www.newsteelconstruction.com

NSC

February 2018
Vol 26 No 2

New terrace for Edinburgh

High engineering in Dublin

Landmark arriving at King's Cross

Steel takes wing at Cumbrian school

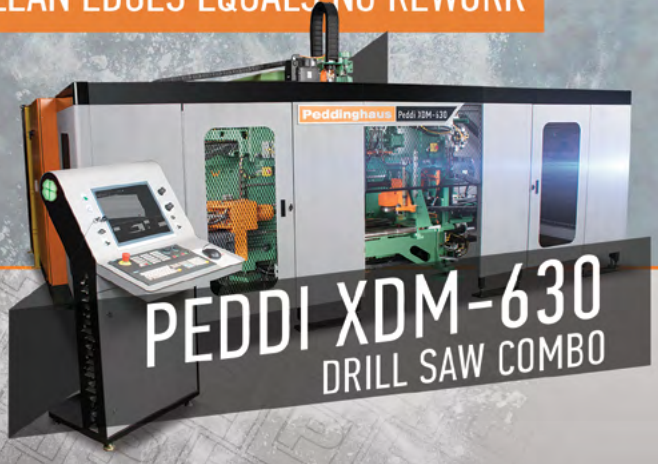
STRONGER THAN STEEL

MULTI-SPINDLE COPE MILLING

MILL ON BOTH FLANGES SIMULTANEOUSLY

COMBINE WITH HIGH SPEED CARBIDE DRILLING, TAPPING, COUNTERSINKING AND MITER SAWING

CLEAN EDGES EQUALS NO REWORK



PEDDI XDM-630
DRILL SAW COMBO

MACH 2018
STAND H19-349

WATCH VIDEOS HERE

www.peddinghaus.com/uk/xdm

Peddinghaus

www.peddinghaus.com | info@peddinghaus.com | +44 1952 200 377

Cover Image
Donadson's, Edinburgh
Main client: Cala Evans Restoration
Architect: Richard Murphy Architects
Main contractor: BAM Construction
Structural engineer: Harley Haddow
Steelwork contractor: Hescott Engineering
Steel tonnage: 2,000t

February 2018
Vol 26 No 2

EDITOR
Nick Barrett Tel: 01323 422483
nick@newsteelconstruction.com

DEPUTY EDITOR
Martin Cooper Tel: 01892 538191
martin@newsteelconstruction.com

PRODUCTION EDITOR
Andrew Pilcher Tel: 01892 553147
admin@newsteelconstruction.com

PRODUCTION ASSISTANT
Alastair Lloyd Tel: 01892 553145
alastair@barrett-byrd.com

COMMERCIAL MANAGER
Fawad Minhas Tel: 01892 553149
fawad@newsteelconstruction.com

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

The British Constructional Steelwork Association Ltd
4 Whitehall Court, Westminster, London SW1A 2ES
Telephone 020 7839 8566
Website *www.steelconstruction.org*
Email *postroom@steelconstruction.org*

Steel for Life Ltd
4 Whitehall Court, Westminster, London SW1A 2ES
Telephone 020 7839 8566
Website *www.steelforlife.org*
Email *steelforlife@steelconstruction.org*

The Steel Construction Institute
Silwood Park, Ascot, Berkshire SL5 7QN
Telephone 01344 636525 Fax 01344 636570
Website *www.steel-sci.com*
Email *reception@steel-sci.com*

CONTRACT PUBLISHER & ADVERTISING SALES
Barrett, Byrd Associates
7 Linden Close,
Tunbridge Wells, Kent TN4 8HH
Telephone 01892 524455
Website *www.barrett-byrd.com*

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


JAMESTOWN
www.jamestownprofiling.co.uk
STEEL
for life
HEADLINE
SPONSOR
MADE BY JAMESTOWN
email: info@jamestownprofiling.com
tel: +353 45 434 288
BCSA

Steel captures collaborative benefits

Nick Barrett - Editor

NSC's Annual Review of projects featured in the magazine throughout last year has been delivered with a range of construction magazines in recent weeks. It can be found on the NSC website if you missed your copy.

The projects in the Annual Review are selected to show the diversity of project size and type, and geographical spread of outstanding steel construction projects, which NSC aims to do in every issue. Increasingly they reflect a growing emphasis on collaboration and transparency as the construction industry responds to client demands for new ways of working.

The O_2 centre in London is a project that shows steel's circular economy agenda advantages, with the foundation slab being reused on a retail project that is designed for deconstruction. The design was informed by being able to access drawings from the steelwork contractor who originally worked on The O_2 some years ago, a level of collaboration that was made straightforward by taking advantage of the Building Information Modelling capabilities of software that the steel construction sector has been using for some 30 years.

In Edinburgh close collaboration among the construction team is delivering prestige apartments at the Grade A listed Donaldson's School to the west of Edinburgh city centre which is being given a new lease of life by reconfiguring the interior. Steel has also been selected for an adjacent new building thanks to its ability to provide the desired floor-to-ceiling heights while keeping the overall building height to an acceptable level at this sensitive location. The parabolic frontage is a striking feature of the new build elements, formed without the use of curved sections by using facetted steelwork.

Over in Dublin, where the local economy looks like it is recovering strongly from the travails of recent years, we visited the old Sir John Rogerson Quay area on the south bank of the Liffey which is being given a new role as a commercial and retail landmark, with a steel frame providing the open-plan spaces that are popular with tenants.

In London a BREEAM 'Outstanding' rating is the target for a project at Kings Cross where steel was selected to replace a concrete alternative by providing a more economical way of achieving long spans and integrated services. These are features strongly valued by tenants and the 12-storey building has been fully pre-let.

Collaboration was also a feature of our foray to Cumbria where steel has been selected to provide Whitehaven with two new school buildings because of its speed of construction and flexibility. The construction team won a race against the onset of winter in its bid to create a watertight structure before the Cumbrian rainy season took its usual firm grip. Steel is tried and tested for schools, with its built in flexibility and large, clear spans allowing for future changes of use like changing class sizes.

Collaborative working has always been a feature of the service that steelwork contractors pride themselves on delivering. Just as the sector was ready to respond to fresh demands for BIM on projects because it had for long worked that way anyway, the new focus on collaboration is being fully supported by a steel sector eager to respond.

New Steel Construction Technical Digest now available online

New Steel Construction's (NSC) second Technical Digest, which brings together a year's worth of technical guidance, is now available for download at: *www.steelconstruction.info.*

Helping to keep engineers and architects up-to-date with steel construction related guidance, NSC's Digest compiles all the magazine's Technical Articles and Advisory Desk Notes from 2017, which can be downloaded as a pdf or viewed online.

Advisory Desk Notes reflect recent developments in technical standards or new knowledge that designers need to be made aware of. Some of them arise because a question is being frequently asked of the steel sector's technical advisers. They have always been recognised as essential reading for all involved in the design of constructional steelwork.

The longer Technical Articles cover more detailed insights into what designers need to know, often the result of legislative changes or changes to codes and standards.

Sometimes it is simply felt that it would be helpful if a lot of relatively minor changes, perhaps made over a period of time, were brought together in one place, so a technical update is needed.

Some of the Technical Article highlights in the Digest include an article by the Steel Construction Institute (SCI) introducing a new design tool available on *www.steelconstruction.info*, Richard Henderson of the SCI discusses steel construction with trusses, and an article discussing the design of hybrid fabricated girders.

Seaside town to get shopping beacon

An £85M steel-framed extension to Eastbourne's existing Arndale shopping mall, currently under construction, will provide 22 new retail units, seven restaurants and an eight-screen cinema.

Once complete, the new enlarged centre will be renamed The Beacon, a name that is said to conjure up images of the town's coastal history and the nearby Beachy Head Lighthouse.

Andrew Rice, Fund Manager for the centre owners Legal & General said it is never easy to find a new name for a shopping centre with a 38-year history.

"After discussions and explorations, including meetings with key opinion formers in Eastbourne, we agreed unanimously that The Beacon was a great new name."

Working on behalf of main contractor Kier, Caunton Engineering is fabricating, supplying and erecting 2,000t of steelwork for the scheme.

The 16,200m^2 extension is partially divided in two by a covered L-shaped pedestrianised street. Officially described as an outdoor space, the street will however offer some weather protection as it will be topped with a glazed undulating roof supported by the main steel frame.

Cutting across the site, approximately at the point where the L-shaped street cranks, a movement joint splits the steel frame into two separate parts via a row of double columns.

Also, included in the steel package, Caunton is erecting two new steel floors to the mall's existing six-storey concrete-framed car park.

Carlisle airport set for summer opening

Passenger flights are due to commence from Carlisle Lake District Airport on 4 June, the facility's owners, the Stobart Group, has confirmed.

For the first time since 1993, the airport will offer business passenger flights to London, Belfast and Dublin.

A new steel-framed two-storey terminal building has been erected by Border Steelwork Structures and is expected to be completed, along with runway works, by early Spring.

Kate Willard, Head of Corporate Projects at Stobart Group, said: "We look forward to working with partners in the visitor economy over these next months to help develop packages and promotions to make sure that our air services match the needs of our visitors."

Cumbria Local Enterprise Partnership (LEP) has put almost £5M into a project to improve the runway and terminal. The organisation's Executive Director, Graham Haywood, said: "Carlisle Lake District Airport will have a huge impact on Cumbria's visitor economy and is also a key strategic business asset for the county. Increasing the numbers of high-spending international visitors is a key target.

"Improving key transport infrastructure facilities like the airport helps boost economic growth and can act as a catalyst for creating new business hubs and attracting private sector investment."

SCCS achieves highways accreditation

Following a UKAS assessment, the Steel Construction Certification Scheme (SCCS) has successfully become the first Certification Body to become accredited to audit National Highways Sector Scheme 3B – Stocking and distribution activities for structural steel products.

From 15 September 2018, National Highways Sector Scheme 3B will be a mandatory requirement for all companies involved in the stocking and distribution of structural steel products for all Highways England projects, as well as other public bodies adopting the Highways England Series 1800 specification for structural steelwork.

For projects that start before 15 September 2018 and finish after this date it is anticipated that NHSS3B will be a requirement.

SCCS is pleased to announce that Kloekner Metals UK is the first company to achieve certification to this National Highways Sector Scheme.

Barrie Salter, Business Development & Marketing Director at Kloeckner Metals UK, said: "We are extremely excited to be the first company certified with NHSS3B by SCCS. This new certification follows in the footstep of our recently awarded certificates for ISO 9001:2015 and ISO 14001:2015.

"It furthermore demonstrates that at Kloeckner we have in place robust quality management processes to supply steel products specifically for suppliers / contractors of Highways England."

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

SCCS now offers additional certification and monitoring services for the structural steelwork sector, including integrated or separate Environmental and Health & Safety management systems, Factory Production Control systems and selected National Highways Sector Schemes.

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

Cleveland Bridge opens Newport office

Steelwork contractor Cleveland Bridge is to open a South Wales office in Newport that will deliver sales, design, engineering and project management functions, creating up to 12 new jobs.

The company said the office will also provide a hub for the company's employees who live in Wales to dedicate their support to projects in Wales and the South West of England.

Cleveland Bridge said it has experienced an upturn in activity in the south of the UK and Wales, which has contributed to two consecutive profitable years with the company reporting profits for 2016 of £4M, an increase of more than £1.5M on the previous year.

Among its recent projects was the design, build and installation of a 228t, 50m-long steel road bridge crossing the Great Western Main Line in Newport.

This project, undertaken for Network Rail, was part of a significant overhead line electrification programme. Fabricated in the north east of England, it was transported to South Wales by road and assembled prior to installation by Cleveland Bridge engineers in a trackside temporary works compound.

Cleveland Bridge Head of Infrastructure Andrew Morris (pictured) said: "South Wales is strategically important, opening a large office here will enable us to strengthen our Welsh team and provide

closer support to the Welsh infrastructure and construction sectors, as well as regions such as the South East and South West of England.

"It will also allow us to take advantage of the wealth of skilled people from the area that will help Cleveland Bridge further grow its market share."

Perth school is catalyst for new development

A new school for a new village on the outskirts of Perth is being constructed by Robertson and steelwork contractor Walter Watson.

The steel frame for the project, comprising approximately 720t of structural steelwork, has recently been completed and roofing and flooring installation is now under way.

Known as Bertha Park, the new 800-acre village is being spearheaded by Springfield Properties, which secured planning consent for its master plan in 2016. The construction of the proposed 3,000 homes will continue for the next 30 years, creating about 450 building jobs.

It is estimated Bertha Park, featuring 60 acres of commercial land accommodating shops, offices and restaurants, will generate work for 2,000 people.

It is hoped that by building the £31M Bertha Park High School in the early stages of the development families will be encouraged to move to the village.

"The project is unique in the current Scottish schools programme as it isn't a replacement for an existing school, rather it is an entirely new building to serve the growing population of Perth," explained Robertson Operations Manager Robbie Kerr.

NEWS IN BRIEF

Barnshaws Section Benders said it has introduced a beam welding service by installing a new semi-automated submerged arc welding machine. The company's Commercial Director Greg North said: "This machine gives us increased capability to support requirements from customers in demanding industries."

The Mayor of London, Sadiq Khan has approved the redevelopment of Croydon's Whitgift shopping centre by the **Croydon Partnership** – a joint venture between Westfield and Hammerson. The project could create 7,000 jobs, deliver nearly 1,000 new homes, and provide the local community with brand-new leisure and retail facilities, and rejuvenated public spaces.

McArthurGlen Designer Outlet in Ashford, Kent has revealed that a £90M expansion to the discount shopping centre will open by 2019, creating 500 new jobs and bringing in 50 more luxury brands. The company has confirmed that McLaren Construction has been appointed as main contractor for the 9,200m² steel-framed extension.

