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# NSC

Four fire stations for Gloucestershire

January 2012
Vol 20 No. 1

**National Football Centre kicks off**

Flats rise at Walsall waterfront

New entrance at Paddington

Zaha success in Glasgow

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New Steel Construction keeps designers and contractors abreast of all major steel construction related developments and provides detailed technical information on key issues such as the introduction of the Eurocodes. NSC will be the first place most people hear about advances made by the extensive research and development efforts of the steel construction partners – Tata Steel, the British Constructional Steelwork Association, and the Steel Construction Institute, as well as other researchers.

Each issue of NSC is a blend of project reports and more in depth technical material. Taking up our free subscription offer is a guarantee that you will be alerted to significant developments in a sector that retains a commitment to continuous development in knowledge and techniques for timely delivery of cost effective, quality projects across all sectors of construction.

Each issue of NSC is typically 44 pages and contains five pages of news, developments related to Eurocodes, cutting edge project reports from site, and the latest technical updates from the Steel Construction Institute in its Advisory Desk Note series. Popular features are 50 Years Ago and 20 Years Ago, looking at key projects of the past by revisiting the pages of 'Building With Steel' and 'Steel Construction'.

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**Cover Image**
St George's Park, National Football Centre, Burton Upon Trent
Main Client: The Football Association
Architect: Redbox Design Group
Steelwork contractor: Billington Structures
Steel tonnage: 3,500t

NSC
January 2012 Vol 20 No 1



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# Building for future prosperity

Nick Barrett - Editor

The start of a new year is a traditional time for a magazine to look forward, but there will be no market forecasts made in NSC's pages against such an uncertain macro economic background. The western world's best financial and political brains have failed to reach agreement on solutions to our economic travails, so none will be suggested here.

Away from the gloom and doom however there is an economy still functioning, employing most of the people that it used to and producing a wide range of goods and services. Steel construction is playing a vital role in helping keep things at least ticking over until better times come around, as well as building the infrastructure that will be vital for future prosperity.

Workloads are down almost everywhere, but signs of life are all around, if we only look for the half full glass – there is plenty of evidence in this issue of NSC. Past success is congratulated with our article on Glasgow's Riverside Museum, an iconic Zaha Hadid designed home for the City's impressive transport history collection. This has proven to be an instant hit with its target audience, with a million visitors in its first few months of opening. This is a complex structure whose construction was made possible by using steel.

This year will be marked as the year of the London Olympics, but already the sports world is planning for the future beyond 2012 as can be seen in our article on the National Football Centre under construction at Burton Upon Trent, where sporting stars of tomorrow and the coaches who train them will have a world class facility. The 80 metre wide spans needed for the indoor football pitches and other sports halls were made possible thanks to steel, also selected as the best choice framing material for a range of other structures such as the two hotels provided on the site.

Steel's speedy construction virtues come into their own with a project that has to be completed on time to allow another major scheme to get under way at Paddington Station, where works to allow for construction of the new Crossrail station are on the critical path. Steel will feature significantly on other parts of the Crossrail project and we look forward to bringing readers more news of that during the year.

The national schools building programme ground to a halt last year, but schools are likely again to feature in industry workloads as essential and unavoidable education investment picks up again. Our article describes three schools in Oldham where steel is overcoming challenges unique to each site.

Already voted the Best Canalside Regeneration Project in the country, the Waterfront South residential development in Walsall shows steel being deployed in ways that show off its sustainability credentials as well as an ability to deliver cost effectively and on time.

There isn't anything like enough work out there to provide the construction industry with a healthily sustainable level of business, but there is clearly work going on and steel is showing itself to its best advantage on the widest range of projects. Steel will continue to do so in 2012; that's the only prediction that can comfortably be made.

NSC

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# Test changes for CSCS cards on the way

A new and refreshed CSCS card test will be introduced as from 2 April 2012, a move that will effect all new applicants.

Three card tests will be available, Basic, Specialist, and Managers and Professional (MAP), and each of these will incorporate case studies that provide the safety awareness element of the test. Candidates will also be asked a series of questions encompassing a common range of topics, all drawn from the core question bank.

Candidates taking a Specialist or MAP test will be asked additional questions relating to the particular requirements.

"Before taking the test a candidate should undertake appropriate training," said Peter Walker, BCSA Health, Safety and Training Manager.

Thirty case studies each dealing with a different scenario have been developed. These have been divided into ten lots of three, with four questions within each. Every candidate will sit three of these case studies and will need to score 10 correct answers to pass.

There is a requirement for candidates to correctly answer two questions on each of the core question topics. The questions are always slanted towards the candidates trade and topics include: accident reporting and recording; health and welfare, noise and vibration, working at height; site transport safety, and manual handling.

Each candidate taking a specialist test will be asked six further questions, appropriate to their trade, and will need to get five answers correct to pass the overall test.

It is advised that a DVD entitled 'Setting Out', which gives a basic overview of the test's case studies, is viewed.

The DVD will be made available 'free to air' as a gift to the industry by ConstructionSkills. It will be available for companies to show through their intranet sites, and trade bodies via their websites; also for individuals to access through YouTube or *www.cskills.org*. Alternately, for those without computer access, libraries will also support on-line usage.

## Supermarket checks out steel design


Structural steelwork dominates the supermarket sector and a recent example of this success story is a recently opened Asda in Cheltenham.

Working on behalf of main contractor ISG, Walter Watson fabricated, supplied and erected 265t of steel to form the portal frame of the 7,000m$^2$ store.

A quick steelwork programme contributed to an overall 27 week construction scheme being completed on time. The store is situated on a former brownfield site and the plot required remediation prior to groundworks and steelwork erection beginning.

The steel frame supports a green sedum roof and timber cladding to the external elevations. A Sustainable Urban Drainage System car park has also been built to help ensure impact on the local environment is minimised.


## BCSA appoints new welding and fabrication manager

Tom Cosgrove, previously with SIAC Tetbury Steel, has been appointed as the new BCSA welding and fabrication manager.

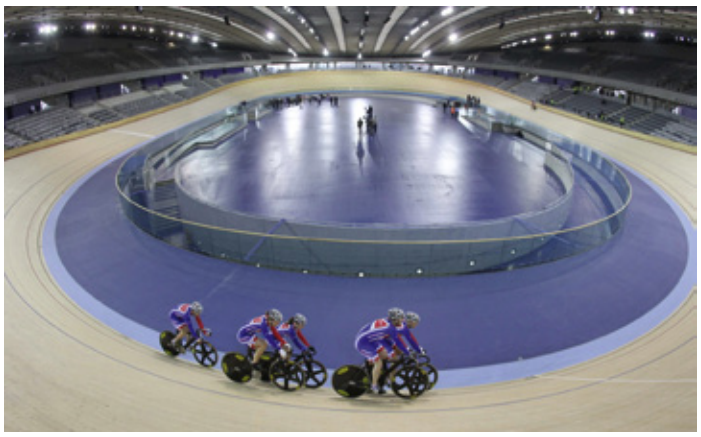
His role will be to undertake company visits to advise members on general welding issues, how to set up Welding Quality Management systems to BS EN 3834, and provide information about the responsible welding coordinator scheme and CE Marking.

Mr Cosgrove, who joined the BCSA in November last year, has a considerable amount of knowledge and experience of the steel construction sector. In his previous job at SIAC he was the technical director responsible for the design, drafting and QA departments. He also had group responsibility for implementing CE Marking and establishing the Factory Production Control and Welding Quality Management systems, as well as implementing the Eurocodes.

Before working at SIAC Mr Cosgrove spent 10 years at the SCI, where he managed the Advisory and Consultancy service with responsibility for business development.

Mr Cosgrove is based at the BCSA's London office and can be contacted on Tel: 0207 747 8125 or email *tom.cosgrove@steelconstruction.org*

# Velodrome leads steel successes at Structural Awards



The London 2012 Velodrome (top) swept the board at the Structural Awards 2011 by winning the Supreme Award for Structural Engineering Excellence as well as scooping the Award for Sports or Leisure Structures and the David Alsop Award for Sustainability.

The Supreme Award is the Institution of Structural Engineers' (IstructE) most exceptional accolade and is presented at the discretion of the judges from a principal category.

The 6,000 seat London 2012 Velodrome will serve as an Olympic and Paralympic stadium for track cycling during the Games. In legacy use, it will take its place as the centrepiece of the VeloPark, a unique community cycling venue.

The 13,000m² roof is supported by a doubly-curved cable net formed of cables stressed between a perimeter steel ring beam, which is integral with the curved steel supporting bowl. Working on behalf main contractor ISG, Watson Steel Structures erected 1,100t of steel for the project.

Structural Awards' judge and Institution President, Professor Roger Plank, said: "The judges all agreed that the London 2012 Velodrome is a project worthy of winning the Supreme Award. As with so many Supreme Award winners before it, there is a sense of "rightness" to this building that is a rare but undeniable quality.

"It is a gem amongst several jewels in a development that the whole UK can be proud of. It demonstrates outstanding creativity and uniqueness in its combination of the art and science of engineering."

He added: 'The Velodrome dispels all myths that structural engineers have little influence on 'greening' a building. Sustainability has simply been achieved through efficiencies rather than gimmicks and extravagance.

Other UK steel projects to be awarded at the ceremony were the Royal Shakespeare Theatre in Stratford-upon-Avon (middle) which won the Heritage Award. Designed by Buro Happold, the steelwork for this historically sensitive job was erected by Billington Structures.

The Media City Footbridge (bottom), designed by Gifford and erected by Rowecord Engineering, won the Award for Pedestrian Bridges.

The Award for Transportation Structures went to Dublin Airport Terminal Two which was erected by Watson Steel Structures working on behalf of Laing O'Rourke.

# Controlled steel erection makes landing

A new 15,000m² facility for the Moog flight controls business in Wolverhampton has been erected by Caunton Engineering.

More than 800t of structural steelwork has been fabricated, supplied and erected for this prestigious job. Caunton is working on a design and build contract for main contractor McLaren Construction.

The steel frame for this large facility comprises of three portal bays, each with a 42.6m span, and a 16m wide lean-to extension.

The project is scheduled for completion in September 2012 when Moog will complete its move from its old nearby facility.

Moog's flight systems are world renowned and control military and commercial aircraft, satellites, missiles and marine vessels. The company has signed a contract to support the motion control system for the Wimbledon Centre Court's retractable roof.

## AROUND THE PRESS

**The Structural Engineer**
***15 November 2011***
**Structural Awards 2011**
(London 2012 Velodrome) On track for a BREEAM 'Excellent' rating, it also has other significant credentials such as the 29% recycled content in the building, natural ventilation, extensive use of natural daylighting and exceeding Part L (2006) requirements by some 30%.

**New Civil Engineer**
***27 October 2011***
**Steel's safety focus pays off**
The success of the BCSA's efforts can be seen in a consistently creditable safety performance with reportable accidents in the sector reduced by 60% since 2000, well ahead of the government's Revitalising Health and Safety campaign for a 10% fall over 10 years.

**Construction News**
***17 November 2011***
**A strict sequence**
(Big Yellow Self Storage, Chiswick) "A steel frame was ideal for this job because of the convenience of erection, says Campbell Reith's Andrew Frost. "The main advantage is that you can leave out floor panels, which can be easily filled in later. Steel provides that kind of flexibility."

**New Civil Engineer**
***10 November 2011***
**In a league of its own**
Viewed from above, the steel arches on the Stadium Footbridge are shaped like a rugby ball - apt for this rugby league hotspot. "We wanted an iconic footbridge," said client St Helens Council bridge engineer Les Fairclough.

**Transportation Professional**
***December 2011***
**While sails take shape in Poole**
(Poole Harbour bridge) The 1000t steel structure - designed to resemble the sails of a yacht when raised - has been created to ease traffic congestion and serve as a catalyst for regeneration.

# Welding courses in preparation for CE Marking

The BCSA will be holding a number of two day residential Responsible Welding Coordinator (RWC) training courses aimed at helping members prepare for CE Marking.

The courses are only open to BCSA member companies, and the content will help in the preparation for subsequent CE Marking certification, using the BCSA members' training and assessment route outlined in the leaflet - 'Routes to CE Marking Certification for Steelwork Contractors'.

Each course is aimed at providing the technical knowledge required to implement and maintain an appropriate Welding Quality Management system and to prepare the nominated RWC for the subsequent assessment of its application. The range of topics to be covered include:

- Basic welding metallurgy
- Welding process technology
- Standards and specifications
- Welding inspection techniques
- Welding Procedure and Welder Qualification
- Writing Welding Procedure Specifications (WPS)
- Welding Quality Management
- Visual inspection
- Weld defects
- Weld acceptance criteria
- The requirements for CE Marking
- The BCSA RWC assessment process

On completion of the course candidates will be required to successfully complete a test paper and the BCSA recommends that those wishing to attend should have a reasonable background in welding and welding technology.

Courses will be held at the Thorpe Park Hotel in Leeds on:
**Tuesday 21 and Wednesday 22 February**
**Monday 19 and Tuesday 20 March**
**Tuesday 24 and Wednesday 25 April**

The course fee is £450 + VAT, and this includes accommodation, lunch and dinner.

For more information contact:
*Gillian.mitchell@steelconstruction.org*

# Hospital aims for excellence

A new 800 bed acute hospital is rapidly taking shape in north Bristol, a project which is making use of more than 6,000t of structural steelwork and aiming to achieve a BREEAM 'Excellent' rating.

Southmead Hospital is being constructed in two phases with most works being completed in phase 1. The main hospital which includes the clinical and ward blocks is programmed to complete at the end of March 2014 after which the new hospital will open. The second phase picks up the remaining elements including external works and landscape and will be complete towards the end of 2015.

Structurally the new main building is split in two, with a concrete framed clinical block containing operating theatres, medical rooms and the emergency department separated from a steel framed ward block by a large steel framed and glazed atrium / concourse.

