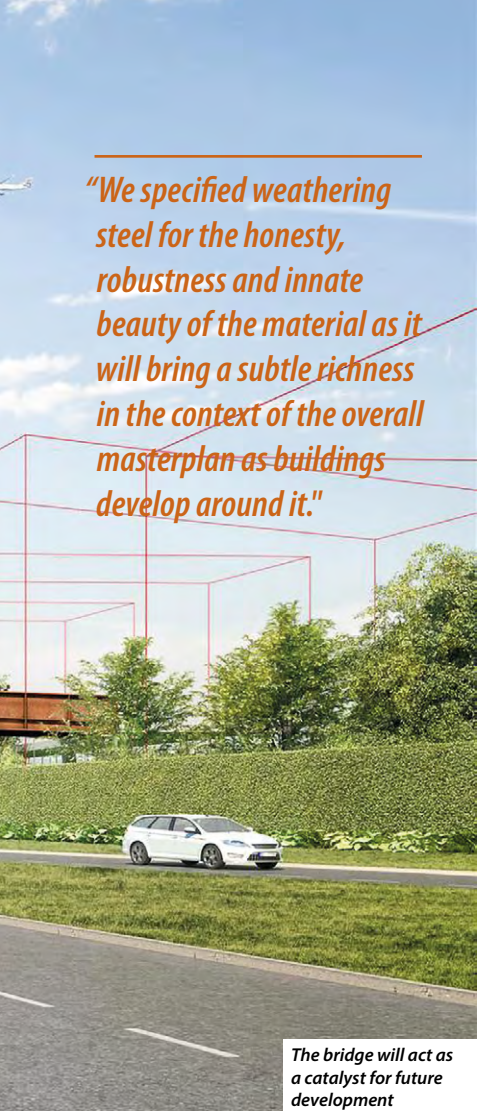
There are around 25,000 people working on the Manchester Airport site. It also has its Airport Academy training centre within its Ground Transport Interchange, which provides employment and training for local unemployed people. Earlier in the year, a state-of-the-art AeroZone interactive classroom opened, which will be used by all schools in Woodhouse Park and the wider Wythenshawe area.

The bridge will also serve as a vital link across the 73-acre site of main development land at Airport City Manchester, which has the capacity to deliver a diverse range of over 15,000 jobs across a number of sectors.

For the installation programme, the main steel walkway structure, measuring 78.5m-long and including the 50m-long main span between its two piers, was assembled in a car park adjacent to the bridge's final position. The assembly also included the installation of the concrete deck.

The three sections of each main plate girder were set on a series of trestles, using temporary restraint systems. The paired

"We specified weathering steel for the honesty, robustness and innate beauty of the material as it will bring a subtle richness in the context of the overall masterplan as buildings develop around it."



The bridge will act as a catalyst for future development

plate girders were then joined by bolted cross girders, aligned and fully butt welded together. The butt welds were also ground flushed for an aesthetic finish. A significant amount of temporary works was also installed, as this was required to provide the structure with adequate stability during the installation process.

The assembled walkway, weighing over 380t was rolled into position overnight by a specialised team of eight people, using two, 800t, 20-axle self-propelled modular transporters (SPMTs).

Cleveland Bridge, working in conjunction with the main contractor BCEGi, manoeuvred the structure into position during a 12-hour operation. The north and south approach staircases and lifts were installed in two subsequent and separate procedures.

Chris Droogan, Managing Director of Cleveland Bridge UK, says: "We are very proud to be part of such an important stage of the development of Airport City Manchester, which is such a significant location for the North of England. The unique design of the bridge, with its extensive collection of perforations, required the extensive experience of our skilled engineers and fabricators who have transformed the architect's vision into a structure that can be enjoyed by visitors and local people."

Jonathan Haigh, Managing Director of MAG Property and Airport City Manchester Development Management Leader, said: "The new bridge is a key component of the Airport City Manchester masterplan and capitalises on the exceptional connectivity to multiple modes of public transport at the Manchester Airport Ground Transport Interchange. In turn, this will underpin increased usage of public transport to more sustainably facilitate occupier needs and enhance convenience for employees, visitors and neighbouring residents alike.

"It's a striking addition to the local landscape, with the architecture reflecting our ambition to create a real sense of place and signal a high quality of environment. The bridge connects the emerging hotel district south of the M56 spur road to the larger swathe of development-ready land to the north, which is earmarked primarily for office and ancillary uses. It also enables car parking to be decanted away from the heart of the scheme helping to enrich the amenity value of public open spaces."

The new bridge at Airport City Manchester is set to open to the public in November this year and when fully complete it will blend into the neighbouring buildings with extensive landscaping and public realm, as well as providing feature ramps and passenger lifts to ensure it is accessible to all.

Design choice

According to RoC Consulting the alignment and span arrangement of the bridge was set to suit the Airport City Masterplan, following several iterations of the scheme, over several years.

The level of the bridge deck is governed by the required highway clearance above the spur road. The resulting elevation is approximately 6m higher than the proposed ground levels at each end of the crossing.

At concept design stage, consideration was given to various bridge forms, including composite beam, through truss, box girder and arch forms, before the half-through plate girder bridge was chosen.

This form was selected as it provided an economical solution for the crossing while also providing an architectural statement reminiscent of Manchester's industrial heritage.

The developed form consists of a pair of weathering steel plate girders, which both support the reinforced concrete deck and provide a parapet to protect bridge users. The primary plate girders are linked with weathering steel cross-girders at 2.5m centres which align with stiffeners to form the u-frames that give this type of bridge its lateral-torsional stability.

Pre-assembled offsite, a 78.5m-long section of the bridge was installed in one piece

The installation of the bridge was completed after a 12-hour operation

On completion 103 Colmore Row will be the city's tallest office block

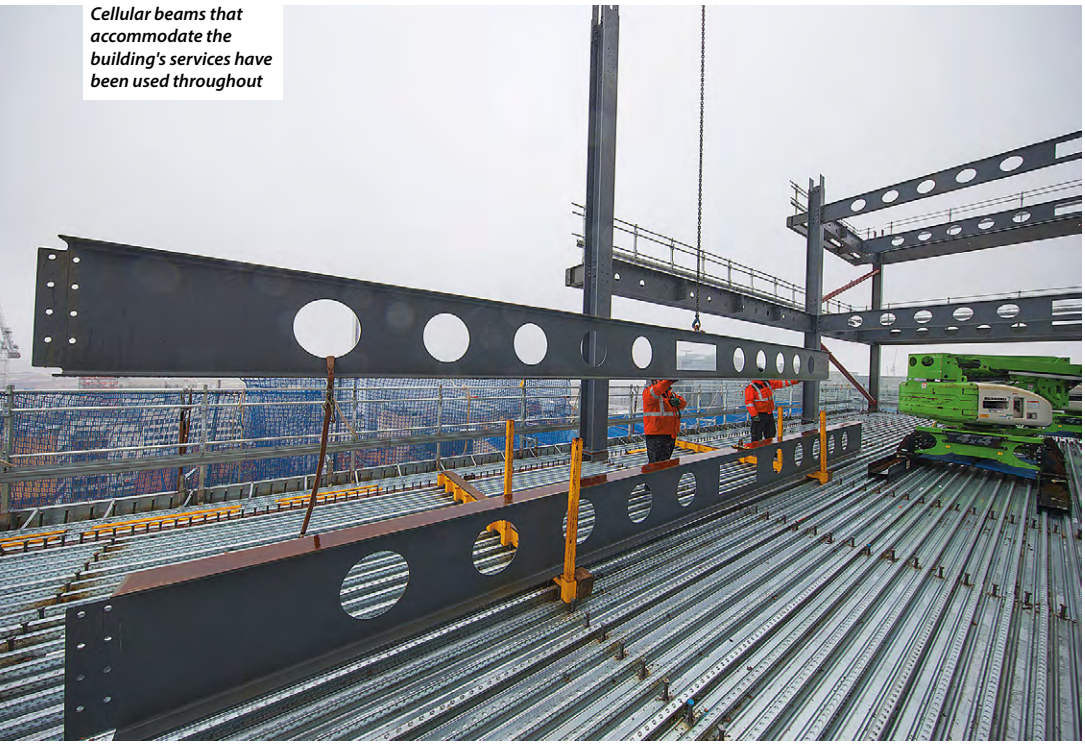
Second city landmark

A steel-framed solution has been chosen for the construction of 103 Colmore Row, which on completion will be Birmingham's tallest office tower. Martin Cooper reports.