Kier, **VolkerFitzpatrick** and **Wates** have been chosen by Public Health England (PHE) to build its new £400M public health science campus and headquarters in Harlow, Essex. Main construction work will start next year with the campus set to be fully operational by 2023.

The **University of Kent** has awarded a £13.4M contract to Willmott Dixon to build its new School of Economics. The three-storey facility will be located on the north-western part of the campus in Canterbury and is expected to be ready in time for the 2019-2020 academic year.

In last month's (January) issue of *New Steel Construction* we reported that SMD had installed metal decking at 100 Bishopsgate in London; this was incorrect as **Prodeck-Fixing** did the work.

PRESIDENT'S COLUMN

The construction sector, government and the wider UK population are reeling following Carillion's liquidation in January. But at the same time, nobody in the sector is that surprised that a large main contractor has gone under.

Government is working with trade associations like BCSA to make sure subcontractors are informed, and to determine the immediate next steps as this particular mess is mopped up. Clients are working with the liquidator to get construction jobs started again and subcontractors, including steelwork contractors, are ready to make sure that the cranes on building sites across the country are working once more.

The calls for reform in the construction sector are welcome, and I've written about these issues before. The solutions include rigorous enforcement of payment terms, getting rid of supply chain financing that can leave subcontractors out on a limb, and dealing with retentions once and for all.

It's ironic that Carillion's demise happened during the government's consultation period on retentions. I strongly support mandatory ring-fencing of retentions and the private members bill that supports this, as well as the longer term abolition of retentions.

However, legislation takes time, so isn't there more that government can do right now to protect subcontractors' money?

The only Carillion subcontractors that are in the clear post liquidation are those that had valid credit insurance (expensive and not always available) and those that were working on projects with Project Bank Accounts (PBAs). The money in these PBAs is ring-fenced and the liquidator has no right to the monies in them that are owed to subcontractors.

Governments in England, Scotland and Wales have already mandated PBAs for central government contracts. This didn't need any legislation, just the collective will to protect the supply chain on construction projects paid for by the taxpayer.

So why can't it be thus for cash retentions?

BCSA is calling for governments across the UK to first and foremost ban the use of cash retentions on all government funded projects, throughout the whole supply chain. This should be done for all central government and government agency projects that are currently being let, quickly followed by local government projects.

In addition, government should mandate the ring-fencing of cash retentions for ongoing works where the cash is currently sitting in main contractors' bank accounts. As we all know now after Carillion, this is the worst place it could possibly be.

This is a simple step and will show the rest of the sector how straightforward protecting subcontractors' monies is. And then we can all get on with the job of legislating for ring-fencing cash retentions across the board before retentions are abolished, by law altogether.

Tim Outteridge
BCSA President & Sales Director Cleveland Bridge

British Steel recruiting 124 manufacturing trainees

A total of 124 manufacturing trainees are being recruited by British Steel in Scunthorpe.

Sixty of the appointments have already been made, with half of them having started work during December. The remainder will join the company this month.

Britsh Steel said it is now looking to find an additional 64 manufacturing trainees who will be trained to perform roles including crane driving, forklift truck driving and machine operations.

British Steel Deputy CEO Paul Martin said: "We're delighted to continue recruiting, underlining our commitment to investing in our people, our products and our future.

"These are excellent jobs, offering successful applicants first-class training and career prospects along with a good wage."

The new trainees will be based in manufacturing areas across our Scunthorpe site and be directly involved in producing the company's steel output.

Candidates must be aged 18 and over as this is a legal requirement in order to be able to work shifts. They will also be expected to have a full and valid driving licence, excellent communication skills and the ability to work well within a team environment.

Lidl announces plans for its largest UK warehouse

German discount supermarket Lidl has announced plans to build its largest warehouse in the UK.

The regional distribution centre at J11A of the M1 near Houghton Regis, Bedfordshire, will be more than double the size of any other Lidl UK warehouse and will create up to 1,000 new jobs.

The 92,900m^2 warehouse on the 58-acre site will be the company's 16th in the UK.

Lidl UK said it was part of its plan to invest £1.45bn in Britain during the next year.

The firm, owned by Germany's Schwarz Group, said the new centre would service its growing estate of London stores.

It said it had already exchanged contracts on the site with the Houghton Regis Management Company - a consortium of Aviva Investors, Land Improvement Holdings and the Diocese of St Albans.

Director for Expansion and Development, Ingo Fischer, said: "With five new stores opening in the next two months alone, and further store expansion and development plans in place for the Greater London area across the new financial year and beyond, this new warehouse is vital in supporting our ambitious expansion plans in and around the M25."

Galvanizing for car park extension

Joseph Ash Galvanizing has successfully galvanized over 400t of steelwork for a second storey extension to an existing car park in Stevenage.

The project involved galvanizing a series of 16m-long beams and wide plate flooring. Joseph Ash Galvanizing's Chesterfield plant was chosen as the plant is said to be able to handle the largest of projects.

Joseph Ash Chesterfield is also said to be unique as it can offer both an assembly and trial erection facility, which reduces major transport and secondary storage costs.

The galvanizing of the beams and plate flooring took four weeks, although most of the work was completed within the first 48 hours of arriving at Chesterfield according to the company.

All of the steelwork was then assembled in the covered facility at the Chesterfield plant and, once this was complete, the 16m long by 2.4m wide units were coated and treated to the customer's exact expectations.

This ensured no wet trades were needed on-site, and all the work could be carried out within ideal conditions for painting.

Steel refit for Tunbridge Wells offices

Located in Tunbridge Wells town centre, the three-storey Heathervale House is being refurbished and extended with the aid of steel construction.

The building has been stripped back to its original concrete frame and the structure is being re-clad with a stone finish using a lightweight steel framing system.

The design also includes a large steel-framed rear extension and two additional steel floors, accessible via a new entrance and circulation core.

The additional fourth and fifth storeys will be largely glazed and set in from the existing footprint behind a bronze clad louvre screen.

Working on behalf of main contractor Grays Thurrock Properties, Gorge Fabrications is fabricating, erecting and supplying 102t of structural steelwork for the project.

Metsec provides design and walling services to regeneration project

Light steel walling systems from Metsec have been used for the construction of new residential blocks at Nine Elms Point in south London.

The site is a former Sainsbury's site in London's Vauxhall district that is being redeveloped to house a new Sainsbury's store and a combination of three high rise and four low rise residential blocks, providing 647 apartments.

Approximately 10,000m² of external façade works have been completed on the residential blocks.

Specified on the project, voestalpine Metsec's steel framing systems (SFS) infill walling is said to have been selected for both its flexibility in terms of sizing, and the additional design services that Metsec is able to provide to projects.

The design services were utilised in the early stages of the project to provide the structural calculations and system requirements for the SFS walling in order to adequately support the various external wall cladding systems.

Metsec said it was also able to provide solutions and installation details for areas where non-standard Metsec product would be required.

This allowed Metsec to use its standard sections, but in a bespoke arrangement, to form the soffits and downstands. In addition to the design, Metsec was able to provide the structural calculations and loading of the solution to demonstrate that the bespoke solution is able to sufficiently support the cladding on the project.

In total the regeneration of the site in Vauxhall is scheduled to take five years, with Nine Elms Point due for completion in Spring 2020. In addition to the supermarket and residential housing, the area will see the development of the new Nine Elms underground station which will form part of the extended Northern Line.

Phase three for Stockport Exchange announced

Developer Muse has submitted plans for a further phase of the £145m Stockport Exchange development, following the success of the first two phases.

The regeneration specialist is delivering the mixed-use regeneration scheme in partnership with Stockport Council.

The next phase, Two Stockport Exchange, will see an 18,200m² six-storey office built next to the existing steel-framed One Stockport Exchange, erected by Billington Structures and Eric Wright Group a year ago.

Outline planning approval is already in place for the Aedas designed scheme, with Hannan Associates on board as building services consultant.

Work is expected to start on site this summer, with completion of phase three anticipated in Spring 2020.

The overall scheme will ultimately deliver up to 114,000m² of office space and 8,500m² of commercial floor space. The first phase of the scheme – a 1,000 space multi-storey car park operated by NCP – was completed in 2014.

Diary

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

Tuesday 20 & Wednesday 21 February 2018
Design of Portal Frame Elements (Part 1) Webinar
This 1 hour webinar will establish the principles and veritifcation of Portal frame columns.

Thursday 22 February 2018
Portal Frame Design course
The course aims to provide in-depth coverage of the major issues surrounding the analysis, design and (crucially) the detailing of portal frames. Swindon.

Tuesday 6 March 2018
Light Gauge Steel Design Course
The 1 day course introduces the uses and applications of light gauge steel in construction
London.

Tuesday 13 & Wednesday 14 March 2018
Design of Portal Frame Elements (Part 2) Webinar
This 1 hour webinar follows the principles established in Part 1.

An introduction to surface preparation for corrosion protection

Cost-effective corrosion protection of structural steelwork can be achieved through the appropriate application of paint and metallic coatings and should present little difficulty for common applications and environments if the factors that affect durability are recognised at the outset.

Galvanized steelwork is used in numerous industrial applications such as supporting silos, as pictured

In this article NSC looks at surface preparation which is the essential first stage treatment of a steel substrate before the application of any coating, and is generally accepted as being the most important factor affecting the total success of a corrosion protection system.

Why surface preparation is essential to ensure effective corrosion protection?

The performance of a coating is significantly influenced by its ability to adhere properly to the substrate material. The initial surface condition of steel can vary in terms of the amount of residual millscale and degree of initial rusting. However, generally it is an unsatisfactory base upon which to apply modern, high performance protective coatings.

Preliminary treatments

Residues of oil, grease, marking inks, cutting oils etc. after fabrication operations will seriously affect the adhesion of applied coatings and must be removed. It is erroneous to think that subsequent cleaning operations will remove such contaminants and it is bad practice to permit them to remain on the surface. Failure to remove these contaminants before blast cleaning results in them being distributed over the steel surface and contaminating the abrasive. Suitable organic solvents, emulsion degreasing agents or equivalents should be applied to remove contaminants in preparation for subsequent descaling treatments.

Blast cleaning

A range of methods of preparation and grades of cleanliness exist, but by far the most significant and important method used for the thorough cleaning of millscaled and rusted surfaces is abrasive blast cleaning. The standard grades of cleanliness for abrasive blast cleaning in accordance with ISO 8501-1 are:

- Sa 1 – Light blast cleaning
- Sa 2 – Thorough blast cleaning
- Sa 2½ – Very thorough blast cleaning
- Sa 3 – Blast cleaning to visually clean steel

The surface preparation process not only cleans the steel, but also introduces a suitable surface profile and amplitude to receive the protective coating. High build paint coatings and thermally sprayed metal coatings need a coarse angular surface profile to provide a mechanical key. This is achieved by using grit abrasives. Shot abrasives are used for thin film paint coatings such as pre-fabrication primers.

A very wide range of abrasives is available. These can be non-metallic (metal slags, aluminium oxide, etc) and metallic (steel shot or grit, etc)

The particle size of the abrasive is also an important factor affecting the rate and efficiency of cleaning. In general terms, fine grades are efficient in cleaning relatively new steelwork, whereas coarse grades may be required for heavily corroded surfaces. The removal of rust from pitted steel is more easily effected by fine grades and, depending upon the condition of the steel surface, a mixture of grades may be required initially to break down and remove millscale and clean in pitted areas.

After abrasive blast cleaning, it is possible to examine for surface imperfections and surface alterations caused during fabrication processes, e.g. welding. Certain surface imperfections introduced during the original processing of the steel may not be detrimental to the performance of a coating in service, particularly for structures in relatively low risk environment categories. However, depending upon the specific requirements of the structure, it may be necessary to carry out additional surface treatments to remove surface imperfections on welds and cut edges, as well as soluble salts to produce an acceptable surface condition for painting.

Acid pickling

This process involves immersing the steel in a bath of suitable inhibited acids that dissolve or remove the millscale and rust but do not appreciably attack the exposed steel surface. The cleaning can be 100% effective. Acid picking is normally only used for structural steel intended for hot-dip galvanizing.

Andrew Harrison, Sales & Marketing Director at Wedge Group Galvanizing Ltd, explained: "Before the hot-dip galvanizing process can take place, steel is put through a chemical clean which removes all rust, oil and millscale from its surface. Once submerged in molten zinc, the steel is then coated inside and out, meaning narrow gaps and corners are easily protected."

Reinventing a landmark

One of Edinburgh's famous landmarks is currently being redeveloped into an exclusive residential scheme with the addition of a steel-framed terrace of apartments. Martin Cooper reports.

FACT FILE
Donaldson's, Edinburgh
Main client: Cala Evans Restoration
Architect: Richard Murphy Architects
Main contractor: BAM Construction
Structural engineer: Harley Haddow
Steelwork contractor: Hescott Engineering
Steel tonnage: 2,000t

The building that once housed Donaldson's School for the Deaf is one of the most distinctive structures in Edinburgh and was designed in the 1840s by William Playfair, one of the city's foremost architects.

Said to have been influenced by Elizabethan manor houses, the turreted property is easily identifiable as it is set back from West Coates, one of the main routes into the city centre, behind a large lawn.

After a long and distinguished history, the School decided to relocate in 2003, vacating the site for a new purpose-built property and selling the old building for redevelopment.

Two projects are now simultaneously under way to convert the site into a high-spec residential development. The listed former school building will remain the same on the outside, while inside a full-scale reconfiguration is being undertaken to create 63 flats.

Under a separate contract, Cala Evans Restoration and BAM Construction are building a further 73 flats contained in a curving three-storey terrace.

Arranged in an arc around the north of the former school, the terrace is being constructed in such a way that it is mostly hidden from West Coates.

According to Richard Murphy Architects, a combination of having the car park in an excavated basement and taking advantage of the natural sloping topography, the terrace is virtually invisible when viewed across the important southern vista.