Both the clinical and ward block are subdivided into thirds, with two movement joints positioned along the structure's length. For the steel framed ward building the movement joints connect to the structure's three concrete cores. Due to space constraints, the usual double column movement joint configuration could not be employed and steelwork contractor Severfield-Reeve Structures has installed a single beam with a sliding joint.

The ward block's frame is a beam and column structure supporting profiled metal decking with concrete infilled floors designed compositely with the floor beams. Loads are transferred vertically down the columns which are supported on pad foundations or piles.

# Cellular beam software aids Eurocode design

Fabsec has launched FBEAM 2011, its latest generation in beam design software that enables the user to create composite and non-composite plain and cellular beams to the Eurocode design code.

The new programme has an array of features that are said to improve beam design efficiency. There is an all new 3D beam viewer showing cross section, elevation, floor plan and user controlled view which allows the beam to be rotated and viewed from any angle.

An SCI accredited Eurocode engineering module has been included that incorporates the following new features: multiple load combination design; varying floor deck angles; cantilever and fixed end beam designs; support for negative or upward loads; shear stud spacings can now be varied along the beam; end posts can now be checked automatically, and comprehensive user defined analysis settings options.

FBEAM 2011 also includes the enhanced Beam Wizard - a 'one-pass' optimiser for beam designs that removes the need for iteration and determines the optimum solution in seconds.

# Work starts on iconic London river crossing

By the end of the year London will have a new river crossing and the UK's first urban passenger cable car.

To be known as the Emirates Air Line, it will connect north and south London, travelling between two new stations on the Greenwich Peninsula and the Royal Docks.

With a capacity to carry up to 2,500 people per hour in each direction, equivalent to the capacity of 30 buses per hour, the cable car will be the first of a package of measures to improve river crossings in east London. It is anticipated that it will carry 2m passengers per year.

Steelwork for the project is being undertaken by Watson Steel Structures and the initial sections of the first of three towers are now on site.

Howard Smith, one of TfL's Chief Operating Officer's, said: "This scheme offers a great opportunity not only to boost the number of river crossings in London but also promote the regeneration of this part of east London and to support tourism to the capital."

## Tandem lift performs support act at new arena

Two large mobile cranes perform a tandem lift to erect a 54m-long truss during the construction of the Leeds Arena.

Weighing 170t, the truss which will form the venue's proscenium arch between the stage and auditorium, took 72 hours to fully erect and connect to the supporting steelwork. The truss is supported by large 30m-high columns, each weighing 30t.

Steelwork contractor Fisher Engineering brought the truss to site in 40 individual pieces, and assembled it on the ground before the mammoth lifting operation could get underway.

Erection has now started on 13 further trusses which will form the roof of the arena. These steel elements vary in length with the longest being 70m.

By the end of March 4,500t of structural steelwork will have been erected to form the Yorkshire city's 12,500-seater arena.

Main contractor for the project is BAM Construction.

## Steel tackles rugby stadium footbridge

Work is nearing completion on a new landmark structure linking St Helens town centre to a new rugby league stadium.

The design and build scheme by main contractor Galliford Try will deliver the 4m wide, 54.6m long St Helens Linkway East Footbridge. The deck of the steel composite bridge is hung from arches constructed of circular hollow steel sections 610mm in diameter and 20.6mm thick. Viewed from above, the bridge's arches will form the shape of a rugby ball.

Steelwork contractor for the project is Rowecord Engineering.

## NEWS IN BRIEF

The **BCSA** will soon be publishing its *'Guide to Weld Inspection for Structural Steelwork'.* The publication will give guidance on weld inspection for structural steelwork and explain how techniques and testing are used to identify and characterise defects that can arise in steel components. It also explains the causes of such defects and the measures that may be taken to avoid them. The guidance is intended for use by persons undertaking, or responsible for, weld inspection. This would be in fabrication facilities, manufacturing structural steel components that are designed for static loading.

The **British Standards Institution** (BSI) has a launched a new digital on-line Eurocodes guide. Known as Eurocodes Plus, it digitises all 15,000 pages of the Eurocodes with an on-line interactive workflow tool that allows designers to quickly find specific codes. For more information visit: *www.bsigroup.com/eurocodesplus*

**Barrett Precision Tubes**, part of the Barrett Steel Group, has introduced what is said to be one of the first fibre laser cutting systems in the UK. The company has commissioned a LT FIBER system at its Lasertube North plant in York.

Steel machinery manufacturer **Voortman** has purchased a German based cutting systems producer in order to increase its equipment range. The new subsidiary of the Voortman Steel Group will operate under the name of Bach Cutting Systems.

Software developer **CSC** has released version 14 of its structural steel design package, Fastrak Building Designer. The company said structural engineers can now access a range of new and updated software features and additions, including free BIM integration sotfware, Revit Integrator.

# Revision to first aid kit standard

A new British Standard for the provision of first aid within the workplace will come into force this month (January).

A provisional standard has been in place since June, but the new BS 8599-1:2011 standard will require all employers to make a more comprehensive first aid kit available.

"Over the past decade the contents requirement of first aid kits has evolved and this has been recognised by the British Healthcare Trade Association (BHTA)," said Peter Walker, BCSA Health, Training & Safety Manager. "The BHTA has now developed a new solution for today's workplace."

Steelwork contractors should always make sure that there is adequate first aid available for its employees. This should be by either utilising the main contractor's kit, or by brining its own kit to site.

"There may be instances when the steelwork contractor may be the dominant contractor on a site, in which case it wouldn't be in a position to rely on another company's first aid," said Mr Walker. "They should always have their own kit with them anyway."

The BSi first aid kits are now the only safe and clear way for an employer to meet its obligations. The new kits contain larger quantities of plasters and wipes, modern burns gel and the introduction of a foil emergency blanket.

# Apprentices launch shipping heritage sculpture

Three Mabey Bridge apprentices have produced a stunning landmark to celebrate Chepstow's long and rich engineering heritage.

A sculpture depicting 16 shipyard workers holding aloft a silhouette of the S.S. Rovigo, which launched from the site of the current Mabey Bridge factory in Chepstow in 1883, will form the centrepiece of the town's new Severn Quay development.

Mabey Bridge produces structures such as bridges and wind turbine towers weighing hundreds of tonnes, the £30,000 sculpture weighs a mere five tonnes and will be painted and installed on completion of the development.

Apprentices James Evans, 23, Conor Thomas, 18, and Mathew Jackson, 18, carried out all the fabrication, welding and finishing on the six metre long sculpture, while more experienced colleagues took responsibility for CAD modelling, cutting and plate preparation.

The ship S.S. Rovigo was built by the Finch company of Chepstow for the Masters Stephen and Mawson of Newcastle-upon-Tyne. It sailed for ten years before hitting rocks in Lisbon's Guadiana River.

Peter Lloyd, Managing Director of Mabey Bridge, said: "We have been at the forefront of manufacturing and engineering in Chepstow from the very beginning and the company has evolved over the years to meet changing requirements.

"It is symbolic that the S.S. Rovigo was built on the same site as one of our current facilities, however it is also worth bearing in mind that engineering work had been taking place on this site for 34 years – since Brunel built the first railway bridge over the Wye – when the ship launched in 1883."

# Galvanizing catches seafood project

Hull-based Humber Galvanizing, part of Wedge Group Galvanizing, has provided its specialist hot dip galvanizing treatment to 20t of steelwork currently being used to build the new Grimsby Seafood Village.

The £3M centre, will be located on a four-acre site near to the town's famous fish docks. Once the first phase of construction is complete, the Grimsby Seafood Village will comprise 20 self-contained units, each with 185m² floor space and a similar amount of office space.

Companies based at the centre will share cold stores, waste collection facilities, and other fish processing equipment, ensuring the new complex will meet strict environmental and health and safety regulations.

Tony Linsley, Commercial Manager of Humber Galvanizing, said: "The Seafood Village will be a real boost for the fish processing sector, not only in Grimsby, but also across the wider region, so it is fantastic that we've been able to play our part in the initial construction work."

# Diary

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**17 January 2012**
**Steel Building Design to EC3**
Birmingham

**19 January 2012**
**Overview of steel design to the Eurocodes**
FREE webinar

**31 January 2012**
**Portal Frame Design**
Leeds

**7, 14, & 21 February 2012**
**On-line Steel Building Design to EC3**
Web delivered course

**9 February 2012**
**Steel Building Design to EC3**
Swindon

**21 & 22 February 2012**
**BCSA RWC Training Course**
Thorpe Park Hotel, Leeds

**29 February 2012**
**Light Gauge Steel Design**
Leicester

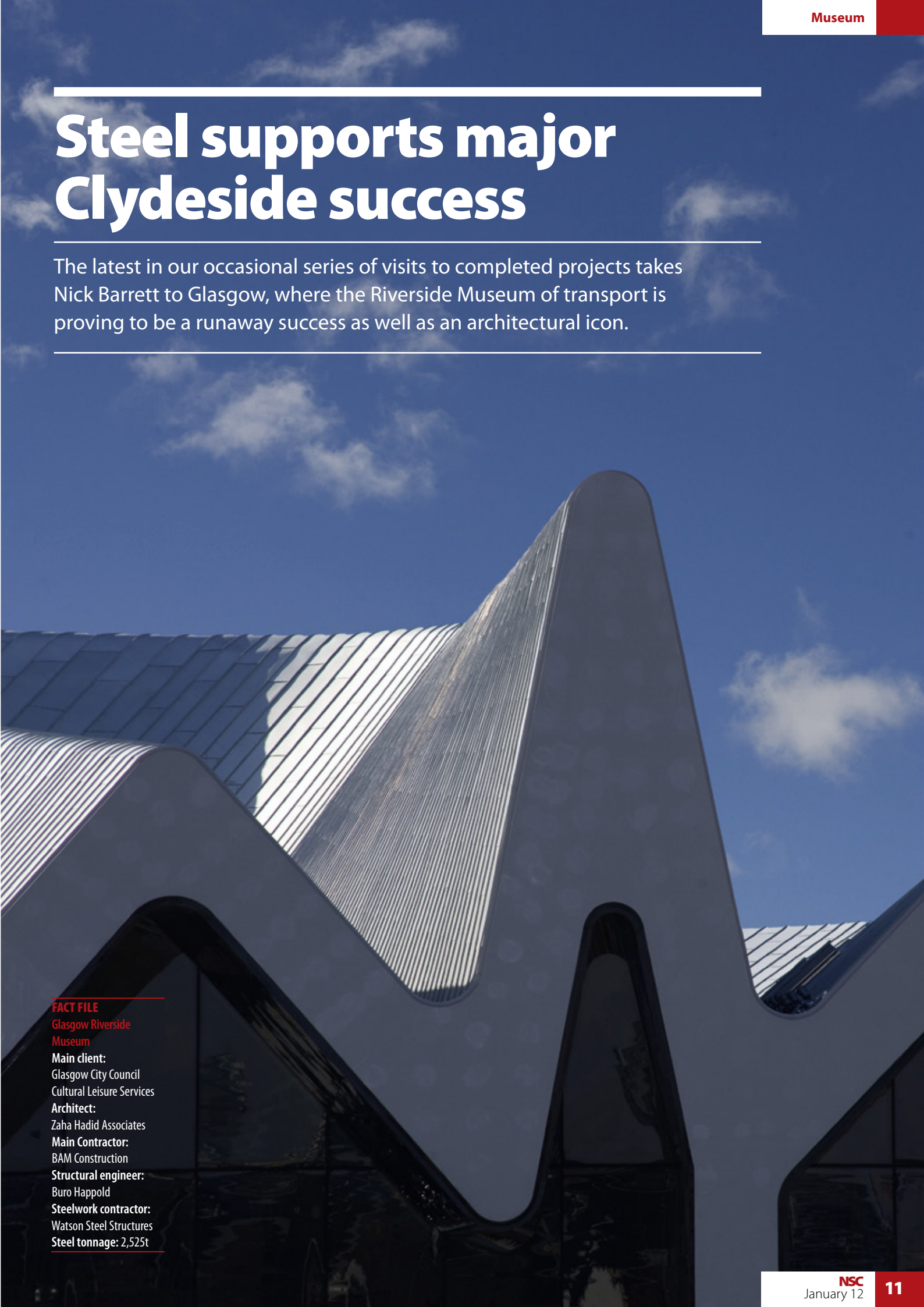
**23 February 2012**
**Connection design**
FREE webinar

**19 & 20 March 2012**
**BCSA RWC Training Course**
Thorpe Park Hotel, Leeds

**24 & 25 April 2012**
**BCSA RWC Training Course**
Thorpe Park Hotel, Leeds

# Steel supports major Clydeside success

The latest in our occasional series of visits to completed projects takes Nick Barrett to Glasgow, where the Riverside Museum of transport is proving to be a runaway success as well as an architectural icon.



**FACT FILE**
**Glasgow Riverside Museum**
**Main client:**
Glasgow City Council Cultural Leisure Services
**Architect:**
Zaha Hadid Associates
**Main Contractor:**
BAM Construction
**Structural engineer:**
Buro Happold
**Steelwork contractor:**
Watson Steel Structures
**Steel tonnage:** 2,525t

For several generations of Glasgow schoolchildren, and their parents, one of the City's great attractions has been its collection of historical cars, locomotives, tramcars, buses, model ships and other transport related memorabilia housed in a variety of temporary museums. A new attraction is the purpose built steel framed and clad Riverside Museum which for the first time brings the collection of over 3,000 items together on a permanent Clydeside site that is itself steeped in the history of Glasgow's industrial past.

The Zaha Hadid designed Riverside Museum has been hailed as an architectural masterpiece and the visitors have been streaming in since it opened in June last year. Designed as an iconic structure that would signature the City's commitment to regenerating a run down shipbuilding and warehousing area, there is nothing else like it in Glasgow.