When it completes in the summer of 2021, Birmingham will have a new 26-storey landmark structure, dominating its city centre skyline and providing 20,700m² of BREEAM 'Excellent' Grade A office space as well as a top floor restaurant offering 360-degree panoramic views.

103 Colmore Row is the tallest office tower currently under construction in the UK outside of London, and it is an example of how the commercial sector is thriving in locations other than the nation's capital.

Reaching a maximum height of 108m, the tower reuses an existing four-storey basement and the foundations from the plot's previous 1970s tower in order to minimise the cost of the substructure works. The weight of the steel-framed superstructure is distributed by a series of concrete transfer walls to the existing foundations were possible. As the footprint of the new building is slightly larger than the existing subterranean levels, some columns land outside of the existing basement and here new piles have been installed.



Cellular beams that accommodate the building's services have been used throughout

FACT FILE
103 Colmore Row, Birmingham
Main client: Sterling Property Ventures
Architect: Doone Silver Kerr
Main contractor: BAM Construction
Structural engineer: Davies Maguire
Steelwork contractor: Severfield
Steel tonnage: 2,440t

"Because we are re-using the substructure, we needed a lightweight frame for the building and so a steel-framed solution was the only viable option," says Davies Maguire Project Engineer Malcolm Archer.

The project's steel frame starts at basement level three, sat on top of a concrete transfer deck and derives its stability from a full height concrete core, which is positioned along the eastern elevation.

Positioning the core along one of the elevations, instead of in the middle of the structure, has helped the scheme to maximise the available floor space. The core's position was also dictated by the fact that the building has steps at levels 18 and 21, and the chosen elevation is the one area that reaches the full 26-storey height, allowing all of the lifts to be located in one place.

A series of Fabsec cellular beams radiate out from the core to create open-plan office space, which contains just one line of internal columns. The cellular beams span up to 12m and accommodate all of the building's services within their 350mm-diameter holes.

Commenting on the scheme's use of structural steelwork, Andrew Hawkins, Development Director, Sterling Property Ventures says: "More than 2,400t of steel has been used in the construction of 103 Colmore Row. The steel was predominantly manufactured in England and fabricated in Northern Ireland, which is great for the UK industry as well as reducing the building's carbon footprint. The mega columns at the entrance to the building provide one of its main architectural features, and are the largest of their kind in the city.

"Severfield fabricated, delivered and installed the steelwork in challenging circumstances. We are grateful for their

"Because we are re-using the substructure, we needed a lightweight frame for the building and so a steel-framed solution was the only viable option."

professionalism and commitment to this project."

The mega-columns Mr Hawkins is referring to are four large plated box girder members, measuring 18.5m-tall and fabricated from double web 30mm thick ArcelorMittal HISTAR® grade S460 steel. Each of the columns have 600mm-wide flanges and weigh 19.5t.

These large steel sections form one of the building's architectural highlights; a four-storey high winter garden that occupies the lower part of the structure along its main elevation.

For the first four levels, this one part of the building's office accommodation is set back by 9m behind the winter garden. From the fourth-floor upwards, the structure's offices sit atop the winter garden with the mega-columns supporting the front of the steel frame up to level 26.

As the name suggests, the mega-columns are so large they were the only steel elements that could not be installed by the site's tower cranes.

Severfield Project Manager David McGurk explains: "We had to bring a mobile crane to site in order to lift the columns into place. However, this large piece of kit required a temporary road closure, which meant we had to do the lifts during October when the nearby streets were closed due to an annual Xmas market.

"This meant the columns were installed ahead of the natural erection programme and they were initially erected with temporary supports, which were only removed once the main frame was erected around and above the columns and the permanent connections were made."

As well as an architectural feature of the scheme, the winter garden will also serve to extend the public realm of the surrounding area. To add some artistic interest, a large abstract steel sculpture, known as Equinox, weighing 700kg and measuring approximately 6m × 4.5m will be hung from the soffit of the garden's roof steelwork.

Along the northern façade of the building a further design feature has extended the amount of useable office space within the building by introducing a cantilever at second floor level over an adjacent service road.

Severfield has installed two large plate girders, weighing 16t and 14t respectively, that cantilever over the ▶20

More than 2,400t of structural steelwork has been used for the project

An offset core, along with long-span beams has created the maximum amount of floor space possible

▶19 thoroughfare by up to 3m, and carry the loads of 21-storeys above, back into the main frame.

As previously mentioned, Colmore Row has a couple of high-level steps (set-backs) in its design. At level 18 this forms a 278m² private outdoor terrace for tenants, while two further steps are located on either side of the building at floor 21, forming what have been dubbed the structure's shoulders.

Above the shoulders, one portion of the structure rises to the building's full height. This contains a kitchen and back-of-house zone on level 23, while the remaining uppermost floors will house the Lantern restaurant that overlooks the city of Birmingham.

Summing up, Waheed Nazir, former Corporate Director Economy at Birmingham City Council, says: "103 Colmore Row is a massive vote of confidence in Birmingham. The commitment to this major new building will bring high quality office space to the heart of an expanding central business district and shows that Birmingham continues to be a hugely attractive place to invest and do business."

103 Colmore Row is scheduled for practical completion in June 2021.

Four mega columns support the front of the building and create a four-storey winter garden

Mega columns at Colmore Row

David Brown of the SCI considers the use of S460 HISTAR® used for the "mega columns" at Colmore Row

HISTAR® is produced by ArcelorMittal in S355 and S460. The advantages of 'regular' S460 over lower grades are clear – increased strength means comparatively smaller sections of lighter weight and more usable space. For rolled sections in compression, such as columns, a further advantage of S460 is that the buckling curves in BS EN 1993-1-1 improve by either one or two steps. In the critical minor axis, for rolled column profiles with a flange up to 100 mm, the specified curve improves from curve "c" to curve "a", representing a significant increase in resistance.

If the member is fabricated by welding, Table 6.2 of BS EN 1993-1-1 specifies the same buckling curve for all steel grades. The "mega columns" at Colmore Row were fabricated from plate with twin webs – the advantage of S460 in this case is the increased strength.

HISTAR® is manufactured in accordance with a European Technical Approval (ETA) 10/0156. Importantly, the design strength for HISTAR® S460 does not reduce until the material thickness exceeds 100 mm. Compared to the design strength from BS EN 10025-4, which specifies a reduced design strength at thickness steps of 16, 40, 63 and 80 mm, the increase in resistance can be significant. In HISTAR®, the 90 mm flanges have a design strength of 460 N/mm², compared to 400 N/mm² for 'regular' S460.

ETA 10/0156 also specifies the correction factor β_w to be used with HISTAR® S460 for fillet welds as 0.8, in contrast to the value of 1.0 specified in Table 4.1 of BS EN 1993-1-8. The use of $\beta_w = 0.8$ leads to a higher weld strength and thus smaller weld sizes compared to 'regular' S460.

The Carbon Equivalent Value (CEV) is a critical material characteristic when preparing welding procedure specifications – a higher CEV makes defect-free welds more difficult. The maximum CEV for HISTAR® S460 up to 63 mm thick is 0.41, which compares favourably with 0.47 for 'regular' S460 of the same maximum thickness.

Fabricated box sections offer opportunities to adjust the cross-section to suit the applied loading and buckling length in both axes. The disadvantages are the fabrication effort and for closed cross sections, the possible complexity of the connections. Connections to box sections are often via fin plates, or beam stubs, or by 'blind' fixings with access from one side only.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Steel's the ticket for new rail depot

Structural steelwork has played an important role in the construction of Northern Railway's new maintenance depot in Manchester

Train services in the North of England are getting a boost as Northern Railway is investing £20M to revamp its Newton Heath train depot in Manchester, in order to increase the maintenance capability of the site, which in turn will improve reliability and punctuality for its customers.