Sat atop the basement car park, the terraced flats are arranged over ground, first, second and third floors. The lower two floors (ground and first) consist of single-level accommodation, but the second floor offers split level mezzanines meaning the apartments on this floor are effectively arranged over three levels.

The uppermost floor has larger penthouse flats that are set back to create private roof terraces, which will give extensive views not only of the Donaldsons' turretted roofscape but also to the north over the trees and towards the sea.

The terrace is being constructed as a steel-framed structure supported on pad foundations with the perimeter columns

The three-storey terrace will sit behind the renovated Donaldson's building

The second floor flats have mezzanine levels

which is currently under construction, handed over in July.

"We will then decamp from the site and return early in 2019 to construct the eastern end of the terrace."

BAM began the initial phase during April 2017 and early works included the excavation of the car park. Following the entire arc of the terrace, the 4m-deep basement required nearly 40,000m^3 of overburden to be removed from site.

Steelwork contractor Hescott Engineering completed the western part of the terrace in January (2018), and this work required 1,000t of steel. The company was also responsible for the installation of precast flooring and stairs.

Hescott used two 50t-capacity mobile cranes for the steelwork erection and a further two 100t-capacity cranes for the installation of precast units. An identical procedure will be employed when the company returns to site for the eastern end of the terrace.

Using a variety of MEWPs in conjunction with its cranes, Hescott had to contend with extremely confined site conditions. With only a slither of land available between the terrace and the former college building, there was very little space for materials storage and so all steel and precast units were delivered on a just-in-time basis.

Generally, Hescott erected the terrace building up to and including second floor level, installed the precast stairs and floor planks, before finally erecting the uppermost penthouse level.

The steel frame is set out on a regular 7.2m × 6m grid pattern, with two internal rows of columns. There are no curved ▶14

Steel contractor Hescott erected steelwork and installed precast planks

founded on the basement's concrete retaining wall. Stability is derived from a combination of concrete lift and stair cores, and bracing.

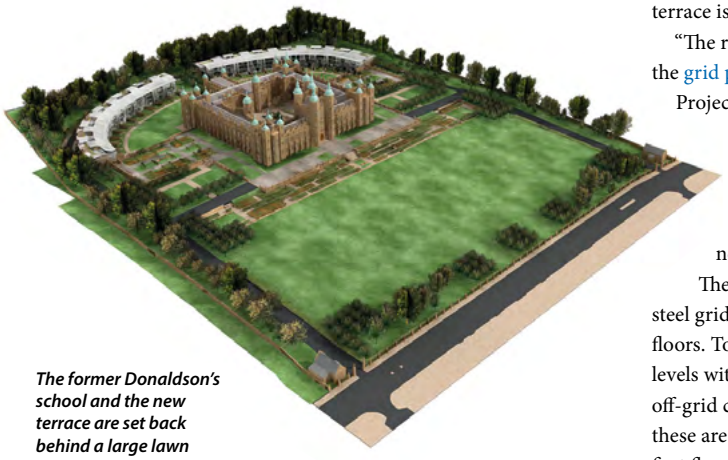
Explaining the choice of framing materials, Harley Haddow Director Richard Dunn says during the early stages of the design process a cost analysis was undertaken and steel was the most cost-effective option.

"There is a planning restriction on how high the terrace can be, and so we went for a steel-framed solution supporting precast flooring as it offered the best way of maximising the project's floor-to-ceiling heights, as the planks are set within the floor beam's depth."

The terrace is neatly split into two structurally-independent frames, each approximately 100m-long, by a centrally-positioned car park ramp and a concrete plant house.

BAM Project Manager Gary Brown says: "We are working on a phased construction programme that will see the western side,

How the completed terrace will look



The former Donaldson's school and the new terrace are set back behind a large lawn

▶13

members as the entire parabolic curve of the terrace is formed with facetted steelwork.

"The required car park spacings dictated the grid pattern," explains Hadley Haddow Project Engineer Russell Henderson.

"Once we'd designed the basement we then carried this pattern up through the first three levels of apartments, and so avoided the need for transfer structures."

The only exception to this regimented steel grid pattern is the second and third floors. To accommodate the mezzanine levels within the second floor, a number of off-grid columns have been inserted and these are supported by transfer beams at first floor ceiling level.

The other exception is the penthouse floor which, as well as being set back, also accommodates much larger apartments – roughly one flat occupying the area of two below.

This floor is set out on an entirely different grid pattern and so a series of large transfer beams support this level's columns.

Most of the inner curve of the terrace will be fully glazed, giving residents plenty of natural light and views of the college building and beyond. The outer arc will feature a natural stone cladding. Above, the terrace will be topped with a steel-framed roof spanned with metal decking.

The entire Donaldson's scheme is expected to be complete by 2020.

136 high-spec flats will be available on this Edinburgh city centre site

SUBSCRIBE TO THE FREE* PRINT EDITION OF NSC

* UK and Ireland addresses only

Subscriptions to NSC are now available for **free*** online at www.steelconstruction.info - the same place the digital subscriptions are handled at.

Here's how to register for your copy

Visit ***www.steelconstruction.info***

If you already have an account:

- Login using the normal **'Login / create account'** button in the top left corner *(If you cannot remember your password, use the 'Email new password' button)*
- Go to the **'Toolbox'** sidebar menu on the lower left hand side
- Select **'My Profile'**
- Tick the box to receive either digital or printed NSC magazine, or both
- Click **'Save'**

If you don't have an account:

- Click the **'Login / create account'** button in the top left corner
- Click the **'Create an account'** blue link in the Login box
- Enter the required details to create an account
- Tick the box to receive either digital or printed NSC magazine, or both
- Click **'Save'**

or Email your details to ***info@steelconstruction.org***

Riverside development

Overlooking the River Liffey, Dublin's latest prestigious commercial scheme is a highly-engineered steel-framed project incorporating two historic structures. Martin Cooper reports.

FACT FILE
1-6 Sir John Rogerson's Quay, Dublin
Main client: Hibernia Reit
Architect: Henry J. Lyons Architects
Main contractor: John Paul Construction
Structural engineer: Casey O'Rourke
Steelwork contractor: Kiernan Structural Steel
Steel tonnage: 1,000t

After a number of years in the doldrums, the construction sector in the Republic of Ireland is showing signs of an upturn and Dublin's skyline is once again awash with tower cranes.

One of the most prestigious schemes currently being undertaken is the 1-6 Sir John Rogerson's Quay project. Situated on the south bank of the River Liffey, a few hundred metres from the city centre, the project forms an important element in the regeneration of an area once dominated by dockside warehouses.

The main part of the project consists of a steel-framed six-storey office building with ground floor retail units and a large basement containing car parking and bicycle storage facilities.

The building will offer approximately 10,200m² of commercial floor space and 500m² of ground floor retail space, all housed within a building featuring long clear spans and only two internal columns.

"This is a modern prestigious inner city development and choosing a steel-framed solution was the easiest way of creating the desired open-plan design," explains John Paul Construction Project Manager Eddie Cogan.

With one centrally positioned concrete core, the steel frame radiates outwards with maximum clear spans of up to 15m being achieved on three sides. The exception is the southern rear elevation, where due to the length of the spans, the structure's only two internal columns have been installed creating two spans of 11m and 8m respectively.

Cellular beams, measuring 740mm-deep and with 500mm holes, have been used throughout the project for a cost-effective method of accommodating the building's services. The beams support a composite metal deck flooring solution throughout.

"Steelwork was also chosen for its flexibility," explains Casey O'Rourke Engineer John McMenamin.

"Strengthening of the frame has occurred on the fourth and fifth floors where the building has step-backs accommodating outdoor terraces.

"Here a series of larger than normal 14m-long × 740mm-deep plate girders, each weighing nearly 7t, has been installed to accommodate the extra loadings."

Kloeckner Westok provided design support throughout the project as Westok's Design Team Manager John Callanan explains, "In the Dublin commercial office sector, we have certainly seen a shift away from traditional concrete frames to clear span steel-framed cellular beam solutions. It is great to see Irish developers and

The completed building will use a retained entrance

The upper floors step back to create terraces

architects keen to exploit the programme and commercial benefits steelwork brings to the table.

"At 1-6 Sir John Rogerson's Quay, we worked closely with the engineer to provide optimised pre-cambered beams, and we also had to meet very stringent deflection tolerances for the edge beams supporting the cladding. We're pleased Westoks ticked all the boxes".

Along the front riverside elevation, the development incorporates two retained features, a masonry arched entranceway and a historic building dating back to the 1600s [see box].

New steelwork has been used to support the entranceway, but essentially the main steel frame does not touch either of these two existing structures.

The entranceway will provide the development with a grand access/exit point and will lead into an open courtyard that in turn leads to the main building entrance lobby.

Perhaps the most stand-out feature of the building is a protruding bullnose wing that overlooks the main northern riverside elevation. Jutting out adjacent the open courtyard, the bullnose is the full height of the building and will offer the lucky occupants some excellent views up and down the Liffey.

Faceted welded beams supported on CHS columns form the bullnose point. The feature 356mm-diameter tubular columns then extend along the length of the building's perimeter elevations. As they will remain exposed within the completed scheme, they create another feature element for the development.

Kiernan Structural Steel [KSS] has erected the entire steel frame using the project's two tower cranes, with the only exception being three bridges that span across the main entrance lobby at floors three, four and five,

The steel bridges measure 250mm-deep × 1,500mm-wide × 16.5m-long and each one weighs almost 21.5t.

Brought to site as complete units, they were too heavy for the tower crane's capacity and consequently another lifting solution was required.

"Due to the ground conditions along the river we were not able to support a mobile crane, which would have been our preferred option," says KSS Managing Director John Kiernan.

"We had to skid the bridges along the ground floor slab and then lift them into position using lifting beams built off the fifth floor steelwork overhead and use a pneumatic heavy duty chain block."

1-6 Sir John Rogerson's Quay is due to complete in July 2018.

Retained features

As the address implies, the project was once occupied by six separate buildings, with 1, 2, and 3 demolished to create the space for the main six-storey building.

A 14m-high arched brickwork entrance that once allowed trains to enter the warehouse at number 2 is a listed element that has been retained within the project.

This is now a free-standing structure, unconnected to the project's other structures.

In order to make the arched entrance self-supporting, steelwork contractor Kiernan Structural Steel installed 80mm-thick plate girders around the inside of the façade, which were then connected to universal column sections which are set into the piled foundations.

Numbers 4 and 5 form another retained element of the scheme. Dating back to 1680, these buildings once housed the Docker's Pub, once famous as a haunt of musicians, including U2, when they were recording at the Windmill Lane studios that formerly occupied a site to the rear of the project, and the Merchant Seaman Society.

The old four-storey structure is being renovated and could on completion be occupied by restaurants, or alternatively they could be incorporated into the main scheme via a link.

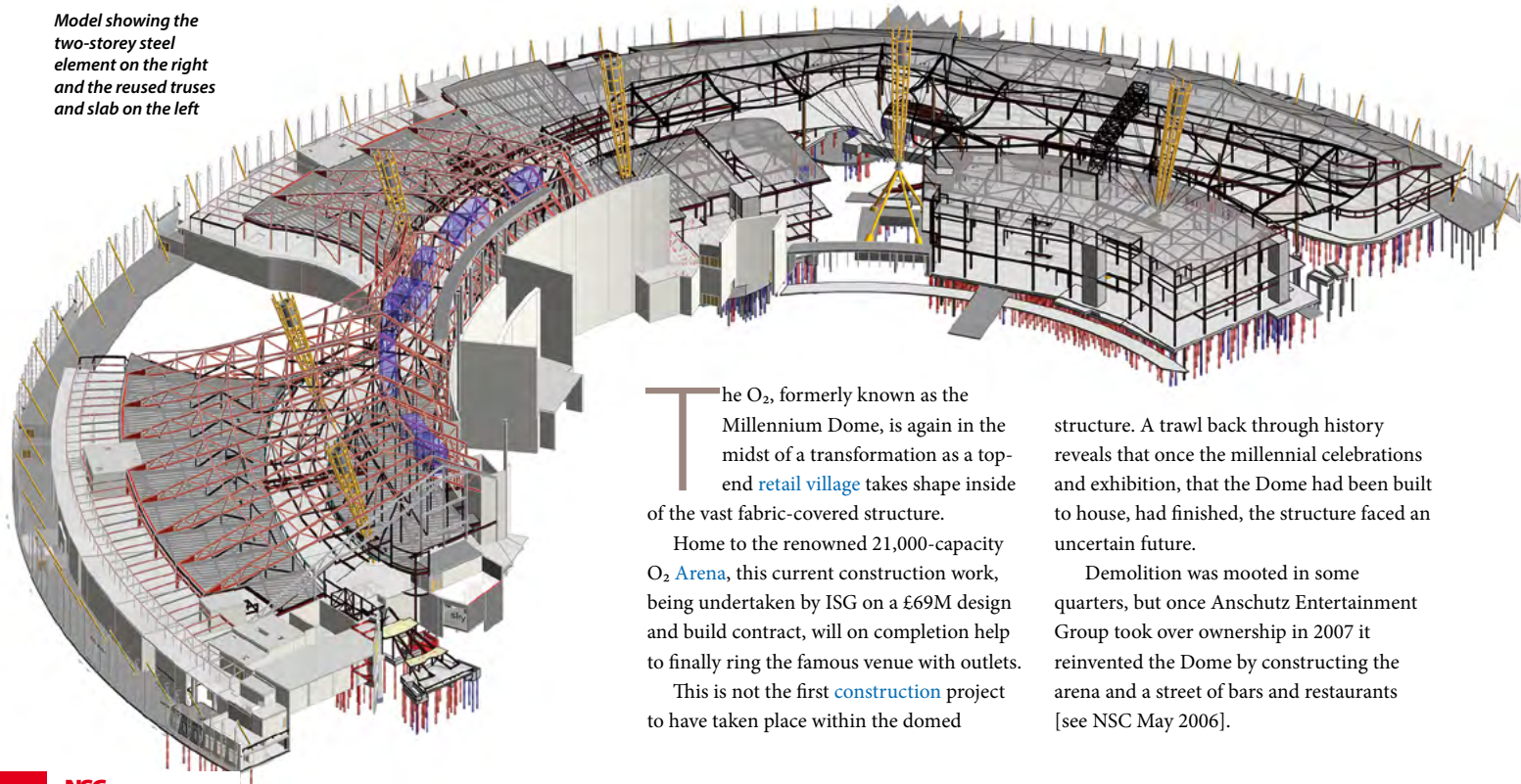
Occupying a slither of land between the retained pub building and an existing structure, number 6 has been knocked down and is being rebuilt as a stepped four-storey steel-framed building that will link into the main building.