Officially opened by Princess Anne in November 2010, the museum has become the City's most popular attraction, with its one-millionth visitor passing through after only five months. On its busiest day so far 15,000 people visited.

The museum is located in the west of Glasgow, at the old Pointhouse Quay in Partick, where the River Kelvin flows into the Clyde at its north bank. Transport and engineering history surrounds the building as well as filling it. Outside the striking structure is permanently berthed a 19th century Clyde built tall ship, the Glenlee, which is a floating museum in its own right, and on both banks of the river were some of the shipbuilding yards that made 'Clydebuilt' a mark of quality worldwide.

The site was for 100 years the yard of shipbuilder A&J Inglis, whose ship launching slipways can still be seen at low tide. Slightly upriver is the Finnieston crane that was used to lift newly built locomotives from the famous Springburn Works onto ships for export worldwide.

It's not all just history though; today seaplanes take off and land on the stretch of river outside the museum and the Glasgow Helipad, used by the City's emergency service helicopters, is located nearby. The world's last surviving ocean going paddle

## Complex roof

The steel pleated roof, featuring five differing peaks, of which the highest is 18m above ground level, was the most complex part of the project. Working out the complex roof connections and the de-propping programme called for close cooperation between Watson Steel and Buro Happold, with models continually passing back and forth.

Watson Steel designed a unique node connection (dubbed a can) to accommodate the incoming rafters, bracing and ridge valley members that form the roof. As the roof pitches at various angles and slopes from south to north, most nodes – of up to one metre diameter - are unique and can accept up to ten steel members.

Most of the roof connections are unique to a single joint, fabricated using individual jigs modelled in XSteel. The curved ridge and valley members were fabricated using multi-jigs.

One of the museum's most important exhibits is a locally-built steam locomotive. It is displayed above first floor level supported on a large steel truss which is curved in plan (because of the building's shape), spanning 30m between two perimeter columns. The truss supports both the roof and the first floor exhibition area.

The top cord is formed from a valley beam of the roof, and the lower cord by the edge beam at first floor. Towards the riverside entrance of the building there is another large truss, known as the paternoster truss. This 26m span element was brought to site in three pieces and assembled on the ground before being tandem lifted into position as one 26t section. This supports one of the museum's key attractions, a revolving wheel which houses models of ships which were built on the River Clyde.

*The museum has become the city's most popular attraction, with its one millionth visitor passing through after only five months. On its busiest day so far over 15,000 people visited.*

## Site visit

NSC visited the site in early 2009 when steel construction was well underway. The building's geometry is unique, with its steel frame twisting and curving in a roughly Z shape, under an innovative roof with five peaks and valleys. It has two main facades, one facing the land and the other leading to the riverside where the tall ship Glenlee is docked. Steelwork dictated the construction programme after the ground floor slab was cast, with erection divided into seven phases.

Sequential programming meant the steel erectors mostly worked from a clean and smooth concrete slab. Cladding followed on behind steelwork.

Tim Kelly, Buro Happold Associate told NSC during construction: "The structure exploits the convex and concave geometry to form a locked structure which spans across the width of the exhibition space to the column lines which flank the building.

"Large open column free spaces up to 50m wide were created by forming the innovative roof with a series of inclined trusses, following the external geometry of the roof, which utilises folded plate action. The inclined planes are supported at the north and south facades on a series of structural mullions and within the building at two transition zones."

Along the two outer perimeter elevations the museum features two-storey exhibition areas. Here, cross bracing that aids stability has been hidden; stability is also derived from portal action at various points in the steel frame.

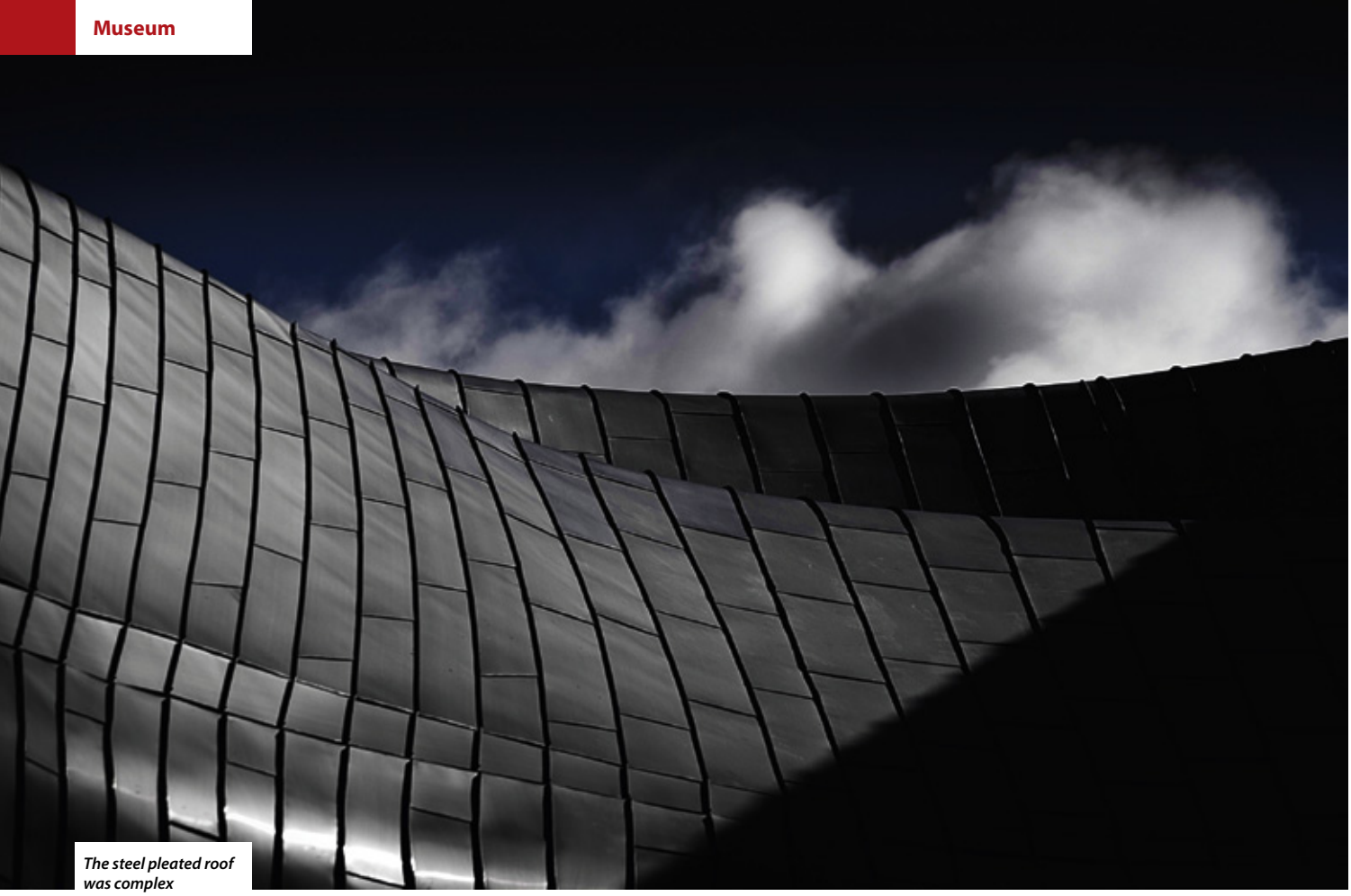
Phase one of steel erection consisted of a two-storey zone approximately halfway along the eastern elevation, chosen as the starting point as it would stand up without any propping. Other phases were connected to the initial zone, and three of these subsequent areas were supported with temporary props and trestles. The props were predominantly CHS sections connected to roof nodes via an 80mm diameter pin. Props were designed to be reused throughout the project.

***Full sized cars are exhibited on the walls***

***The structure's form is a twisting Z-shape***

***Tramcars feature as exhibits***

***A wide range of bicycles are suspended from the roof***



*The steel pleated roof was complex*

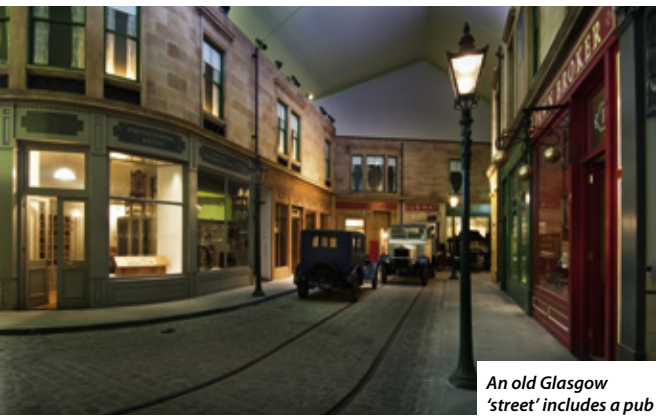
steamer, the Waverley, regularly calls at the harbourside – fittingly as A&J Inglis' yard is where it was built. The ferry service that once linked the shipbuilding centre of Govan on the south side of the river with the museum site has been resurrected and runs frequently.

Zaha Hadid is one of the world's most 'in demand' architects and the Riverside museum is her first major public building to open in the UK. Describing the shape is not easy; her own website describes it as a sectional extrusion open at both ends, its outline encapsulating a wave or pleat flowing from the city to the waterfront, symbolising the dynamic relationship between Glasgow and the shipbuilding, seafaring and industrial legacy of the Clyde.

Inside is one of the finest transport collections anywhere, including innovative and interactive displays. As a modern museum, Riverside works – the visitor numbers confirm that.

The big hope for the project was that when it opened it should reinforce Glasgow's reputation as an engineering and tourism hotspot. The construction team always felt it would be an attraction that team members would be proud to bring their children to; the visitor numbers suggest they have brought their friends along as well.

Model ships are a feature



An old Glasgow 'street' includes a pub

Locomotives are a popular draw for the crowds

# Steel scores for football centre

St. George's Park will provide an array of accessible multi sports facilities with accompanying training and sports medicine units as well as top of the range hotel accommodation. Martin Cooper reports from The Football Association's national centre.

**FACT FILE**
**St. George's Park, National Football Centre, Burton Upon Trent**
**Main client:** The Football Association
**Architect:** Redbox Design Group
**Main contractor:** Bowmer & Kirkland
**Structural engineer:** Arup
**Steelwork contractor:** Billington Structures
**Steel tonnage:** 3,500t
**Project value:** £73M

English football is about to get a major boost as the long awaited National Football Centre nears completion. Known as St. George's Park and situated on a 330 acre site near Burton Upon Trent, the facility will provide The Football Association (FA) with a teaching and development centre as well as a training home for all 24 England representative teams.

Whether England triumph at this year's European Championship or not, The Football Association knows that for the national team and the game to prosper as a whole the country needs more qualified coaches.

This is one of the project's main aims, as 750 FA coach educators will be trained at St. George's Park, who in turn will train thousands of new coaches across the nation, which will improve coaching standards and produce more and better players.

To create the correct environment for such lofty intentions, the National Football Centre will have an array of facilities, indoor and outdoor, which will be open to the general public as well.

Two on-site hotels (see box story) will offer more than 200 rooms, conference and banqueting facilities, restaurants and an 18m swimming pool. All of these amenities will be housed in one large hybrid structure (steel and concrete framed), encompassing four wings and the Centre's main entrance.

Adjacent to these facilities are the indoor sports areas, housed in three large steel framed structures, all interconnected but divided by movement joints. The largest of these, measuring over 100m in length, houses a full sized synthetic football pitch and required more than 700t of structural steelwork.

To create the 80m wide spans of this large column free space, steelwork contractor Billington Structures has erected a series of large 4.5m deep trusses, fabricated from columns and CHS sections. Due to the long span nature, steel was selected as the most efficient option.

The trusses were brought to site in four pieces and then erected using four mobile cranes, one vehicle for each truss section. Initially the middle two sections of the truss were lifted and bolted together in mid-air. While these pieces were still being held aloft by two cranes, the outer sections were individually lifted and bolted to the mid section and the supporting outer vertical columns. Only when the entire truss was bolted up and in place could it be released from the four cranes.

"This was a very complex procedure, but all of the trusses and their supporting columns were erected in just six weeks, with three trusses lifted into place every week," says Ian Woodall, Bowmer & Kirkland Project Manager for the sports areas.

## Topping out celebrated at hotels

The Football Association, Hilton Worldwide and main contractor Bowmer & Kirkland recently celebrated the topping out of the two hotels at St. George's Park (Hilton and Hampton by Hilton). The event signalled the conclusion of the exterior construction of the Centre.

"The project is on schedule and on budget," said David Sheepshanks, Chairman of St. George's Park. "We are within sight of the finishing line and the many benefits that this national centre will

View showing hotels in the foreground and the sports facilities behind

***The largest of these structures, measuring over 100m in length, houses a full sized synthetic football pitch and required more than 700t of structural steelwork.***

The indoor football pitch is spanned by trusses supporting a PVC roof

Supported by the trusses, the roof of the indoor pitch is a tensile PVC material which is held in place by more than 10,000 brackets, which were welded to the truss sections at Billington's fabrication yard.

The indoor football pitch building also incorporates a 60m sprint track and a cantilevering canopy along one elevation which will shelter some seating overlooking one of the Centre's 39 outdoor pitches.

The site also has a large 50m x 80m multi sports hall with facilities for 12 badminton courts, Futsal and partially sighted football. This steel framed hall was formed with a series of 50m-long spliced trusses which support the roof and its northlights.

Linking the sports hall to the indoor pitch is a three storey sports medicine science building, which is probably the most traditional steel framed beam and column structure part of the entire project.

Most of the structure is based around a 7.5m x 12.5m grid, although there are some long spans, especially on the ground floor where there are three hydrotherapy pools. This unit is part of the Centre's elite sports medicine, science, educational and performance area. The building will also house changing rooms, offices for FA and a plant area housed on the upper floor.