The company's new diesel trains will be housed at Newton Heath and a team of 300 staff will be responsible for routine servicing, maintenance, upkeep and repair, much of which is carried out at night to keep trains in passenger service during the day.

The building accommodates four railway lines and is served by two overhead cranes

Explaining the decision to upgrade its facilities, Northern's Engineering Director Ben Ackroyd says: "We want to make sure we can get as many trains as possible in service for customers and to do that we need state-of-the-art engineering facilities and expert technicians and engineers.

"Train maintenance depots are the unseen critical element of the railway and we are delivering multi-million investment across the region to improve and expand these operations."

The new train facility is being built by Stobart Rail & Civils, with Border Steelwork Structures (BSS) fabricating, supplying and erecting the steel frame as well as installing roof and wall cladding, and doors and louvres.

Overall the new depot is one large portal frame measuring 135m-long × 24m-wide, which contains four railway lines and two overhead gantry cranes that are incorporated into the primary steel structure.

Attached to one of the main elevations, the depot also includes a 91m-long x 5m-wide ancillary building that will house a two-storey office, workshops, a kitchen, toilets and a plant room.

The main frame is a twin-span propped portal, with a single row of internal columns running along the spine of the structure and splitting the building into two 12m-wide spans.

"These central columns are working extremely hard because as well as supporting the roof, they support crane rails on either side and maintenance walkways," says Craddys Managing Director Colin Davidson.

Each span of the building has its own 10t-capacity overhead gantry crane. They are both supported on crane beams, which are attached to the perimeter columns and either side of the spine columns.

One of the structure's spans has a maintenance walkway that allows workers access to trains at roof level. It spans one rail track and offers a safe working from height environment. One end of this walkway is supported from the hard-working spine columns and the other from a series of smaller steel members positioned between the span's two rail tracks.

As well as the high-level walkway, the spine columns also support two lower walkways, one on either side, that allow access to the trains at the carriage and driver's door level.

As well as being serviced by the walkways, the two central rail tracks, either side of the spine columns, are elevated to make maintenance work easier to undertake.

Model showing the twin-propped portal frame

This required BSS to install 520 steel stub columns to support these railway tracks.

Meanwhile, the two outer railway tracks have maintenance pits incorporated into the structure's concrete substructure. One these rail lines also has a vehicle lifting road, which is a floor designed with jacking points for 16 × 15t synchronised lifting jacks that can raise the carriages for maintenance inspections.

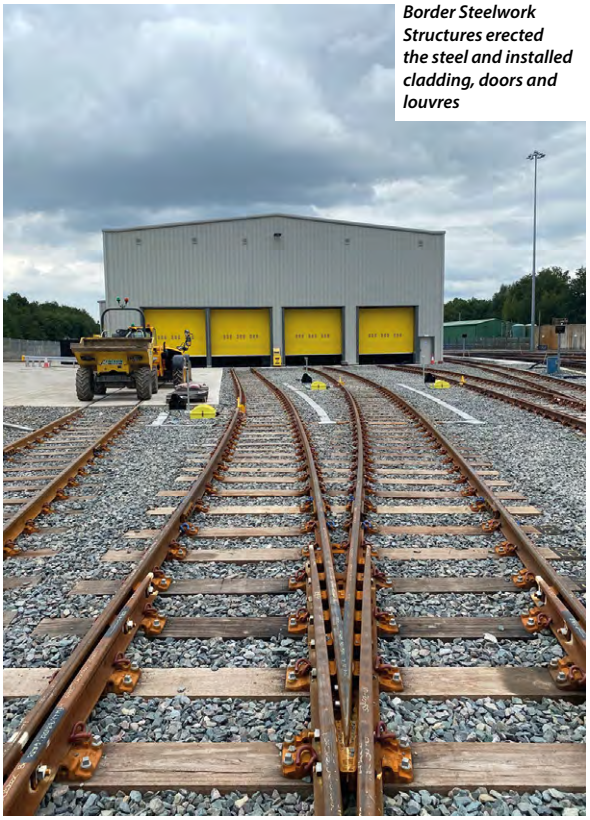
Previously these carriages would have to have been split to allow undercarriage components such as engines and wheel sets to be replaced. Having the ability to lift a whole train in one go will speed up renewals meaning trains can re-enter customer service sooner.

The new steel-framed depot is supported by steel piles and a grillage of reinforced concrete ground beams. The installation of these foundations could only commence once an extensive groundworks programme was completed.

The groundworks were completed at Newton Heath prior to the construction of the new maintenance shed. More than 50,000 tonnes of soil were removed from the site and 521 piles were sunk into the ground to support the structure. A reinforced concrete slab and holding down bolts were then installed, to allow the steelwork erection programme to commence.

Summing up, Stobart Rail & Civils' Project Manager George Smith says: "With two roads mounted above pits and two on steel plinths, the concrete base of the shed includes some complex formwork and construction sequencing to deliver the varying finished floor levels. During design development, an optimised solution was formulated to use thickened ground beams that will also act as permanent earthworks support during reduced-level excavations. This minimised any temporary support requirement and provided a robust foundation of edge protection for the site team.

"Overall, the job is quite a complex build. The coordination of the various works and trades was the biggest challenge to us meeting the programme. Our sub-contractors, especially the steel erectors, had a lot of working from height, which had to be coordinated around other works."



Border Steelwork Structures erected the steel and installed cladding, doors and louvres

FACT FILE
Newton Heath rail maintenance depot
Main client: Northern Railway
Main contractor: Stobart Rail & Civils
Structural engineer: Craddys
Steelwork contractor: Border Steelwork Structures
Steel tonnage: 390t

Coordination was key, as steelwork erection was completed while many other trades were also on site

The development of design rules for restrained columns

Following on from the previous two articles, David Brown of the SCI looks back at the development of design rules for restrained columns. Looking at the work in the 1950s and 1970s reveals the background for many of the features found in today's design standards

The June and July/August articles on restraints around portal frames encouraged a closer look at the rules defining the resistance of restrained columns, making the link between the current rules in BS 5950 and BS EN 1993-1-1 and the salient technical papers published in the 1970s. The work on columns with restraints refers back to earlier rules covering unrestrained columns and unadopted recommendations to modify BS 449, the design standard of the time.

Early research

The most significant papers covering restrained columns are *Design of columns restrained by side-rails*[1] and *Failure of columns laterally supported on one flange*[2], both by Horne and Ajmani, published in 1971 and 1972 respectively, and the record of the associated discussion published in 1973[3]. The authors and contributors include a number of very well-known names in the steelwork world. Professor Horne OBE is a co-author of *Plastic design of Low-Rise Frames*[4] which used to be the definitive work in the UK on portal frame design and detailing. A contributor to the discussion was Dr Morris, co-author of the aforementioned publication, and forever known by the shear stiffener which takes his name. Other contributors to the discussion include Dr Wood, known for the effective length curves found in Appendix E of BS 5950, Professor Nethercot, widely known for most things in steelwork and Mr Needham, who is known for his work with CONSTRADO, the forerunner to SCI.

Dr Ajmani was the Chief Design Engineer for the Tata Iron and Steel Company of Jamshedpur, India. Clearly Dr Ajmani would not know that decades later, his company would buy Corus, previously known as British Steel, Jaguar Land Rover and Tetley Tea - and be so significant in the UK steel industry.