The curved bullnose feature

Completing The O_2's inner circle

A retail village being constructed around part of The O_2 Arena is helping to finally complete the ring of outlets surrounding the well-known venue. Martin Cooper reports.

Construction progresses within the vast dome



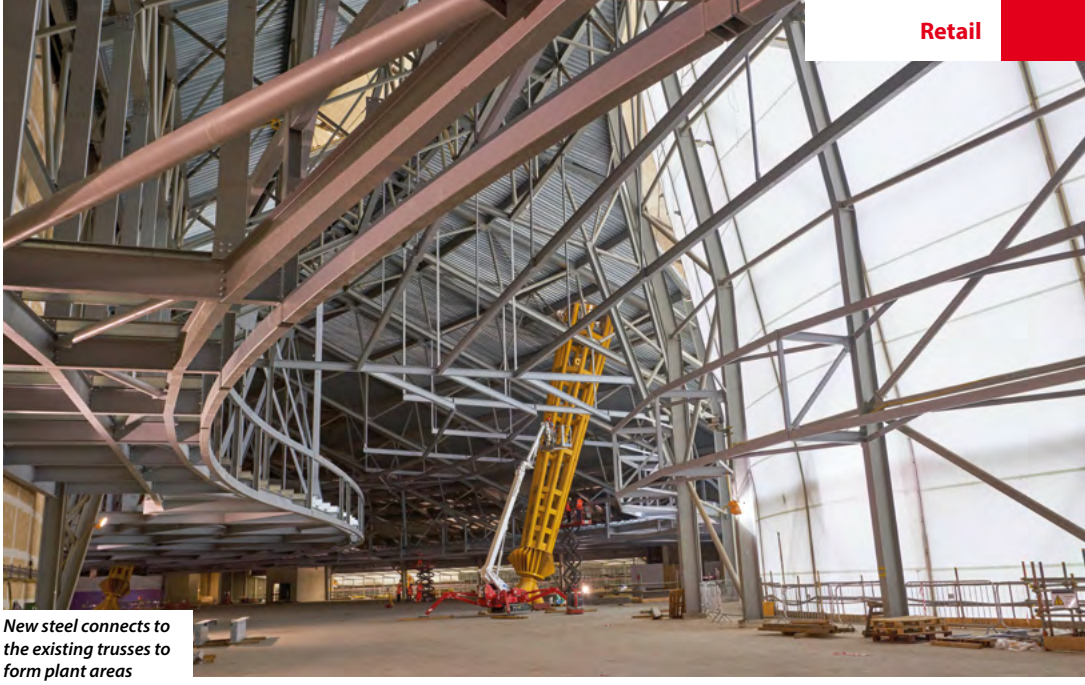
Model showing the two-storey steel element on the right and the reused trusses and slab on the left

The O_2, formerly known as the Millennium Dome, is again in the midst of a transformation as a top-end retail village takes shape inside of the vast fabric-covered structure.

Home to the renowned 21,000-capacity O_2 Arena, this current construction work, being undertaken by ISG on a £69M design and build contract, will on completion help to finally ring the famous venue with outlets.

This is not the first construction project to have taken place within the domed structure. A trawl back through history reveals that once the millennial celebrations and exhibition, that the Dome had been built to house, had finished, the structure faced an uncertain future.

Demolition was mooted in some quarters, but once Anschutz Entertainment Group took over ownership in 2007 it reinvented the Dome by constructing the arena and a street of bars and restaurants [see NSC May 2006].



New steel connects to the existing trusses to form plant areas

That initial steel-framed project, which also included a night club and a cinema, occupied the centre of the Dome (for the arena), with the other elements wrapping around approximately half the circumference of the venue.

Spread in an arc around the northern part of the arena, the 80-plus retail outlets for this latest scheme will be arranged either side of a central street. They will link The O_2's main entrance at one end to the existing entertainment mall at the other.

The construction job is officially known as Project Mint, with the analogy referring to the scheme's resemblance to a Polo Mint with the arena acting as the central hole. "The retail outlets will complete the outer ring, creating a dining and shopping destination," explains ISG Project Director Fraser Tanner.

The project can be divided into two separate parts, a two-storey element and a single storey element. Both are connected, although a movement joint with a row of double columns forms a boundary between them.

Retail roofs

The two-storey retail zone will be spanned by a steel diagrid roof structure supporting a steel mesh. Measuring 36m at its widest part and 156m-long, the structure is formed with a series of CHS members up to 356mm in diameter.

Containing 125t of structural steelwork, this part of the scheme was fabricated, supplied and erected by S H Structures. The company also erected the eight cigar-shaped glulam columns that provide the primary support for the roof.

The roof structure also connects back to the main steel frame of the retail zone at approximately 20 roof level locations.

Providing this part of the retail village with some high-level visual drama, a total of 6,500 lightweight aluminium petals are suspended from the underside of the steel mesh roof.

Meanwhile, the single storey retail part of the village will be spanned by a stretched fabric roof hung from the bottom booms of the large existing trusses that span the supporting slab.

The single storey retail area is being built on top of a large concrete slab that spans the arena's loading bay. This floor was originally constructed in 2006 to accommodate a super casino, but the gambling Mecca was later scrapped and since then the slab had remained unused.

A series of trusses spans the slab creating a large column-free space. The trusses support lightweight metal decking to form a roof, which was constructed to make sure the casino was watertight if the Dome's fabric roof was ever removed.

The trusses vary in length with the longest spanning up to 60m. They are all tapered at both ends and have a maximum depth of 3m in the centre.

Some shorter trusses have been installed around the large Blackwall Tunnel ventilation shaft that protrudes upwards through the slab and out through an opening in The O_2's fabric roof.

This part of the village mall is described as a pinch point, as the slab and the retail outlets squeeze around the vent through a narrower area. There will only be outlets on one side of the mall in this zone.

"With the trusses in place it was decided that the steelwork would be hung from them, thereby creating large column-free ▶20

FACT FILE
Project Mint, The O_2
Main Client: Anschutz Entertainment Group
Architect: Callison RTKL
Main contractor: ISG
Structural engineer: BuroHappold Engineering
Steelwork contractor: Bourne Steel
Steel tonnage: 1,800t

▶19 flexible retail areas," explains BuroHappold Engineering Technical Director Jonathan Roynon.

"It also meant we averted adding more load to the slab, as strengthening works on this structure would have been difficult due to the loading bay and arena back-of-house facilities that sit beneath the structure being in constant use."

Some modifications were however needed to the trusses, as they were never intended to support an underslung steel frame. ISG and BuroHappold were able to get hold of the original design details from Watson Steel (now Severfield).

The dome's supporting pylons protrude through the steelwork

Using this information, it was decided that, in order to make the trusses able to support the extra loads from the new steel frame as well as some associated plant decks, a series of 35mm-thick stiffening plates would be welded to the trusses, while all of the node connections, approximately 36 on each truss, had to be strengthened.

Not wanting to overload the slab also had an effect on what kind of plant equipment steelwork contractor Bourne Steel could use during its erection programme and the strengthening works.

MEWPs were deemed to be too heavy and so a number of spider access units, which spread their load via stabilisers, were used.

As the slab was originally built with just a casino in mind, for today's retail project it has been built a little too high. Consequently, in the area where the slab meets the two-storey steel frame, the upper level gradually slopes down by 1m.

"Maximising the floor-to-ceiling heights on the two-storey zone was important as we have made provision for mezzanine floors to be installed, at a later date, on the ground and first floors," explains Mr Roynon.

The two steel-framed retail elements are both stand-alone structures deriving no stability from the original steelwork malls, roof or arena, but instead relying on new concrete lift and stair cores.

Both are nominally based around 7.5m column spacings, although the grid patterns are dictated by the radial curve of The O_2.

The retail outlets have required over 1,800t of steel, all of which has been fabricated, supplied and erected by Bourne Steel.

"It has been a challenging project working on many work fronts at the same time across a large area spanning some 400m. We have had an excellent team both on and off site and have completed the main works ahead of our contractual programme," sums up Bourne Steel Divisional Manager Andy Davies.

ISG will begin handing over retail units from May and the entire project is expected to be complete by Autumn 2018.

In-situ steel reuse

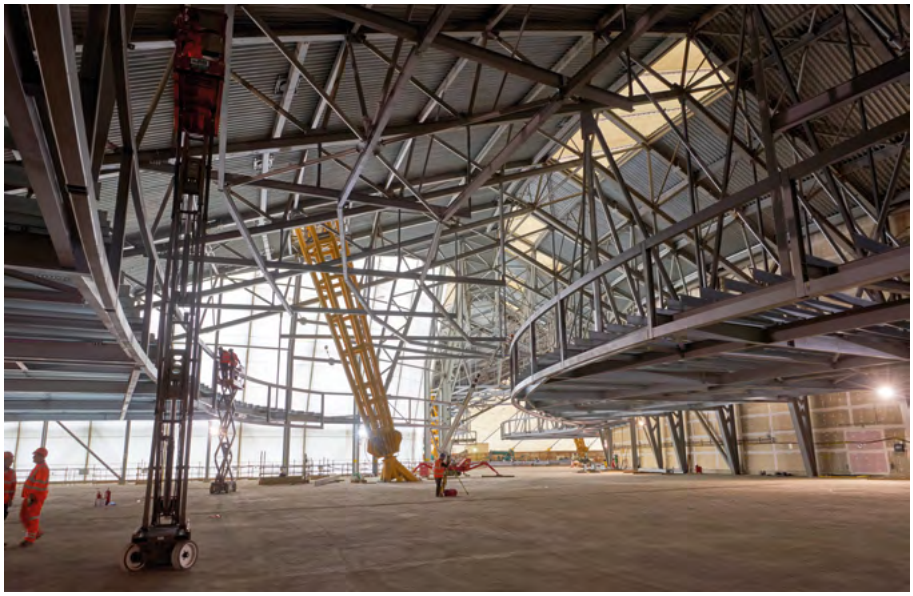
Michael Sansom of the SCI discusses the reuse of steel and 'design for deconstruction'.

Although not specifically intended when first designed, the ability to reuse the trusses for retail units demonstrates the versatility of steel structures in the hands of structural steel experts.

By retaining the slab and the existing steel trusses, waste is minimised and resources preserved; both key aspects of the evolving circular economy agenda. Not to mention the avoided costs and inconvenience were the existing slab to be broken out and the trusses recycled and replaced with a new, bespoke retail design.

More thought should be given, particularly for structures like The O_2 which are likely to be frequently reconfigured, about how they can be designed to be adaptable and extendable so that projects like this become the norm. This 'design for deconstruction' concept should be extended to all buildings going forward. Principles for doing this are given here: *https://www.steelconstruction.info/Steel_and_the_circular_economy#Design_for_deconstruction_and_reuse*

The adaptation of the steel trusses at The O_2 also demonstrates the importance of material and design data and information in facilitating the reuse of steel structures. In this case, BuroHappold was able to obtain the 2006 design information from Severfield and based on this, assess the existing structure and propose strengthening measures for the trusses. For older structures, this is frequently not the case and often expensive, intrusive surveys and testing are required before refurbishment or adaptation can happen.



SCI is exploring how BIM can be used to collate and securely store structural steel information to facilitate projects like Project Mint in the future. Material traceability, data security and future-proofing are key considerations but mill test certificates, block-chain and open IFC formats are readily available solutions.

The UK steel construction sector has been using what is now called 'BIM' for over 30 years, and capturing the necessary material and design information to facilitate future reuse of steel structures is a simple thing for the sector to do. While there remain significant barriers to the mainstream reuse of structural steel, certainly within existing business models, putting in place a means to facilitate future reuse of steel makes good sense for the sector and wider society.

SCI's R&D into steel reuse includes the EU projects REDUCE and PROGRESS. The focus of REDUCE is demountable composite flooring solutions and the focus of PROGRESS is the reuse of single storey industrial buildings. Both projects are exploring the use of BIM to facilitate the deconstruction and reuse of steel structures.

celebrating

excellence in steel

Call for entries for the 2018 Structural Steel Design Awards

The British Constructional Steelwork Association and Trimble Solutions (UK) Ltd have pleasure in inviting entries for the 2018 Structural Steel Design Awards.

The Awards celebrate the excellence of the United Kingdom and the Republic of Ireland in the field of steel construction, particularly demonstrating its potential in terms of efficiency, cost-effectiveness, aesthetics and innovation.

The Awards are open to steel-based structures situated in the United Kingdom or overseas that have been built by UK or Irish steelwork contractors. They must have been completed and be ready for occupation or use during the calendar years 2016-2017; previous entries are not eligible.

To find out more and request an entry form visit www.steelconstruction.org/resources/design-awards or call Gillian Mitchell of BCSA on 020 7747 8121

Closing date for entries:
Friday 23rd February 2018

BCSA

Trimble

Pre-let success

A steel-framed solution was the answer for the latest stand-out commercial development in London's King's Cross. Martin Cooper reports.