Visually and structurally the most interesting steel element of this building is a feature cantilever staircase in the central entrance area. This was a tricky steel part of the job and during construction Billlington had to temporarily prop the whole staircase until it was complete. Some complex design work was required for this feature and required coordination between steel and concrete design.

"The staircase isn't laterally supported at the top with only vertical loads transferred down the columns," explains David Bloomfield, Arup Project Engineer. "At the floor levels the lateral and eccentric loads from the staircase are transferred to the concrete slab and then into the frame via studs."

St. George's Park is due to open this autumn.

bring both to football and hopefully to the wider sporting community."

Much of the hotel complex, which features four interlinked finger wings, has been built using structural steelwork. The exception to this is the Hilton, where all of the 142 bedrooms spread over three levels have been built with precast concrete, likewise another wing housing the 86-bedroom Hampton by Hilton hotel is precast for the two upper levels of bedrooms, and steel framed transfer structure for the ground floor seminar rooms.

"Steel offered a more efficient solution for the ground floor as we could achieve a shallower depth and service intergration for the ceiling voids," comments David Bloomfield, Arup Project Engineer.

The remainder of this portion of the project is all framed in steel - the reception hall, a wing containing restaurants and a banqueting and conference hall, and the fourth wing which houses a swimming pool and spa.

"There are some long spans in these areas and steel was the best choice for the framing material," adds Mr Bloomfield. "The same reasoning why steel was used in the sports structures."

David Sheepshanks (centre) celebrates the topping out with the project team

*A large truss spans live rail lines and supports the new concourse building*

# Taxis in the frame

**FACT FILE**
**Paddington Integrated Project, Paddington Station, London**
**Main client:** Crossrail
**Architect:** Weston Williamson
**Main contractor:** Carillion
**Structural engineer:** Mott MacDonald
**Steelwork contractor:** Rowecord Engineering
**Steel tonnage:** 1,100t

Steelwork is playing a significant role in the works currently being undertaken at Paddington Station, a project which is creating the space for the forthcoming Crossrail scheme. Martin Cooper reports.

Arriving or departing from London's Paddington Station by train passengers will have noticed the steelwork frame taking shape alongside the Hammersmith & City Underground lines to the north of the historic terminus. These works may not initially look very substantial, but they are in fact the precursor for the Crossrail project and vital to its forthcoming construction programme.

Known as the Paddington Integrated Project (PIP), the job will deliver a new Hammersmith & City line station and entrance, improved access into the mainline terminus, and importantly a brand new taxi facility and ramp from Bishops Bridge Road. The new taxi area to the east of the existing station will have access to the terminus via lifts and escalators, but most importantly its completion will allow taxis to relocate from their current pick-up area on Departures Road.

This is vital as the current taxi facility's area has been earmarked for the new Crossrail station, which will run alongside the western facade of Paddington Station.

"The main Crossrail works can't start until the taxi area has been moved, so it is important that we complete our project on schedule," says Andy Swift, Carillion Project Manager for the PIP. "As soon as the taxis have moved excavation work will start on the new Crossrail station."

When it opens in 2018, Crossrail will run 118km from Maidenhead and Heathrow in the west, through new twin-bore 21km-long tunnels under central London to Shenfield and Abbey Wood in the east.

It is the largest expansion of the south east's rail network in fifty years and probably the decade's biggest construction job in the capital. Paddington will be a major interchange between the new Crossrail lines, Network Rail and London Underground services, so there are a number of stakeholders and much riding on construction keeping to a deadline.

As the PIP scheme is a vital cog in the overall Paddington programme, it is a collaboration between Crossrail, London Underground, Network Rail and Transport for London. The works have been designed to create an enhanced interchange, but delivering it has many challenges.

The new steel framed structure, which comprises of a new north entrance, a double-storey concourse situated above the Hammersmith & City lines, and a taxi ramp, which connects to Bishops Bridge Road at one end and the new taxi pick-up area at the other (see box story), is wedged into a tight triangular site bounded by Paddington Station, the Grand Union Canal and an array of roads, offices and residential blocks.

As a lot of the steelwork is being erected above 'live' railway lines much of the work has had to be done during three hour windows between 1am and 4am, as well as the occasional weekend and Bank Holiday closure.

Having such a short period in which to erect its steel, contractor Rowecord Engineering says this job has taken longer than a project requiring 1,100t would normally. But the timescale is not the only challenge they face as Operations Director Ian Hoppe explains: "As there's no storage space most of our deliveries are made at night and then erected almost immediately. Night time work also means there are onerous noise restrictions in place which means tasks such as welding and cutting are left until day time."

*Tubular V-shaped columns support the concourse's main façade*

Rowecord's steel package has included an assortment of sections and sizes, as the job requires a raft of differing members. The concourse and entrance building are formed with large concrete filled tubular columns, trusses have been installed across the rail lines and above the taxi ramp, complicated tree columns have been designed for the platform and taxi area's roof and new steelwork has been connected to old existing steelwork in some areas.

Interestingly, the structure is the first phase of this development, plans are afoot to build a 17-storey commercial block on top. This 'over-site' development was always in the plans and so the steelwork has been designed to sustain the proposed offices. The offices will be built above the taxi ramp and the North Entrance (excluding the concourse), in short the portion which is not directly above railway lines.

To facilitate the future commercial development, the steel frame has a demountable roof in places, which can be unbolted, something that is easily done with structural steelwork, in readiness for the second phase of steelwork to be added.

"We are using significantly larger member sizes than we'd otherwise need because of the proposed offices on top of the structure," explains Chris Levy, Mott MacDonald Project Engineer. "The supporting tubular columns have been concrete filled because of the extra loads they will support and for fire protection."

Fitting the steel frame into its wedge-shaped footprint and because of the three differing elements within the structure, it gets its stability from a number of sources. It has transversal moment frames, longitudinal cross bracing and a steel framed lift core.

The confined nature of the site has also meant steelwork has been delivered piece-small, so it could be lifted into place via a tower crane. "Early in the works, when there was a little more space we were able to get a mobile crane on site," adds Mr Swift. "But as the job has progressed the footprint has been taken up by the steel frame."

The new taxi deck is due to be ready this Spring, while the new entrance and concourse is scheduled to open later this year.

## Key to the project

Relocating the taxi pick-up area from Paddington Station's western side to a new facility will enable the new Crossrail station to proceed as planned. The current taxi concourse at Eastbourne Terrace and Departures Road will be excavated to form a 230m-long underground station box about 23m below the surface. This work can only commence when the new taxi deck on the eastern side is ready.

Taxis will enter the new area from Bishops Bridge Road via a new ramp, which is integrated within the new North Entrance and station concourse structure. They will then proceed to a new taxi deck adjacent to the station and above platform 12. This steel deck was constructed in the 1930s as a mail and parcel zone, and the original steelwork has survived in good condition. Openings have been cut into it for lifts and stairs, and in these areas new steelwork frames have been welded to the old riveted metalwork.

A series of 22 steel tree columns, with two and four branches, will support the taxi deck's roof. These columns have complicated castings, designed by Rowecord, and are being brought to site in sections before being welded up and erected. They are welded and connected to the deck's original steelwork and immediately propped for stability. Only when the glazed roof's connecting secondary steel has been installed are the trees able to be de-propped.

*Tree columns will support the roof over the new taxi pick-up area*

*The steel structure is situated in a tight plot adjacent to Paddington's eastern façade*

# Residences framed in steel

**FACT FILE**
**Waterfront South, Walsall**
**Main client:** Jessup Build Develop
**Architect:** S.P. Faizey
**Main contractor:** Jessup Build Develop
**Structural engineer:** B. Marshall
**Steelwork contractor:** Traditional Structures
**Steel tonnage:** 1,100t
**Project value:** £40M

A major regeneration development of apartments on a prominent canalside location in Walsall has benefited from the use of structural steelwork. Martin Cooper reports.

Consisting of 265 canalside apartments, Walsall town centre's Waterfront South project has already received considerable attention for its sustainability and design. Forming part of a much larger scheme, there are plans to transform this former industrial zone with a hotel, retail outlets and office blocks.

The residential project, which is already half completed, has generated much local interest and helped turn this part of the town centre into a desirable location in which to reside. The project achieved some national recognition by winning the Best Canalside Regeneration Project in the UK 2011 awarded by the British Waterways Trust.

Funding for this two phase scheme came in part from the Government's Homes and Communities Agency, to provide a mix of affordable eco homes to rent or buy. The first phase, which was completed early in 2011, comprises of two apartment blocks, one an eight-storey building with 84 flats, the other a five-storey structure with 17 apartments.

The second phase is due for completion this coming summer and consists of a further 164 apartments, in two separate eight-storey blocks. The steelwork frames for this phase were completed during last November.

Each of the four residential blocks has reaped the benefits of being constructed with structural steelwork. Cost, efficiency and speed of construction were all important considerations when the choice of framing material was made.

"We looked at all materials, including concrete and timber," says Clive Jessup, Director of contractor and developer Jessup Build Develop. "But after consideration we decided that steel met all of our needs, especially the speed of construction, as the first phase had to meet a tight deadline.

"We also needed a lightweight framing

## Green agenda

Today there is a greater awareness of the need to respect the environment and the requirement to limit the impact on climate change. This has led to a growing appetite for sustainable buildings and in line with this increasing trend, Waterfront South apartments boast a number of ecological credentials.

All apartments meet the Government's Code for Sustainable Homes Level 3, which means that they will deliver at least a 25% improvement in energy use over current building regulations.

The buildings feature green roofs, which help with excessive rainwater run-off as well as attracting wildlife. While internally, each apartment is fitted with a NIBE advanced air heat recovery system which provides heating and hot water.

solution because there are many old limestone mine workings beneath this part of Walsall."

Jessup Build Develop purchased the site in 2005, and commenced building the apartments in January 2010. Prior to purchase most of the site had already been cleared of any old structures and the mineshafts grouted. Interestingly, one industrial unit has remained and stands in between phases one and two, this buildings is adjacent to a plot which has been earmarked for a commercial development consisting of 4,797m$^2$ of office space.

As mentioned speed of construction was an important criteria, as the first phase had to be completed by March 2011. Once the ground was prepared steelwork contractor Traditional Structures was able to commence its package, which also included curved feature balconies, metal decking, precast stairs and the installation of insulated membrane roofs.

"The choice of metal decking with the steel frame creates a composite structure, which helped keep the weight down, compared to a precast solution," explains Graham Marshall, Partner of structural engineer B Marshall. "This then meant less cost, as smaller piled foundations needed to be installed."

As well as selecting to go with a steel framed solution for the project, Jessup are also keen to point out that wherever possible they have also selected as many local subcontractors as possible. Traditional Structures are one of these companies, being based just up the road at Cheslyn Hay.

*"We've used all other framing systems before and this one has worked well for us on this project, helping us to keep a tight deadline and by being economical."*

Steelwork for all of the blocks has been erected around a fairly regular 6m and 8m wide grid pattern, with steel bracing providing the structure's stability.

"The majority of the bracing is located in partition walls and in corridors, but we've also fitted some in the exterior walls, but only where it wouldn't interfere with windows," explains Phil Hadley, Traditional Structures' Director.

Importantly steel's flexibility came to the fore while the initial phase of apartments was already under construction. For architectural reasons, the eight-storey block's roof is not constant, but instead features a number of pitched steps. This originally meant some of the top floor apartments would have had a much higher floor to ceiling height than the block's other flats.

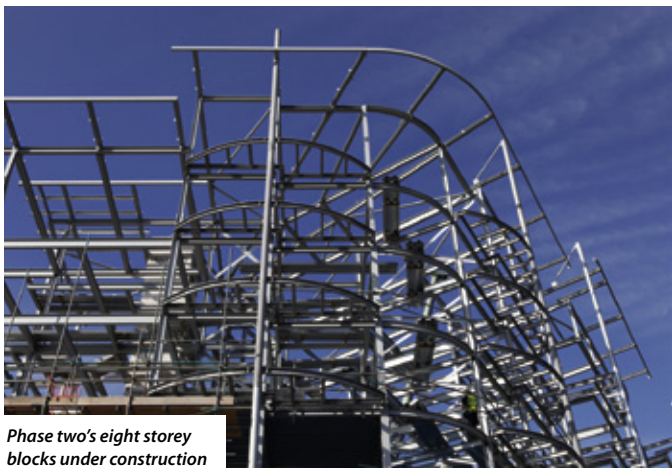
"Many of this building's apartments had already been leased to the Walsall Hospital Trust and they asked if they could have a few more three bedroom units than we had available," says Mr Jessup. "The architect, Steve Faizey, quickly realised that we could include an extra floor within three of the top floor units and this would convert them from two to three bedroom flats."

Steelwork erection was already underway, but this design alteration was easily and quickly incorporated into the steel package, and the entire project team say it could not have been achieved so effortlessly with any other framing material.

After analysing the structural model, the solution proved fairly simple and the supporting columns remained the same, and only extra floor beams needed to be inserted into the framework to create what is in effect a mezzanine level.

Summing up the project, Mr Jessup says Jessup Build Develop has never built a residential scheme with steel before and the company pretty much learnt about the material as they went along.

Would they use steel again? Yes, he says. "We've used all other framing systems before and this one has worked well for us on this project, helping us to keep to a tight deadline and by being economical."



*Phase two's eight storey blocks under construction*

*Steel frames helped the contractor with a speedy erection*

*Balconies were brought to site fully assembled and bolted to the main frames*

*The completed phase one buildings helped the project win a national award*

# Steel to the rescue

Flexibility and speed of erection were behind the decision to choose structural steelwork as the framing material for four new fire stations in Gloucestershire. NSC reports.