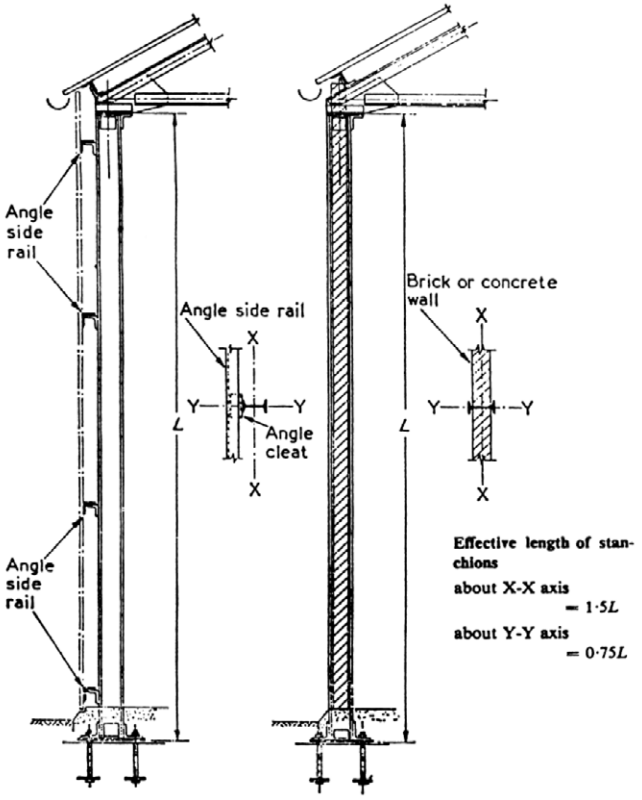


Figure 1: Effective lengths of stanchions according to BS 449 (Figure 15)

The 1971 and 1972 papers present the rules for members restrained on one side only – the tension flange, as typically found with a portal frame column. The work undertaken by Horne and Ajmani leads directly to the stable length rules found in Section 5 and Annex G of BS 5950. In turn, this leads directly to the rules found in BS EN 1993-1-1 section BB.3. Some 50 years later, current design rules depend on this research from the 1970s.

The discussion of the paper is perhaps most interesting. At the time, the UK design standard was BS 449. This standard offered guidance on the effective length of "stanchions" in Appendix D, and proposed that if a stanchion was restrained by side rails, the effective length factor in the minor axis was 0.75*L*. No limitation was placed on the maximum spacing of side rails – the effective length was always 0.75*L*. Figure 1 (Figure 15 from BS 449) is interesting in that the side rails are angles, and are drawn as a considerable proportion of the stanchion depth – around 50%. This is quite different to details found today.

A Professor Bryan was moved to comment that "as Sir John Baker once said, the effective length concept is most unsatisfactory in that one takes the length of a column and then multiplies it by a factor which very much depends on what you had for breakfast". Professor Bryan was complimenting Horne and Ajmani for their contribution in advancing the guidance. The work of Baker *et al* is discussed later in this article, though Baker himself correctly credits a Mr John Mason with the original quote.

Another contributor, Mr Dwight, noted that "it will at last be possible to take account of the restraint afforded by sheeting rails connected to the tension flange". Mr Dwight also commented on "the practice sometimes adopted of bracing the sheeting rail back to the inner flange of the stanchion, thereby supposedly providing restraint to the compression flange". Mr Dwight appears to be sceptical about the effectiveness of the system commonly employed nowadays. Mr Dwight assumed that there was "negligible advantage in doing this because of the great flexibility of the sheeting rail". Professor Horne proposed verifying the relative stiffness of sheeting rail and restrained member – the checks appear in the SCI publications on portal frames with the recommendation that the verification is important when the member size starts to be disproportionate compared to the side rail.

Dr Morris recalled previous practice (he referred to the mid-1950s) and the "relatively simple calculations one used". He noted that "it would seem that as our knowledge of structural behaviour is extended, the design process is refined and becomes complex, and it may be the case in the near future of reverting back to simple elastic design". Although Dr Morris was apparently enthusiastic about elastic design, some ten years later he collaborated with Professor Horne to publish the definitive guide on plastic design of portal frames[4]. Since 1970, the design process has become ever more complex, frequently reliant on computer aided analysis and member verification by software, rather than the simplicity Dr Morris suggested.

The 1970s were clearly a significant time for the development of the design rules for portal frames. In 1979, Professor Horne collaborated on a further paper considering the stability of haunched members[5]. The design rules for haunched and tapered members in Section G of BS 5950 follow from this paper, and from then were "translated" into Eurocode nomenclature in

▶26

▶24

Section BB.3.2 of BS EN 1993-1-1. Eurocode expressions such as BB.14 and BB.16 (and their equivalents in BS 5950) can be immediately recognised in the 1979 paper.

The reference to "Point A", still used today, as the all-important junction between the bottom flange of the haunch and the inside face of the column is found in this paper, as illustrated in Figure 2 (Fig 1 from Horne *et al*)

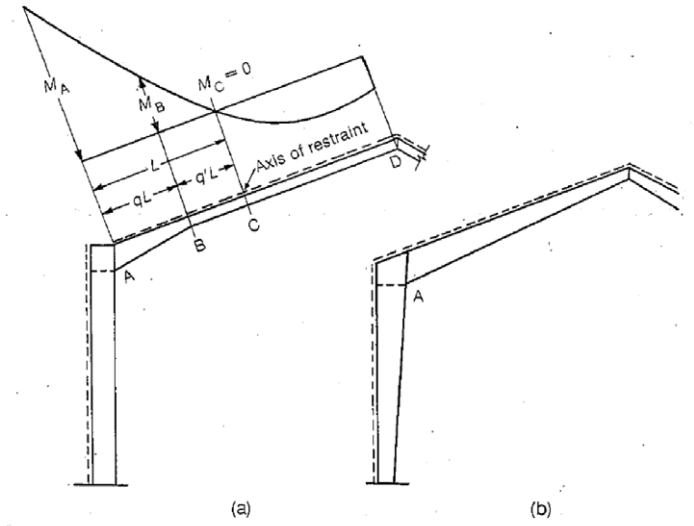


Figure 2: "Point A" – where inner flanges meet (Fig 1 from Ref 5)

The steel skeleton

The comment by Professor Bryan referring to Sir John Baker moves us back another step to the early 1950s and the two volumes of *The Steel Skeleton*[6,7]. Volume 1 covers "Elastic Behaviour and Design". Volume 2 covers "Plastic Behaviour and design" and perhaps it is no surprise that a co-author of volume 2 was Professor Horne – described as "one of the leading protagonists of plastic design".

Both volumes are worth reading, containing some really interesting history. Volume 1 looks back further to 1929 when an investigation was undertaken to investigate the application of modern theory to the design of steel structures. This review considered practice in the UK, New York, Germany, France, Spain, Prussia and Belgium. The live loads to be designed for in different countries varied, as they did in various UK cities. Edinburgh and Glasgow agreed that halls, schools and churches must be designed for 180lb per sq.ft, (8.6 kN/m^2) whereas Newcastle was content with 112 lb per sq.ft (5.4 kN/m^2). Perhaps children and worshippers were not so socially distanced north of the border.

Volume 1 also records the live load reductions that were allowed in various countries, linking to the reduction factors we find in modern codes.

The significance of the loaded area reduction is also evident in the intensities of loading surveyed. Who would want to work in a (presumably claustrophobic) small finance company, when the loading was measured at 11 kN/m^2, compared to a structural engineering company at 4.5 kN/m^2? However, when measured over a larger area, the situation is more comfortable; the loadings become 0.9 and 0.6 kN/m^2 respectively. Over a larger measured area, "consulting engineers" (as opposed to "structural engineers") fare the worst at 1.7 kN/m^2. The survey also noted that concentrated loads, such as fire cabinets and safes needed special attention – another principle found in our modern loading codes.

Of equal interest in Volume 1 are the tests undertaken on real buildings. For one building, a hotel under construction by Dorman Long, it was suggested that a few platoons of soldiers from a nearby barracks could have been used to provide a well-distributed load. In the event, point loads were suspended from the beams. Strain gauge readings were affected by the riveting operations - a hazard not experienced today. A summary of the findings is that the measured effects in beams and stanchions were not as expected. Professor Baker described the behaviour as "radically different from that assumed in the design methods in common use". One key difference was that the riveted connections were relatively stiff, making the frame behaviour more like a rigidly jointed frame than a pin-ended arrangement. It is worth remembering that designers are *modelling* loading and *modelling* the structure and its response.

The Steel Structures Research Committee produced "Recommendations for Design" based on these studies, which was essentially a semi-continuous design method, recognising the stiffness of the connection types used at the time. Unsurprisingly, the connections had to be classified (based on the detailing) – which was associated with the connection stiffness. We might reflect on the current guidance in BS 5950 that the detailing of the connections must be consistent with the assumptions made in the frame analysis, and the explicit requirement in the Eurocode to classify connections and allow for connection stiffness if the effects are significant. This is the same principle advocated in the proposed design method some 90 years ago.