Two atriums are positioned either side of the core

The latest steel-framed building to top-out at the large King's Cross development is Building S2, situated on Handyside Street. Already fully let, the 12-storey building will offer 23,000m² of space and is set to achieve a BREEAM 'Outstanding' environmental rating.

The King's Cross redevelopment programme is radically changing a former run-down industrial site in central London into a vibrant business and residential neighbourhood.

Described as one of the largest regeneration schemes in Europe, it will include 50 new buildings, 2,000 new homes, 20 new streets and 10 new public squares spread over 67 acres.

Steel has allowed cantilevers and architectural set-backs to be incorporated into the design

Steel construction is playing a significant role within this development with a number of commercial and retail schemes having already made use of the material's programme benefits.

Building S2 has reaped the rewards of a design change from a post-tensioned concrete frame to a steel frame. The initial design had the building based around a fairly tight structural grid, which was later deemed to be too constrained with too many internal columns for modern office requirements.

"The design was changed to a steel solution because the material offered a more economical method to achieve the desired spans and service integration," explains Ramboll Engineer James Clay.

Another benefit of steel from a design perspective was in framing the numerous architectural set-backs and cantilevers, primarily the west façade, south set-back terraces and a south-east cantilevered corner.

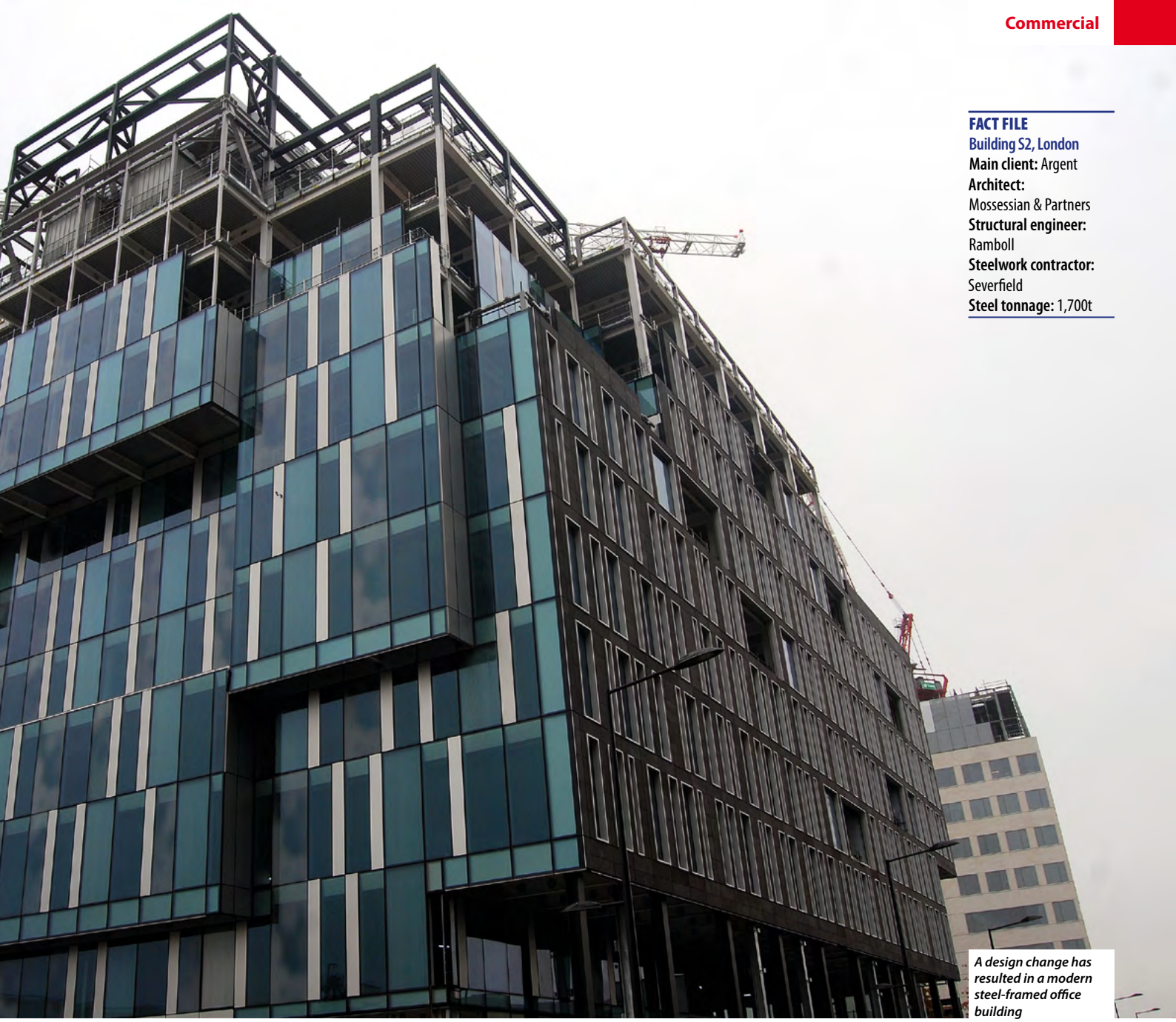
Steel allowed the project team to hang parts of the floorplate and transfer other areas without impacting on the floor-to-ceiling height or raised access floor zone, which would not have been possible in post-tensioned concrete.

Sat atop a concrete basement sub-structure, the building's steel frame starts at ground floor level and is based around a 12m × 12m grid with structural stability derived from a centrally positioned concrete core.

Fabsec cellular beams have been used throughout to accommodate ductwork and services, and these members also support metal decking and a concrete composite flooring system.

As well as accommodating the services within their depth, and consequently maximising the building's floor-to-ceiling heights, the cellular beams will also be left exposed within the completed project, giving the tenant its desired raw, modern industrial-like environment.

The ground floor of S2 is a double-height space containing the main entrance lobby, restaurants and retail units. Above, the first floor has a cut-out area that overlooks the entrance. From the first floor to the ninth level, the floors are fairly repetitive with only a single row of internal columns disrupting the open-plan space.



FACT FILE
Building S2, London
Main client: Argent
Architect: Mossessian & Partners
Structural engineer: Ramboll
Steelwork contractor: Severfield
Steel tonnage: 1,700t

A design change has resulted in a modern steel-framed office building

However, breaking up the regimentation in the floorplates are two atriums positioned on either side of the core. On the eastern side of the building one atrium starts at level four and extends upwards to the underside of level six. The fifth floor overlooks the atrium and wraps around the inside of the void. On the opposite side of the building, another taller atrium begins at fifth floor and extends upwards to the underside of level eight. Within this void, floors six and seven overlook and wrap around the inside.

Having two large atriums may be to the liking of the building's imminent tenant, but possible future occupiers could have different ideas and needs.

In order to give the building maximum future flexibility, the atriums can be covered over to create more office space, as Severfield Project Manager Kyle Fletcher explains. "We've installed extra beams within the frame, adjacent to the voids. They currently perform no structural duties, but if needed they can be unbolted from their locations and installed across the atriums."

Prior to installing these extra beams, Severfield undertook a trial erection to make sure the steelwork fitted and could span the atriums.

The trial and the entire steelwork erection programme was carried out using the site's two tower cranes. The only exception being a couple of 7t beams needed for the upper office levels.

Too heavy for the tower cranes, they needed to be installed by a large mobile crane, which required a Saturday morning partial road closure of Handyside Street.

The building is topped by a generous landscaped roof terrace which is known as level 11. A step in the floor separates this area from a plant zone, which is called level 10. More plant is located on floor 12, which is a steel-framed deck set back from levels 11 and 10 and occupying approximately one third of the building's footprint.

S2 is the first part of a two-building scheme, with the adjacent Building S1 having recently gained planning approval.

Buildings S1 and S2 will be linked stylistically according to the project architect Michel Mossessian.

"S1, like S2 will be clad in a textured black stone that frames the buildings, forming the mass, and contrasting strongly with the light of the white 'cavities' in the façade. These cavities frame the windows and connect the buildings to the exterior space, highlighting the connection to the public realm."

The space between the two buildings will form a dramatic sculptural void and act as a passageway, leading to a new public square that will be home to some distinctive restaurants.

"The key is to acknowledge that there is a fine line between public, curated and private tenants' realm, from the ground up to the rooftops of the buildings," adds Mr Mossessian. "This is what really makes the spaces hang together and generate a strong and engaging urban and spatial character for users."

Building S2 is due to complete this summer.

Education in the frame

Steelwork's speed of construction and flexibility have both come to the fore on an education project in Cumbria.

Two schools in Whitehaven, Cumbria will soon be sharing new state-of-the-art premises that also incorporate an array of community accessible sports facilities.

Known as Campus Whitehaven, it will bring together St Benedict's Catholic High School and special education needs (SEN) school, Mayfield, into two brand new buildings at the former's existing site in Hensingham, Whitehaven.

The project, which is due for completion in August 2019, has a £28M value and has been funded by investment from a range of partners, including Copeland Community Fund, Cumbria County Council, the Nuclear Decommissioning Authority and Sellafield Ltd.

"This remarkable project has incredible potential to transform the education of young people in Whitehaven and improve the health and wellbeing of the whole community," says Cabinet Member for Economic Development and Property Councillor David Southward.

As well as an indoor sports hall, fitness suite and a hydrotherapy pool, a range of outdoor facilities will be available to the local community during non-school hours. These include multi-use sports pitches, one of which will have an all-weather 4G surface.

Main contractor Wates Construction started on-site during May 2017 and, after some earthworks to prepare the former sports pitches in readiness for the construction works, foundations were installed which then allowed steelwork erection to begin in June.

"We erected the entire 700t steel frame in 11 weeks, which amounted to some 3,500 individual pieces," says Border Steelwork Structures [BSS] Contracts Director Stuart Airey.

Despite some very inclement weather – as unfortunately the Cumbrian coast is prone to a fair amount of precipitation – the steelwork was still able to complete a week ahead of schedule. This then allowed BSS to continue with the other elements of its package, such as installing precast floor slabs and roof decking.

"That's one of the advantages of steel, it is quick to erect and only high winds, which we didn't really get, will halt its progress," says Wates Senior Project Manager Simon Humphrey.

"I've been involved in a number of steel construction jobs in the past and this one has been one of the most well organised. The trick is to order the steel early and get the fabrication started as soon as possible to iron out any snags, and this is precisely what we did."

Completing the steel frame quickly allowed the follow-on trades to get an early start, helping to achieve the project team's aim of creating a watertight structure before the onset of winter.

The Campus has been designed with a focus on using intelligent planning to produce a creative and collaborative

The entrance area culminates in a beak-like feature element

learning environment for students across a wide range of abilities.

Mayfield, for instance, is a Mobility Opportunities via Education (MOVE) Centre of Excellence, combining therapy and education to teach children with physical disabilities and complex needs functional skills, such as sitting and walking.

Augmentative technologies will be used from the very first design phase to identify and propose flexible and innovative interior solutions to support these learning objectives and help students live more independent lives.

St Benedict's interior will draw inspiration from the local area's technological industries and provide solutions to facilitate a diverse curriculum, where students will be encouraged to explore robotics, renewable energy and low carbon technologies.

On plan, the overall project has a bird-like appearance with two long teaching wings positioned either side of a body-like structure that contains the entrance/winter garden and the sports areas.

Emphasising the avian likeness, the central body culminates in a triangular pointed entrance area that resembles a beak.

Each of the two schools will occupy one of the wings, with St Benedict's getting a three-storey wing, and Mayfield being accommodated in a lower two-storey building.

Both of the wings are of a similar design with steelwork supporting precast planks and columns mostly based around a 7m × 7.5m grid pattern. This creates two perimeter rows of classrooms separated by central corridors – 1.8m-wide in St Benedicts and 2m wide in Mayfield - formed by intermediate columns.

"Building schools with steel is a tried and tested method," comments Curtins Consulting Director Andy Roberts. "It's an efficient way to build with the added benefit of built-in flexibility, whereby partition walls can be removed to create larger classrooms if and when desired."

All of the classroom services are accommodated within the corridors beneath the steel beams, with individual services then directed into each class.

Each wing is a fully braced frame with cross bracings positioned in some internal partitions as well as in stairwells, which are located at each end of the structures. Because the wings are each approximately 100m-long, they are each separated from the central zone by movement joints.

As each wing is located either side of the entrance and the sports facilities, ease of access has been guaranteed to these areas as well as a fair amount of privacy.

The central shared zone of the Campus, which will also be the part accessed by the local community, is highlighted by the beak-like triangular pointed entrance which provides access into a double-height circulation area known as the winter garden.

The fully glazed entrance is formed with a series of CHS feature columns with UB roof beams and ties supporting a 159mm-deep aluminium deck roof.

The winter garden is a large open space with just one internal column, but with no heating, making it a pseudo outdoor environment. A large circular roof light will allow plenty of natural light into the zone. The longest steel elements of the project were used to span this area, with some beams measuring up to 22m-long.

Positioned towards the back of the winter garden are the shared dining areas, kitchens and sports areas. These consist of a number of double-height long span structures, with the largest being the main sports hall. The sports hall has a clear span of 18.4m, while the pool has a span of 15.1m.

"When looking at the structural choices for Campus Whitehaven, steel was the obvious choice. We have some large spans throughout the scheme and for economy wanted to keep the building height to a minimum, steel helped us achieve this.

"The winter garden forms the main entrance to the campus and we wanted a light and airy feel to the double-height space, while the dynamic triangular feature canopy that articulates the entrance was easily achieved in steel to give the minimal look we wanted," sums up Ellis Williams Architects Associate Ruth Clayton.

FACT FILE
Campus Whitehaven
Main client: Cumbria County Council
Architect: Ellis Williams Architects
Main contractor: Wates Construction
Structural engineer: Curtins Consulting
Steelwork contractor: Border Steelwork Structures
Steel tonnage: 700t

A complex pattern of steelwork forms the zone where the two wings meet

The lower two-storey wing will house the SEN school

Cold formed sections

The forming process affects the toughness of cold formed sections and their use in external structures. Welding is prohibited near the corners of cold formed sections in certain circumstances. Richard Henderson of the SCI discusses the issues.