*Cheltenham East fire station's architecturally designed community area*

Fire station design has changed in recent times, gone are the days when these ubiquitous establishments were the sole preserve of the red fire engines and their company of firefighters, today they are also buildings for the general public offering meeting rooms and, in the case of one, a life skills centre (see box story).

Known as community fire stations, four of them are currently under construction for Gloucestershire County Council. Two each in Cheltenham and Gloucester, all of these stations will feature the traditional fire engine (appliance) depot area and its adjacent office block and firefighter living quarters, but they will also contain community areas where local residents can take advantage of facilities such as free meeting rooms.

"We want to invite and welcome local people into our new fire stations," explains Peter Thorp, Project Manager for Gloucestershire Fire & Rescue Service. "These new buildings will be part of the community offering more than just the traditional firefighting services."

NSC visited one of these new facilities, Cheltenham East Fire Station, a new structure being built on the site of the town's old fire station on Keynsham Road. In order to get this project started, once funding had been assured earlier this year, the town's fire service had to move to a temporary site to allow for demolition.

Main contractor Kier Moss started its work with a refurbishment programme of the nearby temporary premises, prior to starting on the new station. After demolition and groundworks were completed, steelwork erection was able to begin in June.

A number of criteria favoured the use of structural steelwork, but most importantly, "steel was chosen for these projects for its flexibility," explains Project Architect Mark Massey of Calderpeel. "Using steel has allowed us to future-proof the living quarters and office spaces as the partition walls could be moved if the client wanted to rearrange the layout."

Jim Seager, WYG Project Engineer adds: "Speed of erection was also an important factor in steel's favour, while the only alternative may have been load bearing masonry, but these buildings have two-storey elements and they are too high for that option."

Steelwork erection was carried out by Adstone Construction, while metal decking installation was contracted to MSW. The Keynsham Road site is quite tight and once the frame started to go up space for materials storage was at a premium.

"Small loads brought to site on a just-in-time basis was the order of the day," says Paul Ingram, Kier Moss Senior Site Agent.

# Centre for community safety

The same team of companies, headed by Kier Moss, are also constructing the three other community fire stations. All of them are similar in size and layout to Cheltenham East, and all of them are steel framed structures. Uckington is the other location in Cheltenham for a new fire station, while Gloucester has two under construction - North and South.

Gloucester South (below) is the largest of the four projects, and one which will also accommodate a Life Skills Centre. Attached to the main fire station buildings, the skills area is housed in a 23m x 38m clear span structure, formed with a series of mono-pitched rafters.

"Jim Seager of WYG says: "Commercially, steelwork was the most viable option to cater for the spans over the life skills exhibition area."

The Life Skills Centre has been designed to help people of all ages learn about safety in general. A number of risk and consequence scenarios, using real-life exhibits and film footage, as well as slips, trips and falls avoidance zones, will be housed within the building.


Structurally the fire station is divided into three parts, the appliance bays (where the fire engines reside), a two-storey zone for the fire officers and the adjacent community zone, which is separated from the rest of the building by a covered 'street'.

These differing parts helped Adstone erect the structure sequentially, starting with the large appliance area, a portal framed shed containing six bays to house the fire and rescue vehicles.

A large column free space was required for the vehicles and Adstone formed this with six 5m wide portalised and braced bays. A high floor to ceiling height is also needed as maintenance to the vehicles will be carried out in the appliance zone. Consequently the area has a 7.3m high roof which will allow the largest fire engines to raise their cabs within the structure.

The rear of the appliance area has a large rooftop canopy and this required Adstone to erect a 30m-long truss to support the feature. The truss is spliced at third points and represents the largest single steel element for the whole project.

Next door is the attached two-storey operational area, which is a braced beam and column zone featuring a pitched roof. This will accommodate locker rooms and showers for staff, a fitness suite, toilets, a kitchen and a spacious area where crews can eat meals and relax. The ground floor will have offices, while a plant room is located on the upper second floor.

An enclosed covered 'street' housing the main entrance, divides the operational part of the fire station from its self-contained community area. This is a two-storey element, again a braced beam and column structure, which will house toilets, a refreshment area and adjoining prayer/baby changing room. Adjacent to this is a lecture and training room with a folding partition so the area has the flexibility to be extended into one large space.

Architecturally the community area stands out from the rest of the fire station as it has a curved facade, formed with a series of faceted beams and it is also structurally higher.

"There's a void space above the first floor area as we wanted the corner of the building to be high and act as a focal point," says Mr Massey.

As well as integrating the community area's design, the project also had to take into account its location. Much of Cheltenham town centre consists of a conservation area and the new fire station, with its easy lines, pitched roof and curved front facade, has to blend into its neighbourhood, much easier than its predecessor did.

The lozenge shape of the fire station is also a result of having an adjacent listed building. "The fire station splays out at the community area end, this is a direct result of the need to preserve views of the adjacent College Baths building," sums up Mr Massey

Cheltenham East is due to open in April.

**FACT FILE**
Cheltenham East Fire Station
**Main client:** Gloucestershire Fire & Rescue Service
**Architect:** Calderpeel
**Main contractor:** Kier Moss
**Structural engineer:** WYG
**Steelwork contractor:** Adstone Construction
**Steel tonnage:** 500t

*Impression of the completed Cheltenham East station and (right) the project under construction*

# Community schools for former mill town

As part of the Academies framework, three new steel framed schools are taking shape in Oldham. Here NSC reports on each of the project's progress.

At its peak in the early part of the 20th Century Oldham was the most productive cotton spinning town in the world, with its 350 mills churning out more product than many western European nations.

The town also led the way in the design and manufacture of spinning and weaving machinery, but it was so dependent on the cotton sector that when the former began its inextricable decline, this industry took a downswing as well. Oldham's last mill ceased operation in 1998, and today although many of these buildings remain, they have been converted to other uses.

In the meantime, like many former industrial towns, Oldham has had to reinvent itself, and ever since the negative publicity it received following the 2001 riots it has been trying to highlight some of its positive characteristics.

This is where three new schools fall into the equation, as one will have a massive impact on the local community by aiding the integration of various communities.

Two of the schools are on former mill sites and on a design perspective, all of the projects are making use of structural steelwork for their main frames, a decision made for a number of reasons, but primarily for the speed with which it can be erected.

"On all of the jobs getting the frames up quickly and then weather tight was important," says Martin Griggs, GCM Consulting Project Engineer. "Once that's achieved and the composite floors are in, the fit-out can begin and the external skin can be installed."

The schools are all different and steel has helped overcome unique challenges on each project.

## Academy to transform community

*Waterhead takes shape on a former mill site*

**FACT FILE**
**Waterhead Academy**
**Client:** Oldham Council
**Architect:** Aedas
**Main contractor:** Willmott Dixon
**Structural engineer:** GCM Consulting
**Steelwork contractor:** James Killelea
**Steel tonnage:** 1,000t
**Project value:** £26.3M

Waterhead Academy is the largest of the three academies Willmott Dixon is currently building in Oldham. What is significant about this school is that it will replace two existing schools, one where the pupils are 98% white, the other 98% Asian, and thereby bringing the town's disparate young communities together under one roof.

Building the academy has thrown up a few challenges as Willmott Dixon Project Director Mike Lane explains: "It's a tight former mill site and within its confines we've had to support an adjacent highway, grout three disused mineshafts and avoid building near a culvert which runs across the plot."

Meanwhile, the six-storey school, which is sponsored by Oldham College, will have a 12,800m$^2$ footprint and unusually a 150 space car park located beneath the building in an undercroft.

"Using a steel frame has had a number of advantages for this job," says Mr Lane. "By putting the car park underneath we've not had to change the structure's design, it's basically just been jacked-up on steel columns to accommodate the undercroft."

Mr Griggs agrees and says: "By avoiding a basement structure and forming an undercroft with the steel frame was cheaper as no tanking was required for waterproofing."

As with most schools Warerhead's design has had to incorporate a number of differing uses and classroom sizes, consequently in many areas of the structure there is very little repetition.

"Steel certainly helped with this complicated design as it has a number of different shaped and sized grids," adds Mr Lane.

The car park is based on a 7m x 15m grid, a standard pattern for car parks, but above this grid patterns change and many columns do not 'match up' between the undercroft and the main school building. Transfer structures (deeper beams) are located throughout the structure to accommodate these column variations.

A feature of the school structure is that it has eight open roof terrace areas, located at various levels. All of these require further large transfer structures to be erected along with the main steelwork. Stability for the structure is predominantly derived from cross bracing and steel lift cores.

Steelwork contractor James Killelea programme lasted 20 weeks and during that time it erected approximately 3,000 individual pieces of steel.

Waterhead is scheduled to open in November 2012.

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# Iconic structure for an oasis

*An LED façade will illuminate the structure*

**FACT FILE**
**Oasis Academy**
**Client:** Oldham Council
**Architect:** Aedas
**Main contractor:** Willmott Dixon
**Structural engineer:** GCM Consulting
**Steelwork contractor:** James Killelea
**Steel tonnage:** 750t
**Project value:** £25.5M

The Oasis Academy, sponsored by Christian Charity Oasis, is also being built on the site of a former mill, this one a prominent plot overlooking Manchester.

Other similarities with the Waterhead project include three on-site mineshafts which had to be grouted during the early works stage and the fact that the building is also a large steel frame. James Killelea is the steelwork contractor for this job as well, erecting 750t of steel during a 20 week programme that completed in late May 2011.

Consisting of 13,500m² of floor space, this academy is a large three-storey rectangular structure divided in half by a 800m² atrium. The brief for this academy called for an iconic building, one which architect Aedas duly delivered with an eye-catching main facade visible from the town below. This elevation includes ten LED-lit lightboxes, approximately 8m², programmable so they can change colour, adding a touch of originality to the project.

Using steel for this project's structural frame has brought a number of benefits, including the much needed speed of construction.

"Erecting and designing this iconic structure would have been much more difficult with another material," says Mr Lane. "Steel's speed of erection allowed us to get the roof on and make the structure watertight in good time."

GCM Consulting designed this academy in two halves, with each wing (either side of the atrium) braced for stability and structurally independent.

Steel also allowed the architect to easily incorporate a four-court sports hall on the first floor. Large 15m spans in the sports hall have been formed with a series of trusses, while below another series of trusses has allowed the designers to put music rooms, directly below, on the ground floor.

'There are a number of long spans in the project, a feature easier and more cost effective to achieve with steel," adds Mr Griggs.

An unusual element to the Oasis job has been provided by a public thoroughfare which cuts right across the site. This right of way has had to remain open for most of the construction process, but its location has impinged on the Academy's design.

The main structure is situated on one side of the path, while the school's sports facilities are on the other.

"To avoid pupils having to exit the school and cross a public path, we've erected a steel footbridge which connects the school building with the sports pavilion," explains Mr Lane.

*Steelwork erection was completed in 20 weeks*

*A tight and busy site did not impinge on steelwork being completed on time*

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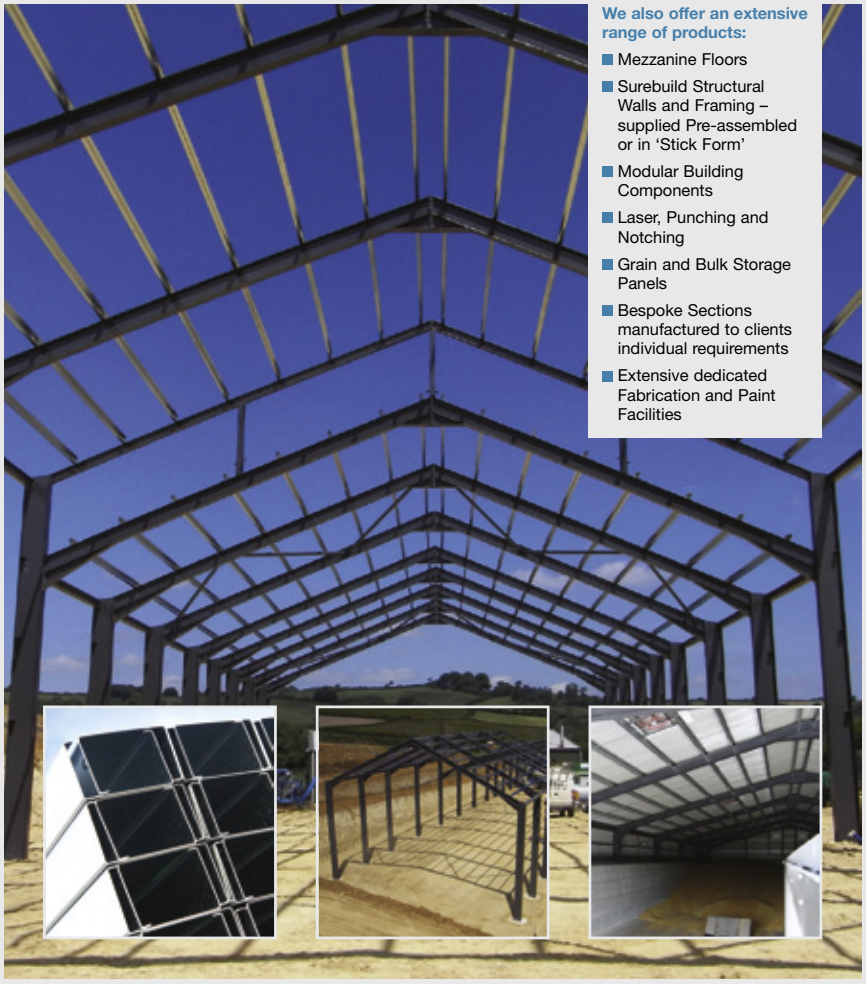

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# School takes shape with diplomacy

The third of the academies being built by the team led by Willmott Dixon is the Oldham North Academy. This project got underway in July 2011 and is the smallest of the jobs, with the main frame requiring 350t of steel.