The proposed design methods, published in 1936, were complicated. Baker comments that despite the constructional steel industry paying for the research for a period of 7 years "neither the industry itself nor consulting engineers generally felt any enthusiasm for the outcome of their labours". Baker noted that "whatever criticism could be levelled at the method of design which had held the field for nearly fifty years, it certainly had the merit of simplicity; in fact it would be difficult to imagine anything simpler". Baker also noted that the recommended procedures were laborious, and there was "no advantage that the average client would appreciate". The orthodox method of design was shown to be safe, if quite conservative in some cases.

Wartime regulations

Once war broke out, steel was a very important commodity. A wartime amendment was made to BS 449 which increased the permissible stresses by 25%. Baker notes that "this earned the taunt that the engineer had discovered that steel was stronger in war than in peace, whereas all he was admitting was

that greater risks had to be taken in wartime".

In 1939, a recommendation was made that for government buildings, design should be based on the "more exact design methods" proposed by the Committee, but Baker notes "there is no evidence that this last wise recommendation has ever been acted upon".

Holding nothing back!

In 1943, BS 449 was revised, still not embracing the more exact methods. One senses a degree of disappointment when Baker notes "the third revision…. owes nothing to the tests of existing buildings and the other resources… except that it has achieved almost all the economy possible in beams without bothering to define the vital end-connections to be used". He suggests it perpetuates "a design method which neglects almost every effect but axial load and can only be defended on the score of expediency". He does not spare his criticism – the method which was originally adopted as "an empirical method well proved by years of use to be safe… has been changed in a haphazard way unjustified by practical experience or the results of scientific investigation". The method which so frustrates Baker is the assumption of nominal moments due to beam end reactions 100 mm from the face of a column – a method still loved in the UK found in clause 4.7.7 of BS 5950 and available to Eurocode designers via NCCI.

Baker concludes that further economy was certainly possible and that too much attention should not be paid to the complexity of the proposed design method "for it does less than justice to the abilities of steelwork designers". Some 70 years later, perhaps we are on the advent of embracing semi-continuous design, being armed with numerical methods and software that will determine the stiffness of connections and software which can include connection stiffness in the frame analysis.

Lessons from the war

Appendix B of Volume 1 reports on multi-storey steel frames subject to air attack. The appendix notes that it also shows what happens when these structures are subject to conditions of overload.

Of interest is the comment that "the floor (construction) which can best tie the members of the main frame together is to be preferred". Today, we would discuss the subject under "the avoidance of disproportionate collapse". Baker notes that "hardly ever does progressive collapse take place", unless "the explosion caused failure of certain beam-to stanchion connections" (on the façade) "and allowed the external wall framework to move outwards, when a certain amount of collapse ensued". Today, we would recognise the need for connections to not only carry the vertical shear, but also the tying forces to avoid exactly this problem. The appendix also makes recommendations about the layout of beams, which we would recognise as the arrangement of horizontal ties. Despite these clear recommendations, the disproportionate collapse at Ronan Point in 1968 (Figure 3) is usually noted as the catalyst for the modern tying rules, perhaps because the risk of blast from high explosive ended in 1945.

Conclusions

Many of the features of our modern codes have their roots in work completed many years ago – some expressions are precisely those proposed over 50 years ago. That original work was hugely significant, influencing much of what we do today, from loading to resistance calculations. Perhaps the tools that structural engineers now have available will finally facilitate progress from the empirical methods which Professor Baker described as "almost entirely irrational and therefore incapable of refinement".

To appreciate something of the background and reasons for certain requirements must always be helpful. As Professor Baker notes: "it is important that the steelwork designer should not become a technician blindly applying irrational rules. He can only escape from this role if he has the information on which he can base better rules"

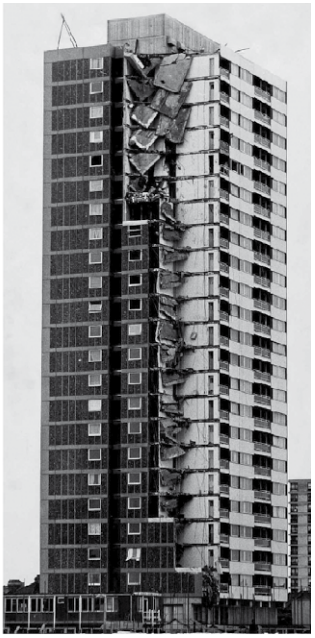


Figure 3: Ronan Point

1 Horne, M. R. and Ajmani, J. L.
Design of columns restrained by side rails
The Structural Engineer, August 1971

2 Horne, M. R. and Ajmani, J. L.
Failure of columns laterally supported on one flange
The Structural Engineer, September 1972

3 *Failure of columns laterally supported on one flange; Discussion*
The Structural Engineer, July 1973

4 Horne, M. R and Morris, L. J.
Plastic design of low-rise frames
Collins, 1985

5 Horne, M. R. Shakir-Khalil, H. and Akhtar, S.
The stability of tapered and haunched beams
Proceedings, Institution of Civil Engineers, Part 2, September 1979

6 Baker, J. F.
The steel skeleton, Volume 1, Elastic behaviour and design
Cambridge University Press, 1954

7 Baker, J. F; Horne, M, R; Heyman, J.
The steel skeleton, Volume 2, Plastic behaviour and design
Cambridge University Press, 1956

AD 448: Support to profiled steel decking

It is now over ten years since the revised edition of P300 was published by SCI. This work, in collaboration with the Metal Cladding and Roofing Manufacturers' Association (MCRMA), benefitted from considerable practitioner input. Since the demise of the MCRMA's decking group, more recent practitioner comment on updating the content has come from BCSA's Cold Formed and Metal Decking Group.

One area where the BCSA Group felt it was worth adding some more detail concerns the support provided to steel decking around penetrations, and at ends and edges.

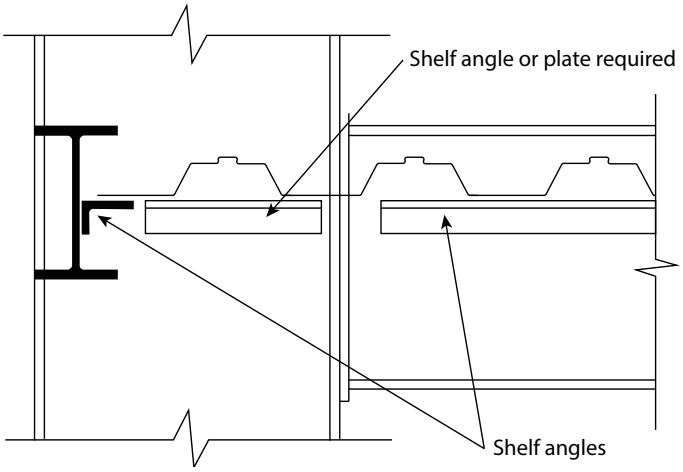


Figure 1: Decking penetrated by a 'wide' column and requiring additional end support

Support around a penetration

The guidance in P300 says that flashing should not be used to support decking around penetrations. Such supports should be provided by shelf angles or similar. The BCSA Group confirms this approach, and notes that the need for shelf angles should be identified at the design stage. This will mean they can be included as part of the shop fabrication and thereby fixed in a controlled environment rather than on-site and potentially working at height.

P300 states that such (structural) support should be provided when the decking is penetrated by a column resulting in a deck edge dimension in excess of 250 mm with no beam underneath to provide support. Figure 1 is taken from P300, showing a column with a 'width' in excess of 250 mm and the decking around this column therefore requiring end support from an angle fixed to the column web. The figure also shows shelf angles providing end support to the decking abutting the beam framing in to the column flange, and edge support to the decking abutting the beam framing in to the column web.

The BCSA Group has added some detail to this requirement, based on the fact that decking is effectively one-way spanning and so noting that:

- Up to 250 mm is acceptable as a structurally unsupported length along the edge of decking
- At the ends of the decking this critical dimension should be reduced to 50 mm

End and edge supports

The BCSA Group confirms that the guidance given in P300, namely that shelf angles should be used, remains current. Also, as for support around penetrations, that the shelf angles are identified during design and included as part of the shop fabrication.