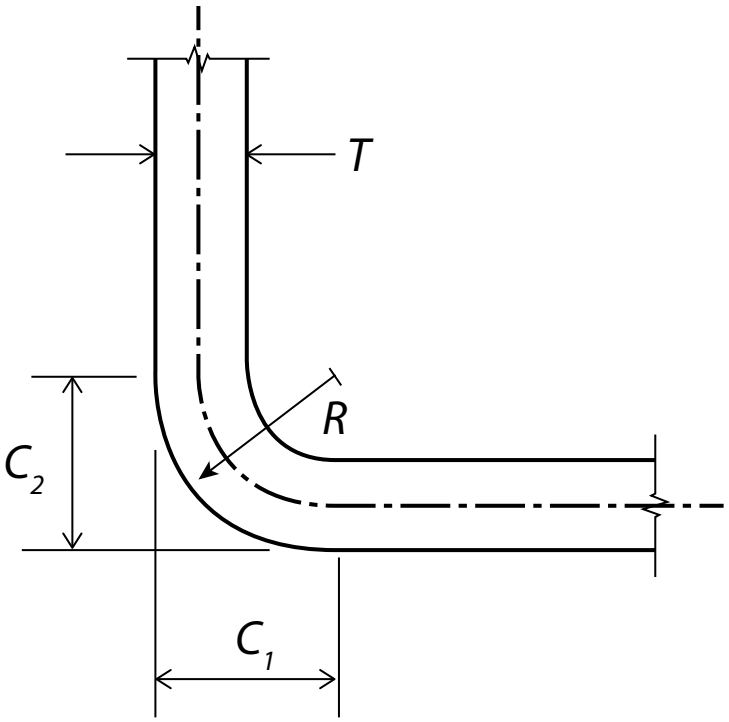


Figure 1: Corner dimensions

The toughness of steel is affected by the extent of strain it has undergone as well as by other factors. This fact is taken into account when determining the limiting thickness for materials using BS EN 1993-1-10. The limiting thickness of plate or hot rolled or hot finished structural sections does not, in general, depend on the extent of strain because such elements are not subject to plastic strain during their use, nor in the course of their manufacture. This does not apply however to cold formed square and rectangular hollow sections, which experience significant strains at the corners of the profile. Neither does it apply to beams which have been pre-cambered by cold bending.

The product standard for cold formed welded structural hollow sections, BS EN 10219-1:2006 requires that for square or rectangular sections, the test pieces for impact testing are taken either longitudinally or transversely midway between the corners from one of the sides not containing the weld. The impact values therefore relate to material which is unaffected by cold forming, thus tacitly acknowledging that the forming process affects the material toughness. According to clause 6.7.2 of the product standard, there is no requirement for impact tests for specified thicknesses of less than 6 mm.

The effect of strain during cold forming must be taken into account when determining the limiting thickness of material of a given sub-grade. According to BS EN 1993-1-10 and its UK National Annex, the reference temperature T_{Ed} for determining the toughness of a steel element:

$$T_{Ed} = T_{md} + \Delta T_r + \Delta T_\sigma + \Delta T_R + \Delta T_\varepsilon + \Delta T_{\varepsilon_{cf}}$$

where $(T_{md}+\Delta T_r)$ considered together represent the minimum effective temperature of the steel part, ΔT_R is a safety allowance, ΔT_ε is an adjustment for strain rate and $\Delta T_{\varepsilon_{cf}}$ is an adjustment for the extent of strain during cold forming.

The UK National Annex collects together factors affecting the safety of elements and gives an equation for ΔT_R as follows:

$$\Delta T_R = \Delta T_{RD} + \Delta T_{Rg} + \Delta T_{RT} + \Delta T_{R\sigma} + \Delta T_{Rs}$$

where ΔT_{RD} is an adjustment for detail type, ΔT_{Rg} for gross stress concentration, ΔT_{RT} for Charpy test temperature, $\Delta T_{R\sigma}$ for stress level and ΔT_{Rs} for strength grade. The procedure is consistent with $\Delta T_\sigma = 0$.

The temperature adjustment for cold forming is given in clause 2.3.1(2) of the standard as minus three times the percentage strain expressed as degrees Celsius. A strain of 10% would result in a temperature adjustment of −30 °C. This is potentially significant when considering the adoption of cold formed sections.

The strain resulting from cold forming SHS or RHS tubes can be determined from the limiting dimensions in the product standard as follows. Consider the corner of a box section as shown in Figure 1. The external corner profile is determined in the product standard by measuring dimensions C_1 and C_2 or R.

The length of the centre line is the original length before forming. For one corner, the centre line length is:

$$L = \frac{2\pi}{4}\left(R - \frac{T}{2}\right)$$

The outside length after forming is $\frac{2\pi}{4}R$

The change in length $\Delta L = \frac{2\pi}{4}R - \frac{2\pi}{4}\left(R - \frac{T}{2}\right) = \frac{\pi T}{4}$

The strain is $\frac{\pi T/4}{2\pi/4(R-T/2)} = \frac{T}{(2R-T)}$

The dimensional tolerances on the corner radius for different thickness ranges is taken from the product standard and used to determine the maximum percent strain due to cold forming in Table 1 (over page) by substituting the minimum external radius in the formula for strain.

The strain could therefore be as high as 45% for material less than 6 mm thick bent to the tightest radius, giving a temperature adjustment for cold forming of -3 × 45 = −135 °C when determining the limiting thickness. Such an adjustment puts

▶28

SCI PUBLICATIONS

SCI
Steel Knowledge
www.steel-sci.com

Our high quality technical publications continue to be used as the definitive guidance within the sector, focusing on providing the latest and most accurate information to ensure best practice is maintained across every aspect of steel construction.

Brittle Fracture: Selection of Steel Sub-Grade to BS EN 1993-1-10 (P419)

In structures where fatigue is not a design consideration, BS EN 1993-1-10 notes that the tabulated limiting thicknesses can be conservative. This guide presents limiting thicknesses for internal and external steelwork in the UK when fatigue is not a design consideration.

SCI Members £22.50
Non SCI Members £45

Design Manual for Structural Stainless Steel (P413)

This Design Manual provides design rules for austenitic, duplex and ferritic stainless steels. The rules are aligned to the 2015 amendment of the Eurocode for structural stainless steel, EN 1993-1-4. They cover the design of cross-sections, members, connections and design at elevated temperatures as well as new design methods which exploit the beneficial strain hardening characteristics of stainless steel.

Electronic Format Only
Free Download

Steel Bridge Group: Completion of Appendix 18/1 (P418)

This publication provides guidance on the completion of an 'Appendix 18/1' document to be used in conjunction with the specifications for steelwork issued by Highways England and Network Rail.
The guidance is in the form of additional requirements that may be included in the project specific Appendix 18/1 document or in Appended Documents.

Electronic Format Only
SCI Members Free
Non Members £30 + VAT

Design of Cast-In Plates (P416)

This guide discusses the technical issues involved in connecting the steel and concrete elements together. A model and a procedure for the design of cast-in plates is proposed including the allocation of design responsibility. The guide includes example calculations.

This guide is available to SCI and BCSA members as a download via Steelbiz or pre order your hard copy now.

SCI Member Cost £22.50
Non Member Cost £45.00

The SCI is committed to helping members meet their design, manufacture, construction and commercial objectives.

@SCIsteel

steel-construction-institute

SCI Bookshop

For further details contact
+44 (0)1344 636505
https://portal.steel-sci.com/shop

Thickness Range (mm)	External corner profile C_1 and C_2 or R	Maximum strain	% strain
$0 < t \leq 6$	$1.6T$ to $2.4T$	$T/(2\times1.6T - T) = 1/2.2$	45.5
$6 < t \leq 10$	$2.0T$ to $3.0T$	$T/(2\times2.0T - T) = 1/3.0$	33.3
$10 < t$	$2.4T$ to $3.6T$	$T/(2\times2.4T - T) = 1/3.8$	26.3

Table 1: Strain due to cold forming

▶26 the relevant temperature well outside the range covered by the tables in BS EN 1993-1-10 and PD 6695-1-10.

The SCI's recent publication P419, Brittle fracture: selection of steel subgrade to BS EN 1993-1-10 addresses the acknowledged conservatism in the standard for structures where fatigue is not a significant design consideration and presents tables of limiting material thicknesses for this circumstance. However, the tables do not extend to the much lower temperatures indicated when considering the adjustments for the high strains resulting from cold forming. SCI has produced values for the relevant temperatures and these are given in Table 2 for S355J2 material (the common steel grade for hollow sections).

As an example consider a cold formed section of steel grade S355J2 with thickness in the range 0 to 6 mm used in an external building environment where fatigue is not a design consideration, with a high design stress ($\sigma_{Ed} > 0.5f_y$), no gross stress concentration and with a welded detail classed as "Welded very severe".

Temperature adjustments are given in Table 3:

From Table 2, the limiting thickness of the cold formed section is 5 mm. Limiting thicknesses for sections in the higher thickness ranges in the product standard are given in Tables 4 and 5 for details classed as "welded very severe" and "welded severe".

Table 5 also applies to a detail which is classed as "welded very severe" and has a design stress of less than $0.3f_y$.

An examination of the sizes in the Blue Book shows that certain sections should not be used if the attributes of a connection detail correspond to those in Table 4. If the detail corresponds to the description in Table 5, there is no restriction on the catalogue sizes which could be used.

The strain involved in cold forming circular hollow sections

Material S355J2	Stress level $0.75f_y$											
Temperature (°C)	-70	-80	-90	-100	-110	-120	-130	-140	-150	-160	-170	-180
Thickness (mm)	54	40	30	32	18	15	12	10	8	7	6	5

Table 2: Limiting thicknesses for low temperatures

Adjustment	$(T_{md} + \Delta T_r)$	ΔT_{RD}	ΔT_{Rg}	ΔT_{RT}	$\Delta T_{R\sigma}$	ΔT_{RS}	ΔT_{ε}	$\Delta T_{\varepsilon cf}$	Total
Temperature (°C)	-15	-30	0	0	0	0	0	-136	-181

Table 3: Temperature adjustments for determining limiting thickness

is much less than that at the corners of square and rectangular sections (about 10% in the worst case) and there is consequently no restriction on the choice of cold formed circular hollow sections, even with the presence of a gross stress concentration.

Designers will also remember that BS EN 1993-1-8:2005 Clause 4.14 and Table 4.2 imposes restrictions on welding near cold formed zones. The table is entitled 'Conditions for welding cold formed zones and adjacent material' and gives maximum thicknesses based on an *r/t* ratio or strain due to cold forming. Unhelpfully, the radius considered in the clause is the internal radius of the corner, whereas the product standard BS EN 10219-2 uses the external radius (external corner profile). The corresponding *r/t* values and limiting thicknesses are given in Table 6 (below right).

The clause therefore prohibits welding within 5 times the wall thickness of the corners of many square and rectangular cold formed sections, unless the steel is "fully killed Aluminium-killed steel (Al ≥ 0.02%)", with limits on carbon (C ≤ 0.18%,), phosphorous (P ≤ 0.02%) and sulphur (S ≤ 0.012%). Alternatively, tests must have been carried out to show that welding is permitted.

Table A1 in Annex A of the product standard indicates the steel is fully killed steel with a minimum 0.02% of total aluminium. The table gives the chemical composition of the steel and includes maximum percentages by mass of carbon (C ≤ 0.22%), phosphorous (P ≤ 0.03%) and sulphur (S ≤ 0.03%). The material therefore satisfies the requirement for fully-killed aluminium killed steel but allows the percentage of carbon, phosphorous and sulphur to fall outside the limits specified in Table 4.2.

This restriction prohibits the adoption of a welded end plate or base plate for most rectangular and square cold formed hollow sections which comply with the product standard but do not meet the tighter requirements for carbon, phosphorous and sulphur in Table 4.2.

Design detail	Thickness range (mm)	Temperature adjustment (°C)	Maximum thickness (mm)
no fatigue; external steelwork, welded very severe, high design stress (>0.5f_y) no gross stress concentration, S355J2H	0 < t ≤ 6	-181	5
	6 < t ≤10	-145	9
	10 < t	-124	13

Table 4: Detail classed as welded very severe (equivalent to -30 °C in NA.1)

Design detail	Thickness range (mm)	Temperature adjustment (°C)	Maximum thickness (mm)
no fatigue; external steelwork, welded severe, high design stress (>0.5f_y) no gross stress concentration, S355J2H	0 < t ≤ 6	-171	6
	6 < t ≤10	-135	11
	10 < t	-114	16

Table 5: Detail which is classed as welded severe (equivalent to -20 °C in NA.1)

Product standard thickness range (mm)	Product standard tolerances based on *R*	Table 4.2 Corresponding *r/t*	Table 4.2 "worst case" maximum thickness (mm)
0 < t ≤ 6	1.6T to 2.4T	0.6 to 1.4	not given
6 < t ≤10	2.0T to 3.0T	1.0 to 2.0	6
10 < t	2.4T to 3.6T	*1.4 to 2.6*	6 (out of range)

Table 6: Maximum thickness for welding related to the product standard

AD 415:
Vertical tying of columns and column splices

For compliance with the tying method of providing robustness, vertical and horizontal ties are required for buildings in Consequence Class 2B.

In the accidental action situation, vertical and horizontal tying is required to redistribute loads through the structure via alternative load paths, away from locally damaged areas. This principle is shown in Figure 1. Vertical ties also help to limit the risk of the upper floor being blown upwards in an explosion.