EvadX is the steelwork contractor working on this school and it completed its programme in just 7.5 weeks; which was ahead of schedule according to Willmott Dixon.

*Impression of the school's Agora Theatre*

It is being built on the playing fields of another local school, Our Lady's High School. This school will be moving to new premises shortly, but in the meantime - with construction taking place adjacent to a functioning school and one which is not getting the new buildings - the situation requires a great deal of diplomacy.

In places the construction site is only 10m from the occupied school premises and steel erection and tasks such as the cutting of metal decking have had to be done with utmost consideration to scholars.

The new school comprises of a central block housing a large auditorium with seating for up to 500, and two attached three-storey teaching block wings. Overall the shape of the 8,800m² structure is roughly triangular, and again steel is said to have been essential as there are a number of long span areas (auditorium) and differing classroom sizes and grid patterns.

The academy is due to be completed in March 2013.

**FACT FILE**

**Oldham Academy North**

**Client:** Oldham Council
**Architect:** Aedas
**Main contractor:** Willmott Dixon
**Structural engineer:** GCM Consulting
**Steelwork contractor:** EvadX
**Steel tonnage:** 350t
**Project value:** £16M

*Steelwork was completed ahead of schedule*

# Additional design requirements for overlap joints in structural hollow sections

Christopher Morris of Tata Steel Tubes explains the reasons for an additional design requirement introduced into Eurocode 3 for K and N overlap joints

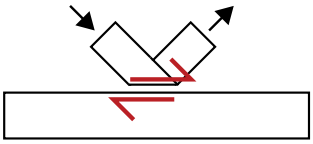

*Figure 1 - Shearing force at an overlapped K joint*

## Introduction

BS EN 1993-1-8:2005 was revised on 28th February 2010 with the implementation of the July 2009 CEN corrigendum. This Corrigendum includes the additional requirement to verify the shear resistance (in the direction of the longitudinal axis of the chord) of the connection between bracing members and chord, for overlapped K- and N-joints in lattice structures of hollow section members. The additional requirement is only applicable to joints with a large overlap. The design situation is illustrated diagrammatically in Figure 1.

## Failure modes for hollow section K and N joints

Overlap K- and N-joints should be verified for the range of failure modes given by clause 7.2.2. The particular modes that usually need to be considered are:

- chord face failure (CHS chords)
- effective width/brace failure (RHS chords)

The addition of the following requirement in clause 7.1.2 (6) effectively adds a further failure mode – shear failure in the connection between braces and chord:

*If the overlap exceeds $\lambda_{ov,lim.} = 60\%$ in case the hidden seam of the overlapped brace is not welded or $\lambda_{ov,lim.} = 80\%$ in case the hidden seam of the overlapped brace is welded or if the braces are rectangular sections with $h_i < b_i$ and/or $h_j < h_j$, the connection between the braces and the chord face should be checked for shear.*

In addition, the range of validity in Tables 7.1, 7.8, 7.20 and 7.23 now includes the value of $\lambda_{ov,lim}$ as an upper limit for the overlap in K and N joints. However, it is not intended as a maximum overlap limit but that if the overlap exceeds $\lambda_{ov,lim}$ the additional check for shear needs to be made.

## Basis for verifying shear resistance

No criteria for this additional failure mode have been included in tables 7.2, 7.10, 7.21 or 7.24. In their absence, the following criteria for adequacy of the shear connection may be used. They are based on research by CIDECT but expressed using EN 1993-1-8 symbols.

## Shear check for CHS bracings

When: $60\% < \lambda_{ov} < 100\%$ and overlapped brace hidden seam is NOT welded

or: $80\% < \lambda_{ov} < 100\%$ and overlapped brace hidden seam IS welded

$$N_{i,Ed}\cos\theta_i + N_{j,Ed}\cos\theta_j \le \frac{\pi}{4}\left[\frac{f_{ui}}{\sqrt{3}} \times \frac{\left[\left(\frac{100-\lambda_{ov}}{100}\right)2d_i + d_{eff,i}\right]t_i}{\sin\theta_i} + \frac{f_{uj}}{\sqrt{3}} \times \frac{(2d_j + c_s d_{eff,j})t_j}{\sin\theta_i}\right] \times \frac{1}{\gamma_{M5}}$$

When: $\lambda ov \ge 100\%$

$$N_{i,Ed}\cos\theta_i + N_{j,Ed}\cos\theta_j \le \frac{\pi}{4} \times \frac{f_{uj}}{\sqrt{3}} \times \frac{(3d_j + d_{eff,j})t_j}{\sin\theta_j} \times \frac{1}{\gamma_{M5}}$$

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### Shear check for RHS bracings

When: $60\% < \lambda_{ov} < 100\%$ and overlapped brace hidden seam is NOT welded

or: $80\% < \lambda_{ov} < 100\%$ and overlapped brace hidden seam IS welded

or: $hi < b_i$ and $\lambda_{ov} < 100\%$

or: $hj < b_j$ and $\lambda_{ov} < 100\%$

$$N_{i,Ed}\cos\theta_i + N_{j,Ed}\cos\theta_j \le \left[\frac{f_{ui}}{\sqrt{3}} \times \frac{\left[\left(\frac{100-\lambda_{ov}}{100}\right) 2h_i + b_{eff,i}\right] t_i}{\sin\theta_i} + \frac{f_{uj}}{\sqrt{3}} \times \frac{(2h_j + c_s b_{eff,j}) t_j}{\sin\theta_j}\right] \times \frac{1}{\gamma_{M5}}$$

When: $\lambda_{ov} \ge 100\%$

$$N_{i,Ed}\cos\theta_i + N_{j,Ed}\cos\theta_j \le \left[\frac{f_{uj}}{\sqrt{3}} \times \frac{(2h_j + b_j + b_{eff,j}) t_j}{\sin\theta_j}\right] \times \frac{1}{\gamma_{M5}}$$

Where $c_s$ is an effective shear area coefficient and all the other symbols are as defined in BS EN 1993-1-8 and subscripts i and j refer to the overlapping and overlapped bracings respectively.

### Effective shear area coefficient

Usually, the hidden part of the overlapped brace (toe) is not welded unless the brace vertical components of design forces differ by more than 20%. However, if it is not welded, it cannot contribute to shear resistance. Therefore, welding the hidden toe of the overlapped brace increases the brace shear capacity and is represented by the effective shear area coefficient:

$c_s = 1$ when the hidden toe is not welded

$c_s = 2$ when the hidden toe is welded.

If the designer requires the hidden toe welding to provide sufficient shear resistance it is essential to provide this information to the fabricator.

### Effective widths of braces

The effective width given as $b_{eff}$ in tables 7.10 and 7.12 (expressed in terms of width of RHS *b* for overlapping brace member *i*), can be substituted by *d* for CHS and subscript *j* for the overlapped brace - except CHS braces to CHS chords. In which case, the effective diameter for the overlapping brace is given by:

$$d_{eff,i} = \frac{12t_0}{d_0} \times \frac{f_{y0}\, t_0}{f_{yi}\, t_i} \times d_i \quad \text{but} \le d_i$$

To apply this for the overlapped CHS brace to CHS chord substitute subscript i for j.

The effective widths for the overlapping and overlapped brace thus depend on chord and brace section profiles, as shown in Table 1.

| | | Brace | |
|---|---|---|---|
| | | CHS | RHS |
| Chord | CHS | Overlapping CHS brace to CHS chord:<br>$d_{eff,i} = \frac{12t_0}{d_0} \times \frac{f_{y0}t_0}{f_{yi}t_i} \times d_i$ but $\leq d_i$ | — |
| | | Overlapped CHS brace to CHS chord:<br>$d_{eff,j} = \frac{12t_0}{d_0} \times \frac{f_{y0}t_0}{f_{yj}t_j} \times d_j$ but $\leq d_j$ | — |
| | RHS | Overlapping CHS brace to RHS chord:<br>$d_{eff,i} = \frac{10t_0}{b_0} \times \frac{f_{y0}t_0}{f_{yi}t_i} \times d_i$ but $\leq d_i$ | Overlapping RHS brace to RHS chord:<br>$b_{eff,i} = \frac{10t_0}{b_0} \times \frac{f_{y0}t_0}{f_{yi}t_i} \times b_i$ but $\leq b_i$ |
| | | Overlapped CHS brace to RHS chord:<br>$d_{eff,j} = \frac{10t_0}{b_0} \times \frac{f_{y0}t_0}{f_{yj}t_j} \times d_j$ but $\leq d_j$ | Overlapped RHS brace to RHS chord:<br>$b_{eff,j} = \frac{10t_0}{b_0} \times \frac{f_{y0}t_0}{f_{yj}t_j} \times b_j$ but $\leq b_j$ |

*Table 1 - Effective width equations*

## Brace ultimate tensile strength

The brace ultimate tensile strength, $f_{ui}$ and $f_{uj}$ for the overlapping and overlapped brace respectively, is given in BS EN 1993-1-1 as:

$f_u = 510$ N/mm² for S355H, hot finished to BS EN 10210-1

$f_u = 510$ N/mm² for S355H, cold formed to BS EN 10219-1

However, the UK NA to BS EN 1993-1-1:2005 recommends the use of values from the product standards, which give:

$f_u = 470$ N/mm² for Celsius 355® to EN 10210-1:2006

$f_u = 470$ N/mm² for Hybox 355® to EN 10219-1:2006

## References:

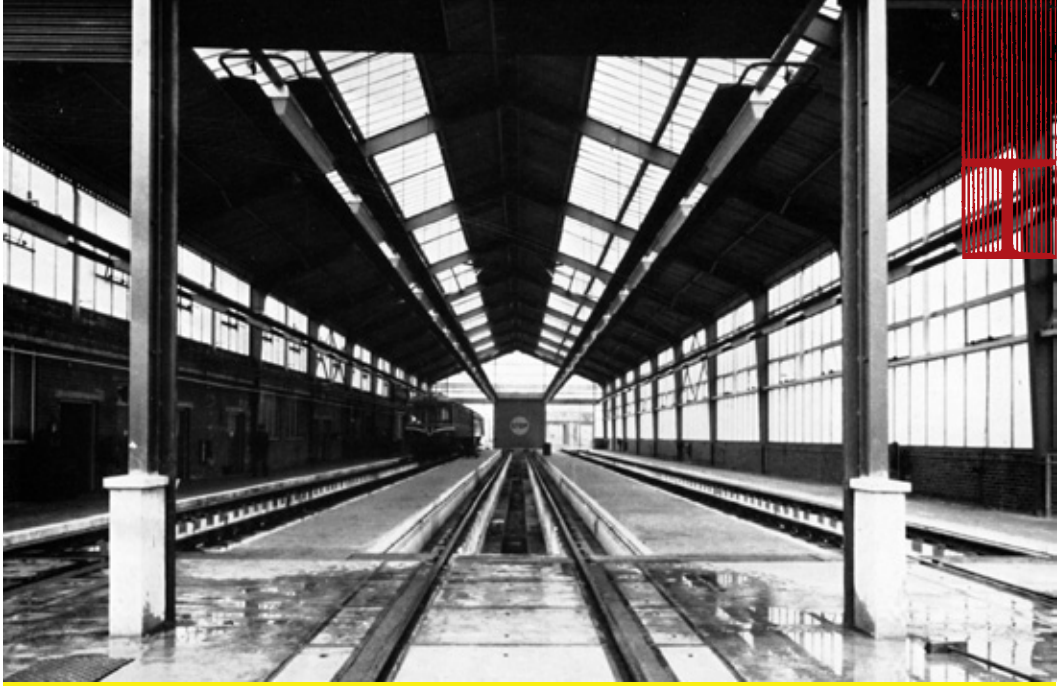
Tata Steel, Tubes: Design of welded joints, Celsius 355 and Hybox 355

BSI: EN 1993-1-8:2005 Design of steel structures, design of joints

CIDECT: Design guide for circular hollow section (CHS) joints under predominantly static loading (2nd edition 2008)

CIDECT: Design guide for rectangular hollow section (RHS) joints under predominantly static loading (2nd edition 2009)

Contact: Christopher Morris,
Tata Steel, Tubes.
Tel: 01536 404012
Email: *christopher.morris@tatasteel.com*



# Structural Steelwork for Railways

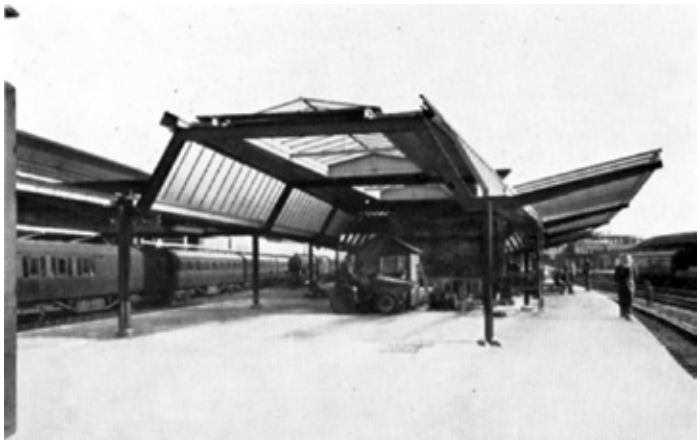
*From Building with Steel, November 1961*

▶ As the massive modernisation programme of British Railways gathers momentum, the old familiar steam locomotive gives way to streamlined electric and diesel tractive units. New buildings are needed for their care and maintenance. The civil engineers and architects of the railways have not been slow in making use of the advantages of steel construction for this type of building. For example, pictured here is the new motive power depot erected at Darnall by the eastern region for the maintenance of diesel rail cars. Some 120 tons of steel were used in the construction of this 60 ft span 300 ft long 2-pin portal frame structure of all-welded construction. Purlins are of Castella construction, while site bolted splice joints were used in the rafters with high tensile steel close-tolerance bolts in all joints.