When a soffit is exposed, and so aesthetics are important, where practical continuous support should be provided to all ends and edges.

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Tel: **01344 636555**
Email: **advisory@steel-sci.com**

New and revised codes & standards

From BSI Updates August 2020

BS EN PUBLICATIONS

BS EN ISO 1182:2020
Reaction to fire tests for products. Non-combustibility test
supersedes BS EN ISO 1182:2010

BS EN ISO 10863:2020
Non-destructive testing of welds. Ultrasonic testing. Use of time-of-flight diffraction technique (TOFD)
supersedes BS EN ISO 10863:2011

BS EN ISO 19650-5:2020
Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM). Information management using building information modelling. Security-minded approach to information management
no current standard is superseded

BS IMPLEMENTATIONS

BS ISO 21678:2020
Sustainability in buildings and civil engineering works. Indicators and benchmarks. Principles, requirements and guidelines
no current standard is superseded

BS ISO 22410:2020
Corrosion of metals and alloys. Electrochemical measurement of ion transfer resistance to characterize the protective rust layer on weathering steel
no current standard is superseded

PUBLISHED DOCUMENTS

PD 6705-2:2020
Structural use of steel and aluminium. Execution of steel bridges conforming to BS EN 1090-2. Guide
supersedes PD 6705-2:2010+A1:2013

CORRIGENDA TO BRITISH STANDARDS

NA+A1:2020 to BS EN 1991-2:2003
National Annex (informative) to BS EN 1991-2:2003, Eurocode 1: Actions on structures. Traffic loads on bridges

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN ISO 9018:2015
Destructive tests on welds in metallic materials. Tensile test on cruciform and lapped joints

BS EN ISO 14919:2015
Thermal spraying. Wires, rods and cords for flame and arc spraying. Classification. Technical supply conditions

BS EN ISO 23277:2015
Non-destructive testing of welds. Penetrant testing. Acceptance levels

BS EN ISO 23278:2015
Non-destructive testing of welds. Magnetic particle testing. Acceptance levels

NEW WORK STARTED

EN 15942
Sustainability of construction works. Environmental product declarations. Communication format business-to-business
will supersede BS EN 15942:2011

EN 15978-1
Sustainability of construction works. Methodology for the assessment of performance of buildings. Environmental Performance
will supersede None

ISO 22058
Construction procurement- guidance on the development of strategy and tactics
will supersede None

PD 7974-7+A1
Application of fire safety engineering principles to the design of buildings. Probabilistic risk assessment
will supersede PD 7974-7:2019

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Set square in Steel

FROM
Building with Steel
November 1970

A few years ago Ken Bartlett designed a steel housing system for a competition organized by the then ECSC. He has recently developed his ideas further and the Mk II version is described here. There are no immediate plans to go into production, though one day - who knows? - but then Bartlett is already thinking of Mk III

Design Philosophy

Producing an industrialized building system in steel was an opportunity to update house form to bring it into line with 20th Century technology. It was felt that the traditional house plan with three bedrooms up and living room below has existed too long, rigidifying living habits, and failing to exploit new building materials and engineering technology to the full.

It is important to make the most of every square metre of floor area. The all-purpose room will be one approach, ensuring that the whole interior of the dwelling can be used at all times during the day. It is uneconomical to allot one half of the house to sleeping and one to living, when with purposeful planning the whole area can be used for living. Again useable floor space is often reduced by loose fittings. In this scheme it is proposed that unrequired fittings, perhaps additional chairs, be stored in the interfloor space accessible from the floor above for immediate use when required.

In fact everything should be capable of addition, reduction and rearrangement. On a larger scale, clip on cupboards and storage units can be added or removed as necessary, also rooms, balconies and porches can be added or taken away.

The rigid use of a module vertically and horizontally will go a long way to give aesthetic control over future additions and alterations which may be made to the dwelling, but a comprehensive handbook, like a car maintenance manual, will be required to instruct where and where not to bolt on an extra room.

Twentieth Century technology also gives opportunity for complete environmental control. Ventilation can be provided mechanically where it is needed at the correct temperature. Similarly, light should be provided where it is needed at the intensity it is needed. This does not preclude daylight and sunshine (without solar gain), essential to the tolerant living atmosphere. Engineering services become more an essential consideration as the house becomes more 'machine' orientated. In this scheme these are accommodated in the interfloor space with easy access for maintenance and alterations.

Modifications to Original Project

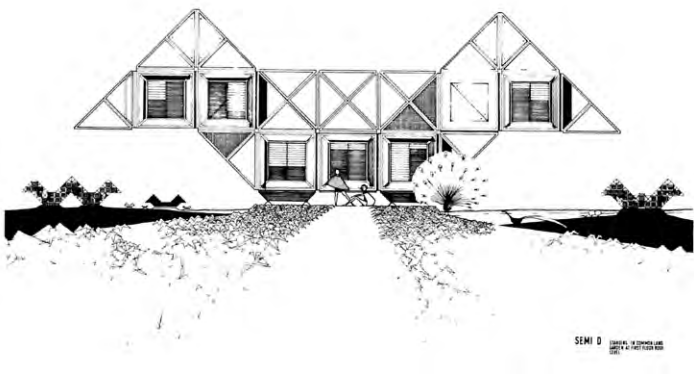
The above was the design philosophy in the original project but modifications have been made to this to make the scheme simpler and more economical, without losing any of the original aims.

The prime consideration was to reduce in size the steel pressing. This is done by the reduction of panel size to a triangular form which combined and fitted to the structural member forms the largest solid panel. It is also intended to reduce the number of variables even further and yet not lose the flexibility of the system. This is done by designing pieces which, when used in other planes, perform other functions.

The same pieces, for example, are used to make up walls, floors and roofs. All components are designed for as many varied functions as possible. Economies are made on the original project by the omission of certain repetitive elements unnecessary to the structure. For example, the structural element was in many cases superfluous but had to be used for the continuity of the system or the purity of the method. The revised version allows the structural element to be omitted when not needed. In a multi-

storey structure a four-column cluster formed by the use of four structural elements is required at the lower floor level, but three- or two-column clusters only are required on upper floor levels.

As the components can be used in various positions to fulfil various functions, this thesis can include the whole structure. The structure element gives diagonal bracing enabling the dwelling assembly to be erected upside down or on its side and the 3m cubes give workable floor space in any direction. This is intended to illustrate the various dwelling profiles that can be incorporated into a group of dwellings erected in the estate context.