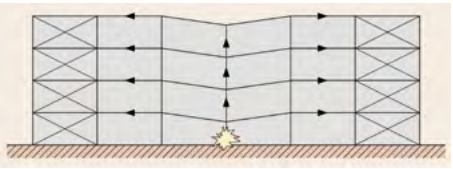


Figure 1

The differences in vertical tying requirements of BS EN 1991-1-7[1] and BS 5950-1[2] has prompted some questions. This AD note reviews those differences and provides recommendations for the design of vertical ties in accordance with BS EN 1991-1-7.

BS EN 1991-1-7, clause A.6 (2) states: "The column should be capable of resisting an accidental design tensile force equal to the largest design vertical permanent and variable load reaction applied to the column from any one storey".

BS 5950-1, clause 2.4.5.3 (c) states: "All column splices should be capable of resisting a tensile force equal to the largest total factored vertical dead and imposed load applied to the column at a single floor level located between that column splice and the next column splice down".

The two differences between the requirements are:

1) The load combination to use for the derivation of the level of loading i.e. accidental or normal ULS load combination.
2) The length of column to be consider to determine the maximum floor load to be considered i.e. the entire column length or the column length between splices.

The rules for vertical tying presented in EN 1991-1-7 (which are non-material specific) are largely based on requirements from BS 8110-1[3] (clauses 3.12.3.7 and 2.4.3.2), requiring continuous vertical ties from the lowest to the highest floor. In BS 8110-1, the design load is generally taken as the permanent actions plus 1/3 of the imposed load, from any one storey, all factored by 1.05.

When considering robustness, which is an accidental limit state, it is logical to use the accidental load combination, as given in BS EN 1990[4]. This guidance supersedes that provided in SCI publication P391 (section 7.3.2)[5] which proposed that the normal ULS loading should be used.

For Eurocode designs, the guidance in BS EN 1991-1-7 should be followed and the entire column length (and any splice) should be capable of carrying the largest accidental design tension resulting from any one storey.

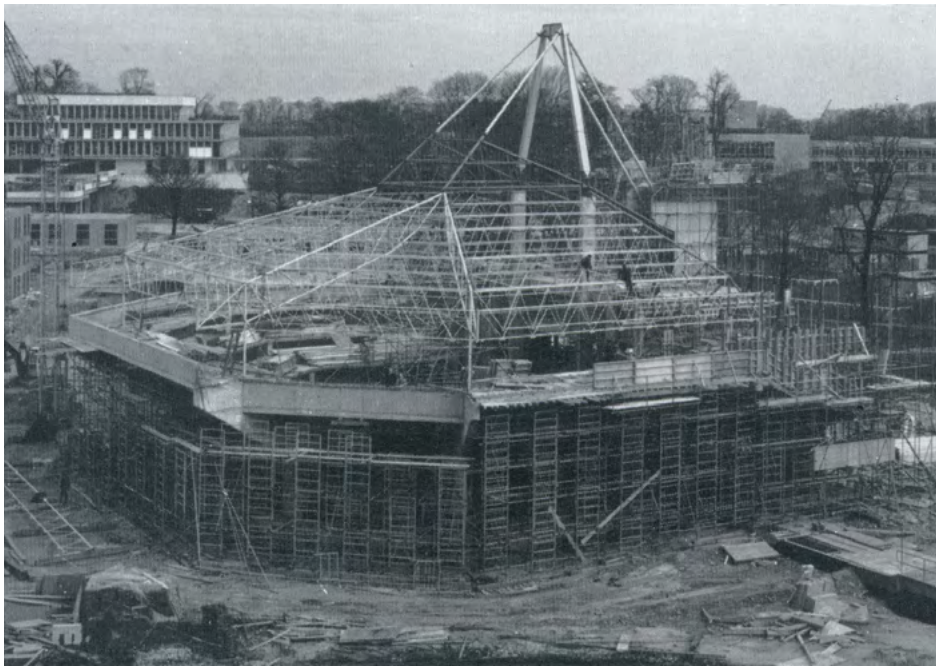
If loads applied at one storey are very large, possibly because (for example) transfer trusses are supported at that level (see figure 9.2 in P391), the accidental force to be accommodated may dominate the selection of the column (and splice connections) at upper levels. If this is the case, it may be more advantageous to consider the support to the transfer trusses to be a key element, and design against its removal.

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

(1) BS EN 1991-1-7:2006+A1:2014 Eurocode 1. Actions on structures. General actions. Accidental actions
(2) BS 5950-1:2000 (BSI 2008) Structural use of steelwork in building. Code of practice for design. Rolled and welded sections
(3) BS 8110-1:1997 Structural use of concrete. Code of practice for design and construction. Amended by AMD 9882, AMD 13468. Amendment, August 2007; Amendment, November 2005
(4) BS EN 1990:2002+A1:2005 Eurocode. Basis of structural design
(5) Structural robustness of steel framed buildings (P391). SCI, 2011

BUILDING WITH STEEL

University of York - unusual roof structure



The shape of the new Central Hall at York University is of particular interest in that it differs completely from the traditional contours of university buildings, both past and present. The building encloses an auditorium seating 1,300 with a large stage and is sited on a brick-faced podium surrounded on three sides by an artificial lake. It has three floors of ancillary accommodation with the main foyer at ground level below the auditorium. The roof and upper vertical parts of the superstructure are clad in aluminium.

The design of the steel-framed roof, which is suspended from an 'A' frame, is also interesting and unusual. The design evolved from the wish to provide a visually acceptable structure which would avoid the need for a suspended ceiling and yet provide an acoustically satisfactory space. The intention was that the roof would provide a strong visual statement externally.

The plan of the auditorium consists basically of a rectangle with the two corners splayed at 45°, raked seating being arranged around the stage through 180° in a manner similar to the classical Greek theatre. Two columns 60 ft high and 28 ft apart pass through the building framing the stage opening. These are topped by a 30-ft high

New and revised codes & standards

From BSI Updates December 2017 and January 2018

BRITISH STANDARDS UNDER REVIEW

BS ISO 16160:2012
Hot-rolled steel sheet products. Dimensional and shape tolerances

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT - ADOPTIONS

17/30332299 DC
BS EN ISO 11125-5 Preparation of steel substrates before application of paints and related products. Test methods for metallic blast-cleaning abrasives. Part 5. Determination of percentage defective particles and of microstructure
Comments for the above document were required by 21 December 2017

CEN EUROPEAN STANDARDS

EN 10263-4:2017
Steel rod, bars and wire for cold heading and cold extrusion. Technical delivery conditions for steels for quenching and tempering

EN 10263-5:2017
Steel rod, bars and wire for cold heading and cold extrusion. Technical delivery conditions for stainless steels

NEW WORK STARTED

EN 10139:2016/A1
Cold rolled uncoated low carbon steel narrow strip for cold forming. Technical delivery conditions

EN 10283
Corrosion resistant steel castings
Will supersede BS EN 10283:2010

ISO PUBLICATIONS

ISO 544:2017
Welding consumables. Technical delivery conditions for filler materials and fluxes. Type of product, dimensions, tolerances and markings
Will be implemented as an identical British Standard

ISO 12944-1:2017
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. General introduction
Will be implemented as an identical British Standard

ISO 12944-2:2017
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Classification of environments
Will be implemented as an identical British Standard

ISO 12944-3:2017
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Design considerations
Will be implemented as an identical British Standard

ISO 12944-4:2017
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Types of surface and surface preparation
Will be implemented as an identical British Standard

ISO 12944-7:2017
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Execution and supervision of paint work
Will be implemented as an identical British Standard

ISO 12944-8:2017
Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Development of specifications for new work and maintenance
Will be implemented as an identical British Standard

ISO 13887:2017
Steel sheet, cold-reduced, of higher yield strength with improved formability
Will be implemented as an identical British Standard

ISO 20805:2017
Hot-rolled steel sheet in coils of higher yield strength with improved formability and heavy thickness for cold forming
Will be implemented as an identical British Standard

ISO 22825:2017
Non-destructive testing of welds. Ultrasonic testing. Testing of welds in austenitic steels and nickel-based alloys
Will be implemented as an identical British Standard

Reprinted from Volume 5 No. 1 February1968

'A' frame fabricated from mild steel plate and standing externally above the roof line.

The 'A' frame is anchored back by two circular hollow sections (CHS) to the lift tower which acts as a counterweight on the axis of the building, thus providing a tied cantilever from which the auditorium roof is hung. The two CHS front ties each pick up two raking main trusses placed, on plan, on the bisectors of the auditorium splays forming the hips of the roof and spanning on to tubular columns placed at the perimeter of the auditorium.

In a similar manner main trusses span from the feet of the 'A' frame legs to the perimeter of the auditorium, on-line with the stage wing walls. Secondary trusses at 6 ft 9 in centres span between the main trusses, reflecting the pattern of the seating below. Channel-reinforced woodwool spans directly onto the secondary trusses, the channel being bolted to tees on the top booms to provide lateral restraint.

A glazed lantern is incorporated between the two front ties and their respective compression tubes, the depth being used to span the rectangle formed by the feet of the 'A' frame and the intersection points of the main trusses. Horizontal wind bracing is provided across the lantern opening and between the secondary perimeter trusses, and vertical bracing to the pin jointed perimeter stanchions. The main trusses are cantilevered beyond the perimeter stanchions to form a canopy to the external access balcony. Access to the roof structure and the projection box is by a continuous walkway around the auditorium perimeter.

The lower booms of secondary trusses carry stage lighting equipment: the main auditorium lighting consists of tungsten fittings fixed direct to the soffit above the roof structure. All structural members of the auditorium roof are constructed from CHS. Secondary truss-to-main-truss connections were made by site welding via a split cup and main connections were bolted through flange plates. The 'A' frame was erected in one piece, the back ties and respective compression tubes anchored to the lift shaft and the lantern structure front ties and main trusses then erected in sequence. Steelwork erection was completed in six weeks. Roof cladding consists of snaprib aluminium on felt, insulation board, a vapour barrier and 2-in thick woodwool.

Architects and structural engineers – Robert Mathew, Johnson-Marshall and Partners.

Steelwork contractors for buildings

Membership of BCSA is open to any Steelwork Contractor who has a fabrication facility within the United Kingdom or Republic of Ireland.
Details of BCSA membership and services can be obtained from
Gillian Mitchell MBE, Deputy Director General, BCSA, 4 Whitehall Court, London SW1A 2ES
Tel: 020 7747 8121 Email: *gillian.mitchell@steelconstruction.org*

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

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

FPC Factory Production Control certification to BS EN 1090-1
1 – Execution Class 1 **2** – Execution Class 2
3 – Execution Class 3 **4** – Execution Class 4
BIM BIM Level 2 assessed
QM Quality management certification to ISO 9001
SCM Steel Construction Sustainability Charter
(● = Gold, ● = Silver, ● = Member)