◀ The 'new look' on British Railways is very apparent in this signal box where power signalling has freed the architect from the limitations imposed by the lever frame. This is the Wilmslow signal box erected by the London Midland region as part of their Manchester-Crewe electrification scheme. Together with another new signal box at Sandbach, Wilmslow controls 27 route miles my colour light signalling: between them the two new boxes replace 12 mechanical boxes. In both cases the use of steel construction was necessitated by the need for rapid erection to comply with the electrification programme and to meet restricted site conditions with difficult site access. In the case of Wilmslow a further factor was the need to keep down weight and so avoid deep foundations close to the permanent way.

Some idea of the size of the Hither Green Continental Freight Depot may be gauged from this aerial view of the project ▼

*A pleasing example of the 'new look' on the London Midland Region is this steel supported roof, seen partially completed, over platforms 1 and 2 at Preston station. Platform 3's cantilever awning and screen is in the background. The roof consists of shaped and stiffened R.S.J. rafters at approximately 25 ft centres supported by box columns out of welded channel sections. The purlins, which are continuous over supports, are of channel section.* ▼



# Don Valley Stadium Sheffield

For:

Sheffield for Health Ltd

**Architects:**
Design & Building Services
Sheffield City Council

**Structural Engineers:**
YRM Anthony Hunt Associates

**Steelwork Contractor:**
Tubeworkers Ltd

**Main Contractor:**
R M Douglas (Management) Ltd

***Judges' Comments:***

*A clear, simple planning and structural discipline produces an eminently useable solution enhanced by the bold decision to reduce the site level to form a natural arena, thus solving problems left by previous industrial use. The result is a simple, elegant and well articulated building.*

Taken from
STEEL CONSTRUCTION
December 1991

The Don Valley Stadium is one of five major new facilities that have been built in Sheffield in time to host the World Student Games. As part of the city's concerted effort for regeneration. Some 6,000 competitors from over 120 countries are involved in the games which, in that sense, are second only to the Olympics.

Acceptance of Sheffield's bid to host the games in November 1987 set a tight timescale for designing and constructing an athletics stadium to full Olympic standard, with an all seater capacity of 20,000 expandable to 40,000 with temporary seating for the opening and closing ceremonies. Half of the permanent seats were to be in the main grandstand parallel to the finish straight, with about three quarters of these being undercover. Warm up facilities were also required, including an indoor running track.

During the design stage the brief was modified to give a permanent capacity of 25,000 all seated and in the event the temporary seating provision was not required.

To accommodate 10,000 seats this grandstand construction was continued with the curve of the track for one bay at either end of the finish straight. This also helped to create a fitting portico for the main competitors' entrance at the western end, the 'Marathon Gate' and, it transpired, provided an ideal location for the later addition to the brief of a library at the eastern end.

To provide wholly uninterrupted viewing the first available support line for the roof was behind the rearmost row of seats. This fell directly over the indoor track in its most economic position tucked under the seating to reduce the building footprint. However, by reflecting the raking support member beneath the terraced seating and linking these two members at spectator level by a beam which would then also support the concourse floor, a tied A frame was generated to solve these apparently conflicting ideals. The roof columns were continued down through the A frame to provide transverse stability above its apex and also to act in tension to provide a midspan support to the tie beam.

A simple and efficient arrangement of 12 metre high masts, back struts and stays achieves the 26m free cantilever of the grandstand roof at an overall equivalent weight of 40kg/m$^2$ of steel. In strong winds this cantilever experiences a net uplift, hence all members need to be capable of resisting compressions and therefore circular hollow steel sections are used throughout due to the high multidirectional resistance to buckling. The main cantilever, backstrut and mast members are all of 508 dia CHS, whilst 323.9 dia CHS is used for the stay system, the front element of which is some 19 metres long and under uplift is equivalent to a six storey high unrestrained column.

To resist high lateral forces from the membrane roof **I** and **T** sections and platework are welded between the front cantilever and backstrut members form vierendeels, with holes in the cross stiffeners to facilitate roof drainage. Polycarbonate glazing in the panels of these vierendeels, which demonstrate the versatility of steel to form multifunctional integral elements, will produce a contrast in light to the 7% translucency of the surrounding membrane. A ring of 50mm dia ties braces each group of vierendeels back to the line of masts to resist, in particular, out of balance forces from unequal loading or panel replacement. On this line a central (or pelvic) vierendeel transfers such longitudinal forces to the apex of the A frames and shares a common chord with a lower warren truss which performs the same function for the vertical loads from the immediate seating support beams.

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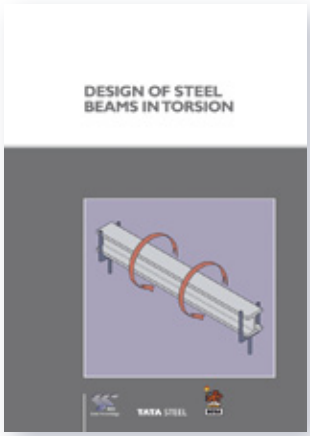


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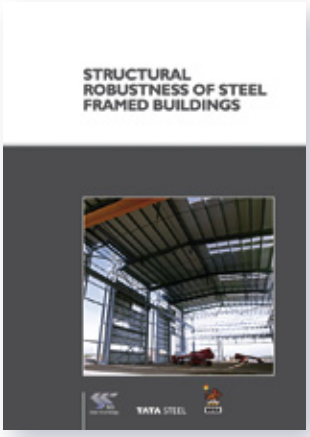


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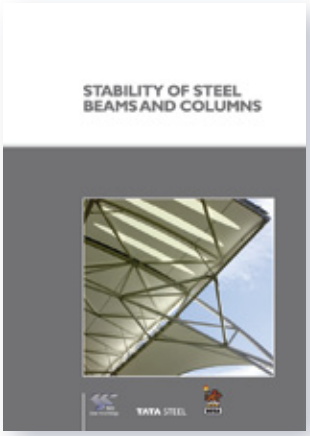


### Stability of steel beams and columns

This guide provides immediate practical guidance for both the common and the non-standard restraint conditions commonly found in construction. The explanation of the underlying physics and the numerical worked examples form a comprehensive resource for all designers completing member buckling checks.

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| | |
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# Strength from Advisory Service

Designing and building in steel has never been as straightforward as it is today, and steel still remains the material of choice for construction in the UK. The steel sector provides comprehensive and in-depth technical back up to ensure that those using steel have all the guidance and support they could need at their finger tips.

The co-ordinated and comprehensive support provided by the BCSA's Structural Advisory Serivce is free of charge to specifiers, clients and designers. Technical experts are on hand to provide an extensive range of services, including design assistance on structural form, performance of steel buildings, seminars and in-house CPD presentations, etc.

Richard Dixon, Manager, Structural Advisory Services, who heads up the network of Regional Technical Managers throughout the UK and Ireland said: "We have a team of experienced regional engineers who are on hand to offer design support and advice to designers, and to point them to the wide range of technical guidance and resources available to them and inform them in a practical way on key topics like EC3 and the sustainability of steel construction through in-house CPDs."


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# AD 364
# Welding stainless steel

This Advisory Desk Note provides guidance on welding stainless steel and gives references for further information. Stainless steel can be readily welded to itself, to carbon steel and to galvanized carbon steel. In order to ensure a sound welded joint, it is essential that the mechanical properties and corrosion resistance of the weld and parent material are suitably matched. Welding processes are chosen and weld procedures developed for the material and joint configuration to ensure that welds can be completed without flaws and that distortion is controlled. After welding, in order to achieve optimum corrosion performance, crevice features, contamination and at least all weld heat tints deeper in colour than a pale yellow should be removed by mechanical dressing followed by acid pickling of the joint.

### Welding processes

The most common welding process for stainless steels is metal inert gas welding (generally referred to as MIG). Manual metal arc welding (MMA) and tungsten inert gas welding (TIG) require higher levels of skill and are generally slower, so they not preferred, except where high quality is a requirement. Laser welding is not an option for piecemeal fabrication but is used for factory production runs of specific products.

More detailed information on processes suitable for stainless steel is given at *www.bssa.org.uk*.

### Welding stainless steel to stainless steel

The two most common families of stainless steel used in construction are austenitic and duplex stainless steels, both of which are 'weldable'. Austenitic stainless steel is readily welded to itself with or without filler wire. There are matching filler metals available for most of the austenitic range of alloys, for example grade 1.4301 (EN 10088 designation, the more common AWS designation is type 304) is generally welded with type 19 9 L filler metal (EN designation, as used in EN 1600, EN 12072 and EN 12073 – the more common AWS designation is 308L).

On the other hand, duplex stainless steel requires more control when being welded and may involve post weld heat treatment or special welding consumables. In general, for welding common grades of duplex such as grade 1.4462 (also known as grade 2205) to itself, the standard filler specified is 22 9 3 N L (2209 in AWS).

For welding austenitic steel to duplex stainless steel, fillers similar to those recommended below for welding duplex stainless steel to carbon steel should be used. It is noteworthy that austenitic stainless steels have lower strength than duplex grades and therefore welded joints made with austenitic filler metals will not be as strong as the duplex base metal.

### Welding stainless steel to carbon steel

It is possible to weld stainless steel to carbon steel, provided that an appropriate filler is used. For welding austenitic stainless steels, the generally accepted procedure is to use an over-alloyed austenitic electrode to ensure adequate mechanical properties and corrosion resistance. Although a standard 19 9 L filler (AWS 308L) can be used for joining austenitic steel to carbon steel, more highly alloyed fillers, such as the 23 12 L (309L) are preferable.

Similar fillers are recommended for welding duplex stainless steels to carbon steel as for welding duplex to duplex. Hence, as discussed earlier, for duplex grades such as 1.4462 (2205), the standard filler specified is 22 9 3 N L (2209 in AWS). The higher nickel content ensures the correct 50/50 ferrite/austenite structure in the weld deposit, thus maintaining strength, ductility and corrosion resistance. Austenitic fillers such as 23 12 2 L (309LMo in AWS), which are low in carbon and have a molybdenum content intermediate between the two steels, can also be used.

### Welding stainless steel to galvanized steel

When welding stainless steel to galvanized steel, the zinc coating around the area to be joined must be removed before welding. The inclusion of zinc can result in embrittlement or reduced corrosion resistance of the finished weld and, in addition, the fumes given off when attempting to weld through the galvanized layer are a significant health hazard. Once the galvanizing has been removed, welding requirements are as for ordinary carbon steel.

### Risk of bimetallic corrosion between carbon and stainless steel

Bimetallic corrosion between carbon and stainless steel is rarely a problem in building environments. However, unprotected welds between them subject to aggressive environments such as immersion in seawater could result in accelerated corrosion of the less noble carbon steel. In this instance, it is preferable to extend the coating on the carbon steel onto the stainless steel to a distance of about 50mm from the weld.

### Further information:

Further information is available from *www.bssa.org.uk*.

Design Manual for Structural Stainless Steel (Third Edition, 2006), Euro Inox and SCI. Available from *www.euro-inox.org* and *www.steel-stainless.org/designmanual*

The Online Information Centre for Stainless Steel in Construction: *www.stainlessconstruction.com*

EN 1011-3:2000 also provides technical recommendations for arc welding of stainless steel.

Contact: **Katherine A Cashell**
Tel: **01344 636525**
Email: **advisory@steel-sci.com**

# New and revised codes & standards

**From BSI Updates November 2011**

### DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

**11/30247279 DC**
*BS EN 1337-1* Structural bearings. Part 1. General

### CEN EUROPEAN STANDARDS

**EN 1998-2:-**
Eurocode 8. Design of structures for earthquake resistance. Bridges
AMENDMENT 2: September 2011 to EN 1998-2:2005

### ISO PUBLICATIONS

**ISO 630-1:2011**
Structural steels. General technical delivery conditions for hot-rolled products.
*Will not be implemented as a British Standard*

**ISO 630-2:2011**
(Edition 2)
Structural steels. Technical delivery conditions for structural steels for general purposes
*Will not be implemented as a British Standard*

**ISO 10799-1:2011**
Cold-formed welded structural hollow sections of non-alloy and fine grain steels. Technical delivery conditions
*Will not be implemented as a British Standard*

**ISO 10799-2:2011**
Cold-formed welded structural hollow sections of non-alloy and fine grain steels. Dimensions and sectional properties
*Will not be implemented as a British Standard*

**ISO 12633-1:2011**
Hot-finished structural hollow sections of non-alloy and fine grain steels. Technical delivery conditions
*Will not be implemented as a British Standard*