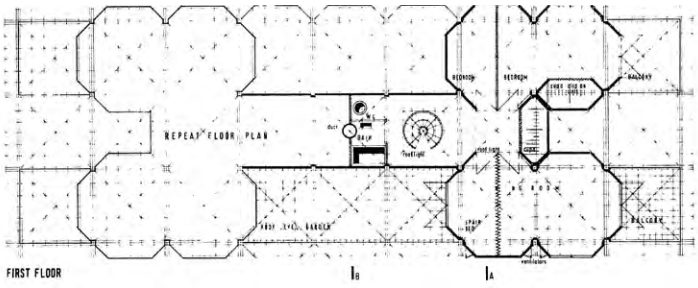


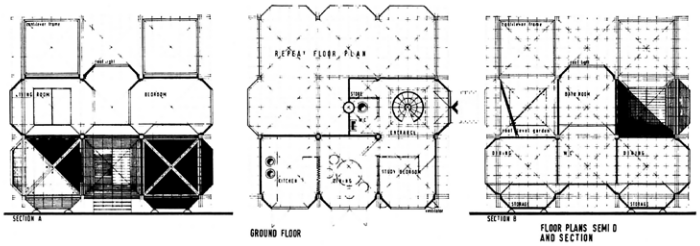
Materials

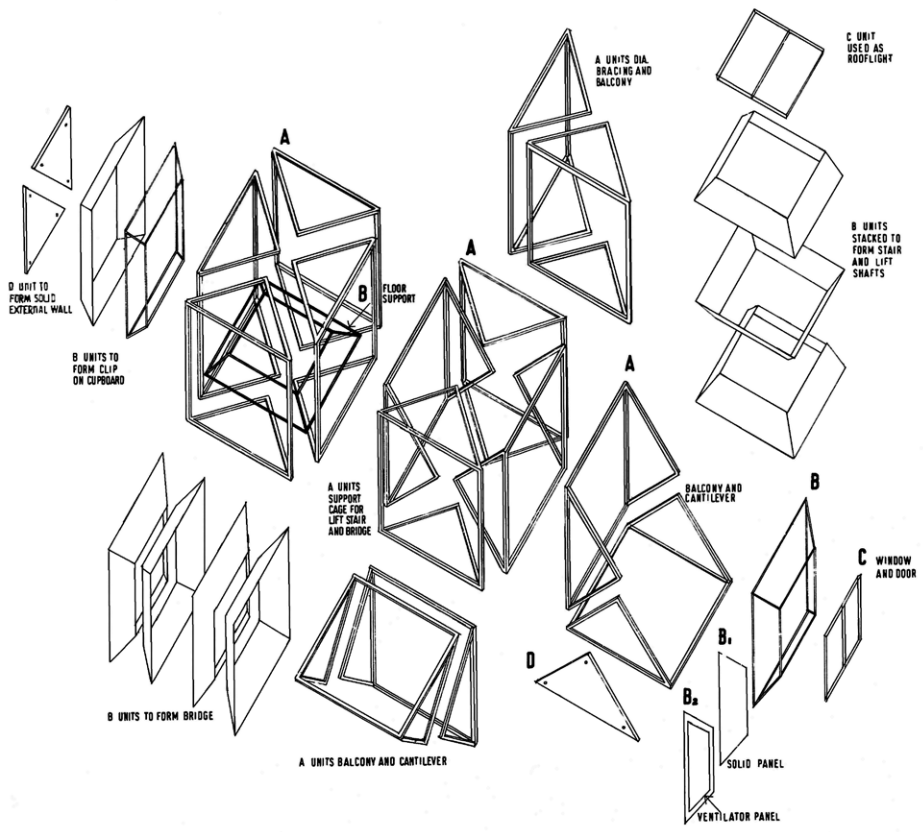
External panels are of plastic coated steel with insulation backing. The panels will be in a variety of colours and canvas sun and wind baffles can also be tied in the triangle formed by the bracing of the structural element.

The components illustrated form only the carcass of the dwelling, though it is intended that the back of the panels are treated as the finished interior surface. To the carcass will be added interiors to cupboard fittings, bathroom and kitchen fittings and internal doors and partitions to complete the dwelling.

The fire resistance to the structure element is suggested in the traditional way with 25mm asbestos casing to the square section tubes. Then plastic coated steel casings detailed to fit the pressed panels. However, a more imaginative and certainly economical way would be to liquid fill the square tubes themselves. If the dwelling is subject to fire the continuous loop of the structure element would circulate the liquid, like a gravity feed heating system, thus keeping the steel temperature down for the time required by byelaws. This, however, is something to be worked out in the Mk III design.







UNITS REQUIRED TO COMPLETE CARCASS OF STRUCTURE

A STRUCTURE

Using 50mm square section cased with 25mm asbestos with plastic coated steel finish

These are bolted together to give 'spider web' construction

For 2 and 3 storey structure the 3m cube can be formed from 2 A units but for greater heights 4 A units are required on lower floors giving centre column cluster of eight 50 mm square tubes. Extra lateral bracing can be given by solid infill panel C where required

These units can be put together to form cantilevers, balconies, diagonal corner bracing and diagonal balconies, bridge bracing and lift shaft bracing

B CLADDING FRAME

This unit will support projecting windows framing to floor, convert with solid panel C to clip on cupboard units, form rooflight framing, form cladding frame to bridge staircase and lift shafts

B_1 CLADDING B_2 TO B

This unit used externally is clad with plastic coat sheeting with ventilators where required for room ventilation

C GLAZING

Double glazed units with blind between to form fixed glazing single or double doors and fixed roof lights

D SOLID PANEL

Of plastic coat sheet steel with thermal insulated backing. This unit gives solid wall units lateral and diagonal bracing, underfloor and roof panels.

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Lorraine MacKinder, Marketing and Membership Administrator,
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*

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

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

BIM BIM Level 2 assessed
QM Quality management certification to ISO 9001
SCM Steel Construction Sustainability Charter
(● = Gold, ● = Silver, ● = Member)

Notes

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

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●			2			Up to £3,000,000
Adey Steel Ltd	01509 556677	●		●	●	●	●	●	●	●	●			●	●	✔	3		●	Up to £4,000,000
Adstone Construction Ltd	01905 794561			●	●	●	●							●		✔	2	✔	●	Up to £3,000,000
Advanced Fabrications Poyle Ltd	01753 653617				●	●	●	●		●	●			●	●	✔	2			Up to £800,000
AJ Engineering & Construction Services Ltd	01309 671919			●	●		●		●	●	●			●	●	✔	4		●	Up to £3,000,000
Angle Ring Company Ltd	0121 557 7241												●			✔	4			Up to £1,400,000*
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2			Up to £800,000
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 £4,000,000
Caunton Engineering Ltd	01773 531111	●	●	●	●	●	●	●		●	●	●		●	●	✔	4	✔	●	Above £6,000,000
Cementation Fabrications	0300 105 0135	●			●		●	●	●	●	●		●	●	●	✔	3		●	Up to £6,000,000
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4		●	Above £6,000,000
CMF Ltd	020 8844 0940				●		●	●		●	●				●	✔	4			Up to £6,000,000
Cook Fabrications Ltd	01303 893011			●	●		●			●	●			●	●		2			Up to £1,400,000
Coventry Construction Ltd	024 7646 4484			●	●	●	●	●	●	●	●	●		●	●	✔	4			Up to £1,400,000
D H Structures Ltd	01785 246269			●	●		●				●						2			Up to £40,000
D Hughes Welding & Fabrication Ltd	01248 421104				●	●	●	●	●	●	●		●	●	●	✔	4			Up to £400,000
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	✔	●	Up to £6,000,000
EvadX Ltd	01745 336413			●	●	●	●	●		●	●	●			●	✔	3		●	Up to £3,000,000
Four Bay Structures Ltd	01603 758141			●	●	●	●	●		●	●			●	●		2			Up to £1,400,000
Four-Tees Engineers Ltd	01489 885899	●			●		●	●	●	●	●		●	●	●	✔	3		●	Up to £2,000,000
Fox Bros Engineering Ltd	00 353 53 942 1677			●	●	●	●	●		●	●				●		2			Up to £2,000,000
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●	●	✔	2			Up to £1,400,000
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 £3,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●			●	●		●		✔	4		●	Up to £6,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			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
LA Metalworks Ltd	01707 256290				●	●				●	●			●	●	✔	2			Up to £2,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●					✔	2			Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●		●		●	●	●			●	●		3			Up to £800,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✔	4		●	Up to £3,000,000
M J Patch Structures Ltd	01275 333431				●					●	●				●	✔	3			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
Mifflin Construction Ltd	01568 613311			●	●	●	●				●						3			Up to £3,000,000
Murphy International Ltd	00 353 45 431384	●			●		●	●	●		●				●	✔	4			Up to £1,400,000
Newbridge Engineering Ltd	01429 866722	●	●	●	●	●	●	●			●	●				✔	4		●	Up to £2,000,000
North Lincs Structures	01724 855512			●	●					●	●				●		2			Up to £800,000
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									●					●	✔	2			Up to £1,400,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £1,400,000
Robinson Structures Ltd	01332 574711			●	●	●	●				●				●	✔	3			Up to £2,000,000
S H Structures Ltd	01977 681931	●		●	●	●	●	●	●	●	●	●			●	✔	4	✔	●	Up to £3,000,000
SAH Luton Ltd	01582 805741			●	●	●				●	●			●	●		2			Up to £800,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●				●			●	●	✔	4			Up to £2,000,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
SGC Steel Fabrication	01704 531286				●					●				●	●	✔	2			Up to £200,000
Shaun Hodgson Engineering Ltd	01553 766499	●		●	●		●			●	●			●	●	✔	3			Up to £1,400,000
Shipley Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●		2			Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✔		Up to £2,000,000
South Durham Structures Ltd	01388 777350			●	●	●				●					●		2			Up to £1,400,000
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
Structural Fabrications Ltd	01332 747400	●			●	●	●	●	●	●	●			●	●	✔	3		●	Up to £1,400,000
Taunton Fabrications Ltd	01823 324266				●					●	●				●	✔	2		●	Up to £2,000,000
Taziker Industrial Ltd	01204 468080	●		●	●		●			●	●		●	●	●	✔	3			Above £6,000,000
Temple Mill Fabrications Ltd	01623 741720			●	●	●	●			●	●			●	●	✔	2			Up to £400,000
Traditional Structures Ltd	01922 414172			●	●	●	●	●	●		●			●	●	✔	3	✔	●	Up to £2,000,000
TSI Structures Ltd	01603 720031			●	●	●	●	●			●			●			2	✔		Up to £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 Haley Engineering Ltd	01278 760591				●	●	●									✔	4		●	Up to £6,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
WT Fabrications (NE) Ltd	01642 691191			●	●	●	●				●			●	●	✔	4			Up to £40,000
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 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, ● = Member)