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

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

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	FPC	BIM	SCM	Guide Contract Value (1)
A & J Stead Ltd	01653 693742			●	●					●	●			●	●		3			Up to £400,000
A C Bacon Engineering Ltd	01953 850611			●	●	●	●				●			●			2			Up to £3,000,000
A&J Fabtech Ltd	01924 439614	●					●		●	●	●		●	●		✔	3			Up to £400,000
Access Design & Engineering	01642 245151					●				●	●			●	●	✔	2			Up to £4,000,000
Adey Steel Ltd	01509 556677	●		●	●	●	●	●	●	●	●			●	●	✔	3	✔	●	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*
Apex Steel Structures Ltd	01268 660828					●	●			●	●			●	●		2			Up to £2,000,000
Arc Fabrication Services Ltd	01709 557654			●	●	●	●	●	●	●	●			●	●	✔	3			Up to £200,000
Arminhall Engineering Ltd	01799 524510	●			●	●		●		●	●			●	●	✔	2			Up to £800,000
Arromax Structures Ltd	01623 747466	●		●	●	●	●	●	●	●	●	●		●	●		2			Up to £800,000
ASA Steel Structures Ltd	01782 566366			●	●	●	●			●	●			●	●	✔	4			Up to £800,000
ASME Engineering Ltd	020 8966 7150				●	●	●	●		●	●			●	●	✔	4		●	Up to £4,000,000
Atlasco Constructional Engineers Ltd	01782 564711			●	●	●	●			●	●			●	●	✔	2			Up to £1,400,000
Austin-Divall Fabrications Ltd	01903 721950			●	●		●	●		●	●			●	●	✔	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 Construction Engineering Ltd	01202 746666		●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Briton Fabricators Ltd	0115 963 2901	●		●	●	●	●	●	●	●	●			●	●	✔	4			Up to £6,000,000
Builders Beams Ltd	01227 863770			●	●	●	●			●	●			●	●	✔	3	✔		Up to £3,000,000*
Cairnhill Structures Ltd	01236 449393	●			●	●	●	●	●	●				●	●	✔	4		●	Up to £3,000,000
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 £100,000
D Hughes Welding & Fabrication Ltd	01248 421104				●	●	●	●		●	●		●	●	●	✔	4			Up to £800,000
Duggan Steel	00 353 29 70072		●	●	●	●	●	●	●	●	●	●			●	✔	4			Up to £6,000,000
ECS Engineering Services Ltd	01773 860001	●		●	●	●	●	●	●	●	●			●	●	✔	3			Up to £3,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✔	4	✔	●	Up to £6,000,000
ESL (GB) Ltd	01482 787986	●					●	●	●	●	●	●	●	●	●	✔	4			Up to £400,000
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
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)
Fox Bros Engineering Ltd	00 353 53 942 1677			●	●	●	●	●		●	●				●		2			Up to £2,000,000
Gorge Fabrications Ltd	0121 522 5770				●	●	●	●		●				●	●	✔	2			Up to £1,400,000
Gregg & Patterson (Engineers) Ltd	028 9061 8131			●	●	●	●	●				●		●		✔	3			Up to £3,000,000
H Young Structures Ltd	01953 601881			●	●	●	●	●		●	●			●	●	✔	2		●	Up to £2,000,000
Had Fab Ltd	01875 611711				●				●	●	●				●	✔	4			Up to £3,000,000
Hambleton Steel Ltd	01748 810598		●	●	●	●	●	●				●		●		✔	4		●	Up to £6,000,000
Harry Marsh (Engineers) Ltd	0191 510 9797			●	●	●	●			●	●				●	✔	2			Up to £1,400,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●	✔	2			Up to £3,000,000
Intersteels Ltd	01322 337766	●			●	●	●	●		●			●	●	●	✔	3			Up to £2,000,000
J & A Plant Ltd	01942 713511				●	●									●		4			Up to £40,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●				●	●		●			4			Up to £6,000,000*
John Reid & Sons (Strucsteel) Ltd	01202 483333		●	●	●	●	●	●	●	●	●	●		●	●	✔	4		●	Up to £6,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445			●	●	●	●	●	●	●	●	●		●	●	✔	4		●	Up to £6,000,000
Kloeckner Metals UK Westok	0113 205 5270												●			✔	4			Up to £6,000,000
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●					✔	2		●	Up to £6,000,000
Legge Steel (Fabrications) Ltd	01592 205320			●	●		●		●	●	●			●	●		3			Up to £800,000
Luxtrade Ltd	01902 353182									●	●				●	✔	2			Up to £800,000
M Hasson & Sons Ltd	028 2957 1281			●	●	●	●	●	●	●	●				●	✔	4			Up to £2,000,000
M J Patch Structures Ltd	01275 333431				●					●	●				●	✔	2			Up to £1,400,000
M&S Engineering Ltd	01461 40111				●				●	●	●			●	●		3			Up to £1,400,000
Mackay Steelwork & Cladding Ltd	01862 843910			●	●		●			●	●			●	●	✔	4			Up to £1,400,000
Maldon Marine Ltd	01621 859000				●	●		●	●	●	●			●	●	✔	3			Up to £1,400,000
Mifflin Construction Ltd	01568 613311			●	●	●	●				●						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
Nusteel Structures Ltd	01303 268112						●	●	●	●				●		✔	4		●	Up to £4,000,000
Overdale Construction Services Ltd	01656 729229			●	●		●	●			●				●		2			Up to £400,000
Painter Brothers Ltd	01432 374400								●		●			●	●	✔	3			Up to £6,000,000*
Pencro Structural Engineering Ltd	028 9335 2886			●	●	●	●	●	●		●			●	●	✔	2			Up to £2,000,000
Peter Marshall (Steel Stairs) Ltd	0113 307 6730									●					●	✔	2			Up to £800,000*
PMS Fabrications Ltd	01228 599090			●	●	●	●		●	●	●			●	●		3			Up to £1,400,000
Rippin Ltd	01383 518610			●	●	●	●	●						●	●		2			Up to £1,400,000
Robinson Structures Ltd	01332 574711			●	●	●	●				●			●	●	✔	3			Up to £3,000,000
S H Structures Ltd	01977 681931	●			●		●	●	●	●	●	●			●	✔	4	✔	●	Up to £2,000,000
SAH Engineering Ltd	01582 584220			●	●	●				●	●			●	●		2			Up to £800,000
SDM Fabrication Ltd	01354 660895	●	●	●	●	●	●				●			●	●	✔	4			Up to £2,000,000
Sean Brady Construction Engineering Ltd	00 353 49 436 4144			●	●	●	●			●	●			●	●		2			Up to £800,000
Severfield plc	01845 577896	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4		●	Above £6,000,000
SGC Steel Fabrication	01704 531286				●					●				●	●	✔	2			Up to £800,000
Shaun Hodgson Engineering Ltd	01553 766499	●		●	●		●			●	●			●	●	✔	3			Up to £800,000
Shipley Structures Ltd	01400 251480			●	●	●	●		●	●	●			●	●		2			Up to £3,000,000
Snashall Steel Fabrications Co Ltd	01300 345588			●	●	●	●	●			●				●		2	✔		Up to £1,400,000
South Durham Structures Ltd	01388 777350			●	●	●				●	●	●			●		2			Up to £1,400,000
Southern Fabrications (Sussex) Ltd	01243 649000				●	●				●	●			●	●	✔	2			Up to £800,000
Steel & Roofing Systems	00 353 56 444 1855			●	●	●	●					●		●	●	✔	4			Up to £3,000,000
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
Underhill Engineering Ltd	01752 752483				●		●	●	●	●	●			●	●	✔	4			Up to £3,000,000
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 £4,000,000
William Hare Ltd	0161 609 0000	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✔	4	✔	●	Above £6,000,000
Company name	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**FPC**	**BIM**	**SCM**	**Guide Contract Value (1)**

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:

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

Notes

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

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

BCSA steelwork contractor member	Tel	FG	PG	TW	BA	CM	MB	RF	AS	QM	FPC	BIM	NHSS 19A	NHSS 20	SCM	Guide Contract Value (1)
A&J Fabtech Ltd	01924 439614	●	●	●	●				●	✓	3					Up to £400,000
AJ Engineering & Construction Services Ltd	01309 671919	●	●	●	●	●	●	●	●	✓	4					Up to £3,000,000
Bourne Construction Engineering 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 £3,000,000
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 £800,000
Donyal Engineering Ltd	01207 270909	●						●	●	✓	3			✓	●	Up to £1,400,000
ECS Engineering Ltd	01773 860001	●	●	●	●		●		●	✓	3					Up to £3,000,000
ESL (GB) Ltd	01428 787986							●	●	✓	4			✓		Up to £400,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●		●	●	●	✓	3			✓	●	Up to £2,000,000
Had Fab Ltd	01875 611711							●	●	✓	4					Up to £3,000,000
Kiernan Structural Steel Ltd	00 353 43 334 1445	●		●				●	●	✓	4			✓	●	Up to £6,000,000
Millar Callaghan Engineering Services Ltd	01294 217711	●				●		●	●	✓	4			✓		Up to £1,400,000
Murphy International Ltd	00 353 45 431384	●	●	●	●				●	✓	4			✓		Up to £1,400,000
Nusteel Structures Ltd	01303 268112	●	●	●	●	●		●	●	✓	4		✓	✓	●	Up to £4,000,000
S H Structures Ltd	01977 681931	●	●	●	●	●	●		●	✓	4	✓		✓	●	Up to £2,000,000
Severfield (UK) Ltd	01204 699999	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Above £6,000,000
Shaun Hodgson Engineering Ltd	01553 766499							●	●	✓	3			✓		Up to £800,000
Taziker Industrial Ltd	01204 468080	●	●	●	●			●	●	✓	3		✓	✓		Above £6,000,000
Underhill Engineering Ltd	01752 752483	●	●	●	●			●	●	✓	4			✓		Up to £3,000,000
Non-BCSA member																
Allerton Steel Ltd	01609 774471	●	●	●	●	●		●	●	✓	4			✓		Up to £4,000,000
Centregreat Engineering Ltd	029 2046 5683	●	●	●	●	●	●	●	●	✓	4					Up to £1,400,000
Cimolai SpA	01223 836299	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000
CTS Bridges Ltd	01484 606416	●	●	●	●	●	●		●	✓	4			✓	●	Up to £800,000
Francis & Lewis International Ltd	01452 722200							●	●	✓	4			✓	●	Up to £2,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●		●	●	✓	3					Up to £2,000,000
Hollandia Infra BV	00 31 180 540 540	●	●	●	●	●	●	●	●	✓	4					Above £6,000,000*
IHC Engineering (UK) Ltd	01773 861734	●							●	✓	3			✓		Up to £400,000
Interserve Construction Ltd	020 8311 5500							●		✓	N/A					Above £6,000,000*
Lanarkshire Welding Company Ltd	01698 264271	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	Up to £2,000,000
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●						●	●	✓	N/A					Up to £3,000,000
Total Steelwork & Fabrication Ltd	01925 234320	●		●				●	●	✓	3			✓		Up to £3,000,000
Victor Buyck Steel Construction	00 32 9 376 2211	●	●	●	●	●	●	●	●	✓	4		✓	✓	●	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
Control Energy Costs Ltd	01737 556631
Gene Mathers	0115 974 7831
Griffiths & Armour	0151 236 5656
Highways England Company Ltd	08457 504030

Company name	Tel
Kier Construction Ltd	01767 640111
McGee Group (Holdings) Ltd	020 8998 1101
PTS (TQM) Ltd	01785 250706
Sandberg LLP	020 7565 7000

Company name	Tel
Structural & Weld Testing Services Ltd	01795 420264
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.

1 Structural components
2 Computer software
3 Design services
4 Steel producers
5 Manufacturing equipment
6 Protective systems
7 Safety systems
8 Steel stockholders
9 Structural fasteners

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

SCM
Steel Construction Sustainability Charter
Gold,
Silver,
Member

Company name	Tel	1	2	3	4	5	6	7	8	9	CE	SCM	BIM
AJN Steelstock Ltd	01638 555500								●		M		
Albion Sections Ltd	0121 553 1877	●									M		
Arcelor Mittal Distribution - Scunthorpe	01724 810810								●		D/I		
AVEVA Solutions Ltd	01223 556655		●								N/A		
Ayrshire Metals Ltd	01327 300990	●									M		✓
BAPP Group Ltd	01226 383824									●	M		
Barrett Steel Services Limited	01274 682281								●		M		
Behringer Ltd	01296 668259					●					N/A		
British Steel Ltd	01724 404040				●						M		
BW Industries Ltd	01262 400088	●									M		
Cellbeam Ltd	01937 840600	●									M		
Cleveland Steel & Tubes Ltd	01845 577789								●		M		
Composite Metal Flooring Ltd	01495 761080	●									M		
Composite Profiles UK Ltd	01202 659237	●									D/I		
Cooper & Turner Ltd	0114 256 0057									●	M		
Cutmaster Machines (UK) Ltd	01226 707865					●					N/A		
Daver Steels Ltd	0114 261 1999	●									M		
Daver Steels (Bar & Cable Systems) Ltd	01709 880550	●									M		
Dent Steel Services (Yorkshire) Ltd	01274 607070								●		M		
Duggan Profiles & Steel Service Centre Ltd	00353 56 7722485	●							●		M		
easi-edge Ltd	01777 870901							●			N/A	●	
Fabsec Ltd	01937 840641	●									N/A		
Ficep (UK) Ltd	01924 223530					●					N/A		
FLI Structures	01452 722200	●									M	●	
Forward Protective Coatings Ltd	01623 748323						●				N/A		
Hadley Industries Plc	0121 555 1342	●									M	○	
Hempel UK Ltd	01633 874024						●				N/A		
Highland Metals Ltd	01343 548855						●				N/A		
Hi-Span Ltd	01953 603081	●									M	●	

Company name	Tel	1	2	3	4	5	6	7	8	9	CE	SCM	BIM
International Paint Ltd	0191 469 6111						●				N/A	●	
Jack Tighe Ltd	01302 880360						●				N/A		
Jamestown Manufacturing Ltd	00 353 45 434288	●									M		
John Parker & Son Ltd	01227 783200								●	●	D/I		
Joseph Ash Galvanizing	01246 854650						●				N/A		
Jotun Paints (Europe) Ltd	01724 400000						●				N/A		
Kaltenbach Ltd	01234 213201					●					N/A		
Kingspan Structural Products	01944 712000	●									M	●	
Kloeckner Metals UK	0113 254 0711								●		D/I		
Lindapter International	01274 521444									●	M		
MSW UK Ltd	0115 946 2316	●									D/I		
Murray Plate Group Ltd	0161 866 0266								●		D/I		
National Tube Stockholders Ltd	01845 577440								●		D/I		
Peddinghaus Corporation UK Ltd	01952 200377					●					N/A		
Pipe and Piling Supplies Ltd	01592 770312	●									M		
PPG Performance Coatings UK Ltd	01525 375234						●				N/A		
Prodeck-Fixing Ltd	01278 780586	●									D/I		
Rainham Steel Co Ltd	01708 522311								●		D/I		
Sherwin-Williams Protective & Marine Coatings	01204 521771						●				N/A	○	
Structural Metal Decks Ltd	01202 718898	●									M	●	
StruMIS Ltd	01332 545800		●								N/A		
Stud-Deck Services Ltd	01335 390069	●									D/I		
Tata Steel – Tubes	01536 402121				●						M		
Tata Steel – ComFlor	01244 892199	●									M		
Tension Control Bolts Ltd	01948 667700						●			●	M		
Trimble Solutions (UK) Ltd	0113 887 9790		●								N/A		
voestalpine Metsec plc	0121 601 6000	●									M	●	
Wedge Group Galvanizing Ltd	01909 486384						●				N/A		
Yamazaki Mazak UK Ltd	01905 755755					●					N/A		

STRUMIS V10.3

NOW INTRODUCING
STRUMIS SMART REVISIONS
SAVING YOU TIME AND MONEY

A WORLD LEADING STEEL FABRICATION MANAGEMENT INFORMATION SOFTWARE, USED WORLDWIDE TO REDUCE COSTS WHILE MAXIMISING PRODUCTIVITY AND INCREASING PROFITABILITY.

NEW FEATURES INCLUDE:
BIMREVIEW 8.3
PACKAGES & CONTAINERS
SPEED OPTIMIZATIONS

NEW ENHANCEMENTS TO:
DETAILED PLANNING
ESTIMATING
STRUCNC

COME SEE THE STRUMIS FEATURES THAT OTHER PROVIDERS ARE ONLY TALKING ABOUT.
OTHERS PROMISE; WE DELIVER.

THE FUTURE OF STEEL FABRICATION.

Stay connected to STRUMIS:

STRUMIS

BRINGING STRUCTURE TO STEEL

SALES@STRUMIS.COM | 01332 545800 | WWW.STRUMIS.COM

SOFTWARE BY STRUMIS LTD. PART OF THE GLOBAL RDS GROUP