Notes

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

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

BCSA steelwork contractor member	Tel	FB	CF	SG	PG	TW	BA	CM	MB	SRF	FRF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
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 £4,000,000
Cementation Fabrications	0300 105 0135	●		●	●	●	●					●	✓	3			✓	●	Up to £6,000,000
Cleveland Bridge UK Ltd	01325 381188	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000
D Hughes Welding & Fabrication Ltd	01248 421104	●		●		●			●	●	●	●	✓	4			✓		Up to £400,000
Donyal Engineering Ltd	01207 270909	●		●						●	●	●	✓	3			✓	●	Up to £1,400,000
ECS Engineering Services Ltd	01773 860001	●			●	●	●		●			●	✓	3				●	Up to £3,000,000
Four-Tees Engineers Ltd	01489 885899	●		●	●	●	●		●	●	●	●	✓	3			✓	●	Up to £2,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●			●	●				●	●	●	✓	4	✓		✓	●	Above £6,000,000
M Hasson & Sons Ltd	028 2957 1281	●	●	●	●	●	●	●	●	●		●	✓	4			✓	●	Up to £3,000,000
Millar Callaghan Engineering Services Ltd	01294 217711	●	●	●	●	●	●	●	●	●	●	●	✓	4			✓		Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●	●	●	●	●	●					●	✓	4			✓		Up to £1,400,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £6,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓		✓	●	Up to £3,000,000
Severfield (UK) Ltd	01204 699999	●	●	●	●	●	●	●	●	●	●	●	✓	4	✓	✓	✓	●	Above £6,000,000
Shaun Hodgson Engineering Ltd												●	✓	3					Up to £1,400,000
Structural Fabrications Ltd	01332 747400	●		●	●	●	●			●	●	●	✓	3				●	Up to £1,400,000
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 £4,000,000
Centregreat Engineering Ltd	029 2046 5683	●		●	●	●	●	●	●	●	●	●	✓	4					Up to £2,000,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓		Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●	●	●	●		●	✓	4			✓	●	Up to £1,400,000
Ekspan Ltd	0114 261 1126	●				●			●	●	●	●	✓	2					Up to £400,000
Eiffage Metal	00 33 388 946 856	●	●		●		●	●	●			●	✓	4					Above £6,000,000
Francis & Lewis International Ltd	01452 722200											●	✓	4			✓	●	Up to £2,000,000
Harrisons Engineering (Lancashire) Ltd	01254 823993			●	●	●	●	●	●	●		●	✓	3		✓			Up to £1,400,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000*
HS Carlsteel Engineering Ltd	020 8312 1879									●	●	●	✓	3			✓		Up to £200,000
IHC Engineering (UK) Ltd	01773 861734											●	✓	3			✓		Up to £400,000
In-Spec Manufacturing Ltd	01642 210716									●	●	●	✓	4			✓		Up to £800,000
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
Total Steelwork & Fabrication Ltd	01925 234320	●		●		●				●	●	●	✓	3			✓		Up to £3,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000

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	08457 504030

Company name	Tel
Inspire Insurance Services	02476 998924
Sandberg LLP	020 7565 7000
Structural & Weld Testing Services Ltd	01795 420264

Company name	Tel
SUM Ltd	0113 242 7390

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

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

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

SfL
Steel for Life Sponsor

Structural components

Company name	Tel	QM	CE	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			
Fabsec Ltd	01937 840641		N/A				
Farrat Isolevel	0161 924 1600	✓	N/A				
FLI Structures	01452 722200	✓	M	4	20	●	
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**		**Headline**
Kingspan Structural Products	01944 712000	✓	M	4		●	
Lionweld Group	01642 233238	✓	M	4			
MSW UK Ltd	0115 946 2316		D/I				
Prodeck-Fixing Ltd	01278 780586	✓	D/I				
Structural Metal Decks Ltd	01202 718898	✓	M	2			
Stud-Deck Services Ltd	01335 390069		D/I				
Tata Steel – ComFlor	**01244 892199**		**M**				**Silver**
voestalpine Metsec plc	**0121 601 6000**	✓	**M**	**4**		●	**Gold**

Computer software

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
Idea Statica UK Ltd	02035 799397		N/A				
StruMIS Ltd	01332 545800		N/A				
Trimble Solutions (UK) Ltd	**0113 887 9790**		**N/A**				**Silver**

Steel producers

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
British Steel Ltd	01724 404040	✓	M				
Tata Steel – Tubes	**01536 402121**	✓	**M**				**Silver**

Manufacturing equipment

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
Behringer Ltd	01296 668259		N/A				
Cutmaster Machines (UK) Ltd	**07799 740191**		**N/A**				**Bronze**
Ficep (UK) Ltd	**01924 223530**		**N/A**				**Gold**
Kaltenbach Ltd	**01234 213201**		**N/A**				**Silver**
Lincoln Electric (UK) Ltd	0114 287 2401	✓	N/A				
Peddinghaus Corporation UK Ltd	**01952 200377**		**N/A**				**Gold**
Wightman Stewart (WJ) Ltd	01422 823801		N/A				

Protective systems

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
Forward Protective Coatings Ltd	01623 748323	✓	N/A				
Hempel UK Ltd	**01633 874024**	✓	**N/A**				**Bronze**
Highland Metals Ltd	01343 548855	✓	N/A				
International Paint Ltd	0191 469 6111	✓	N/A				
Jack Tighe Ltd	**01302 880360**	✓	**N/A**		**19A**		**Silver**
Joseph Ash Galvanizing	**01246 854650**	✓	**N/A**				**Bronze**
Jotun Paints (Europe) Ltd	**01724 400000**	✓	**N/A**				**Bronze**
PPG Architectural Coatings UK & Ireland	01924 354233	✓	N/A				
Sherwin-Williams Protective & Marine Coatings	**01204 521771**	✓	**N/A**			●	**Bronze**
Vale Protective Coatings Ltd	01949 869784		N/A				
Wedge Group Galvanizing Ltd	**01909 486384**	✓	**N/A**				**Gold**

Safety systems

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
easi-edge Ltd	01777 870901	✓	N/A			●	

Steel stockholders

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
AJN Steelstock Ltd	**01638 555500**	✓	**M**	**4**			**Bronze**
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			
Cleveland Steel & Tubes Ltd	**01845 577789**	✓	**M**	**3**			**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**		**3B**		**Gold**
Rainham Steel Co Ltd	01708 522311	✓	D/I	4	3B		

Structural fasteners

Company name	Tel	QM	CE	FPC	NHSS	SCM	SfL
BAPP Group Ltd	01226 383824	✓	M		3		
Cooper & Turner Ltd	0114 256 0057	✓	M		3		
Henry Venables Products Ltd T/A Blind Bolt	01299 272955		M				
Lindapter International	01274 521444	✓	M				
Tension Control Bolts Ltd	**01978 661122**	✓	**M**		**3**		**Bronze**

Welding equipment and consumables

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

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