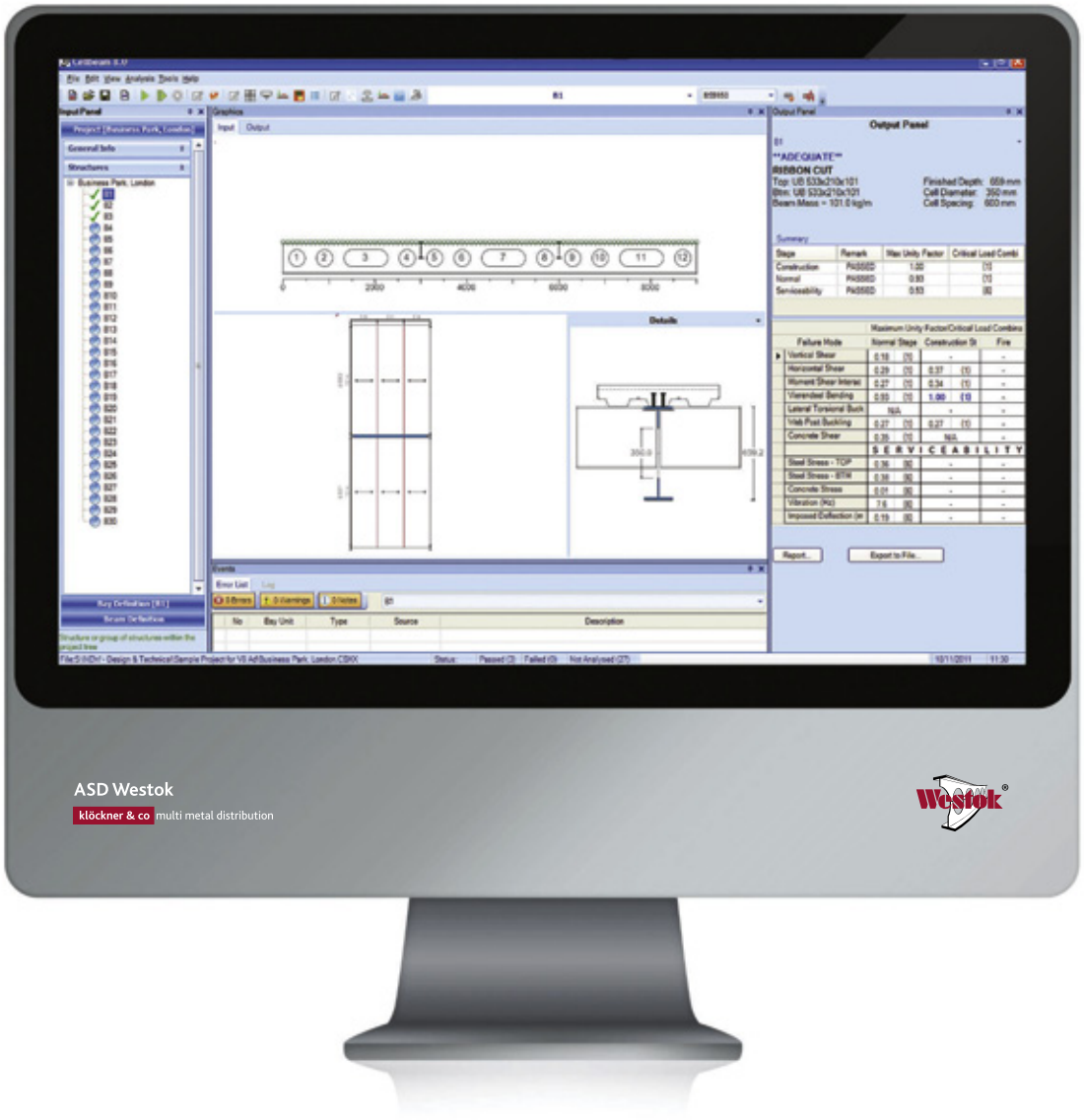
**ISO 12633-2:2011**
Hot-finished structural hollow sections of non-alloy and fine grain steels. Dimensions and sectional properties
*Will not be implemented as a British Standard*

ASD Westok

klöckner & co multi metal distribution

# New Cellbeam®V8

Working in conjunction with the SCI, ASD Westok have now developed **Cellbeam®V8,** BS5950 and EuroCode, the software for cellular beam design.




**Cellbeam®V8 includes EuroCode and is now furnished with numerous upgrades and enhanced functionality. Below are just some of the benefits that can be found in our new software.**

- Design to BS5950-1 & BS5950-3.1A1 or to the Eurocodes (UK and Ireland)
- A large number of structural configurations, including floor and roof beams, internal and edge beams, cantilevers, prismatic, curved and tapered sections
- Project-based design featuring multiple cellular beams within a single project
- A simple, intuitive and logical user interface
- Comprehensive loading configurations including uniformly distributed loads, point loads, wind loads and drifted snow
- Comprehensive 'How to...' guidance
- Detailed technical advice and background information
- Import/Export functions with Fastrack and RAM
- Software written and maintained by the SCI
- Multiple beam analysis

For more details, to get your CD or to talk to our structural advisory engineers please call:

**0113 205 5270** or email **info@asdwestok.co.uk**

**www.asdwestok.com**

# Steelwork contractors for buildings

BCSA is the national organisation for the steel construction industry.
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
- **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 | SCM | Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A C Bacon Engineering Ltd | 01953 850611 | | | ● | ● | | ● | | | | | | | | | | | Up to £2,000,000 |
| ACL Structures Ltd | 01258 456051 | | | ● | ● | ● | ● | | | | ● | | | | ● | | ● | Up to £2,000,000 |
| Adey Steel Ltd | 01509 556677 | | | | ● | ● | ● | ● | | ● | ● | | | ● | ● | | ● | Up to £4,000,000 |
| Adstone Construction Ltd | 01905 794561 | | | ● | ● | ● | | | | | | | | | | | | Up to £1,400,000 |
| Advanced Fabrications Poyle Ltd | 01753 531116 | | | | ● | | ● | ● | ● | ● | ● | | | | ● | ✓ | | Up to £400,000 |
| Alex Morton Contracts Ltd | 028 9269 2436 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | | | Up to £400,000 |
| Angle Ring Company Ltd | 0121 557 7241 | | | | | | | | | | | | ● | | | | | Up to £1,400,000 |
| Apex Steel Structures Ltd | 01268 660828 | | | | ● | | ● | | | ● | ● | | | | | | | Up to £800,000 |
| Arromax Structures Ltd | 01623 747466 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | Up to £800,000 |
| ASA Steel Structures Ltd | 01782 566366 | | | ● | ● | ● | ● | | | ● | ● | | | ● | ● | | | Up to £800,000* |
| ASD Westok Ltd | 0113 205 5270 | | | | | | | | | | | | ● | | | ✓ | | Up to £6,000,000 |
| ASME Engineering Ltd | 020 8966 7150 | | | | ● | | | | | ● | ● | | | ● | ● | ✓ | | Up to £1,400,000* |
| Atlas Ward Structures Ltd | 01944 710421 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✓ | ● | Above £6,000,000 |
| Atlasco Constructional Engineers Ltd | 01782 564711 | | | ● | ● | ● | ● | | | | | | | ● | | | | Up to £2,000,000 |
| Austin-Divall Fabrications Ltd | 01903 721950 | | | ● | ● | | ● | ● | | ● | ● | | | ● | ● | | | Up to £200,000 |
| B&B Group Ltd | 01942 676770 | | | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | | ✓ | | Up to £1,400,000 |
| B D Structures Ltd | 01942 817770 | | | ● | ● | ● | ● | | | | ● | ● | | ● | | | | Up to £800,000 |
| Ballykine Structural Engineers Ltd | 028 9756 2560 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✓ | | Up to £1,400,000 |
| Barnshaw Section Benders Ltd | 01902 880848 | | | | | | | | | | | | ● | | | ✓ | | Up to £800,000 |
| BHC Ltd | 01555 840006 | ● | ● | ● | ● | ● | ● | | | | | | | ● | | | | Above £6,000,000 |
| Billington Structures Ltd | 01226 340666 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✓ | ● | Above £6,000,000 |
| Border Steelwork Structures Ltd | 01228 548744 | | | ● | ● | ● | ● | | | ● | ● | | | | ● | | | Up to £3,000,000 |
| Bourne Construction Engineering Ltd | 01202 746666 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ✓ | ● | Above £6,000,000 |
| Briton Fabricators Ltd | 0115 963 2901 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✓ | | Up to £3,000,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | | | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ✓ | ● | Up to £2,000,000 |
| Caunton Engineering Ltd | 01773 531111 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✓ | ● | Up to £6,000,000 |
| Cleveland Bridge UK Ltd | 01325 502277 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✓ | ● | Above £6,000,000 |
| CMF Ltd | 020 8844 0940 | | | | ● | | ● | ● | | ● | ● | | | | ● | | | Up to £6,000,000 |
| Cordell Group Ltd | 01642 452406 | ● | | | ● | ● | ● | ● | ● | ● | ● | | | | | ✓ | | Up to £3,000,000 |
| Coventry Construction Ltd | 024 7646 4484 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | | | Up to £800,000 |
| D H Structures Ltd | 01785 246269 | | | | ● | | ● | | | | ● | | | ● | | | | Up to £40,000 |
| Discain Project Services Ltd | 01604 787276 | | | | ● | | | | | ● | ● | | | | ● | ✓ | | Up to £800,000 |
| Duggan Steel Ltd | 00 353 29 70072 | | ● | ● | ● | ● | ● | ● | | | ● | | | | | ✓ | | Up to £6,000,000 |
| Elland Steel Structures Ltd | 01422 380262 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✓ | ● | Up to £6,000,000 |
| EvadX Ltd | 01745 336413 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ✓ | ● | Up to £3,000,000 |
| Fisher Engineering Ltd | 028 6638 8521 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ✓ | ● | Above £6,000,000 |
| Fox Bros Engineering Ltd | 00 353 53 942 1677 | | | ● | ● | ● | ● | ● | | | ● | | | | | | | Up to £3,000,000 |
| Gorge Fabrications Ltd | 0121 522 5770 | | | | ● | ● | ● | ● | | ● | | | | ● | | | | Up to £800,000 |
| Graham Wood Structural Ltd | 01903 755991 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | ● | Up to £6,000,000 |
| Grays Engineering (Contracts) Ltd | 01375 372411 | | | | ● | | | ● | | ● | ● | | | | ● | | | Up to £100,000 |
| Gregg & Patterson (Engineers) Ltd | 028 9061 8131 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✓ | | Up to £3,000,000 |
| H Young Structures Ltd | 01953 601881 | | | ● | ● | ● | ● | ● | | | ● | | | | | | ● | Up to £2,000,000 |
| Had Fab Ltd | 01875 611711 | | | | ● | | | | ● | ● | ● | | | | ● | ✓ | | Up to £2,000,000 |
| Hambleton Steel Ltd | 01748 810598 | | ● | ● | ● | ● | ● | ● | | | | ● | | ● | | ✓ | ● | Up to £6,000,000 |
| Harry Marsh (Engineers) Ltd | 0191 510 9797 | | | ● | ● | ● | ● | | | | ● | ● | | | | ✓ | | Up to £2,000,000 |
| Henry Smith (Constructional Engineers) Ltd | 01606 592121 | | | ● | ● | ● | ● | ● | | | | | | | | | | Up to £3,000,000 |
| Hescott Engineering Company Ltd | 01324 556610 | | | ● | ● | ● | ● | | | ● | | | | ● | ● | | | Up to £3,000,000 |
| Hillcrest Fabrications Ltd | 01283 212720 | | | | ● | | | ● | | | | | | | ● | | | Up to £400,000 |
| Hills of Shoeburyness Ltd | 01702 296321 | | | | | | | | | ● | ● | | | | ● | | | Up to £1,400,000 |
| **Company name** | **Tel** | **C** | **D** | **E** | **F** | **G** | **H** | **J** | **K** | **L** | **M** | **N** | **Q** | **R** | **S** | **QM** | **SCM** | **Contract Value (1)** |

| Company name | Tel | C | D | E | F | G | H | J | K | L | M | N | Q | R | S | QM | SCM | Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J Robertson & Co Ltd | 01255 672855 | | | | | | | | | ● | ● | | | | ● | | | Up to £200,000 |
| James Killelea & Co Ltd | 01706 229411 | | ● | ● | ● | ● | ● | | | | | ● | | ● | | | | Up to £6,000,000* |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✓ | ● | Up to £4,000,000 |
| Leach Structural Steelwork Ltd | 01995 640133 | | | ● | ● | ● | ● | ● | | | ● | | | | | | ● | Up to £1,400,000 |
| M Hasson & Sons Ltd | 028 2957 1281 | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | ✓ | | Up to £3,000,000 |
| M&S Engineering Ltd | 01461 40111 | | | | ● | | | | ● | ● | ● | | | ● | ● | | | Up to £1,400,000 |
| Mabey Bridge Ltd | 01291 623801 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ✓ | ● | Above £6,000,000 |
| Mackay Steelwork & Cladding Ltd | 01862 843910 | | | ● | ● | | ● | | | ● | ● | | | ● | ● | ✓ | | Up to £800,000 |
| Maldon Marine Ltd | 01621 859000 | | | | ● | | | ● | ● | ● | | | | | ● | | | Up to £1,400,000 |
| Mifflin Construction Ltd | 01568 613311 | | ● | ● | ● | ● | ● | | | | ● | | | | | | | Up to £3,000,000 |
| Newbridge Engineering Ltd | 01429 866722 | | | ● | ● | ● | ● | | | | | | | | ● | ✓ | | Up to £1,400,000 |
| Nusteel Structures Ltd | 01303 268112 | | | | | | ● | ● | ● | ● | | | | | | ✓ | | Up to £4,000,000 |
| On Site Services (Gravesend) Ltd | 01474 321552 | | | | ● | | ● | ● | | ● | ● | | | | ● | | | Up to £200,000 |
| Overdale Construction Services Ltd | 01656 729229 | | | ● | ● | | ● | ● | | | ● | | | | ● | | | Up to £400,000 |
| Paddy Wall & Sons | 00 353 51 420 515 | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | Up to £6,000,000 |
| Painter Brothers Ltd | 01432 374400 | | | | | | | | ● | | ● | | | | ● | ✓ | ● | Up to £6,000,000 |
| Pencro Structural Engineering Ltd | 028 9335 2886 | | | ● | ● | | ● | ● | | | ● | | | | ● | ✓ | | Up to £2,000,000 |
| Peter Marshall Steel Stairs Ltd | 0113 307 6730 | | | | | | | | | ● | | | | | ● | | | Above £6,000,000* |
| PMS Fabrications Ltd | 01228 599090 | | | ● | ● | ● | ● | | ● | ● | ● | | | ● | ● | | | Up to £1,400,000 |
| REIDsteel | 01202 483333 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | | Up to £6,000,000 |
| Rippin Ltd | 01383 518610 | | | ● | ● | ● | ● | ● | | | | | | | | | | Up to £1,400,000 |
| Rowecord Engineering Ltd | 01633 250511 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | ● | Above £6,000,000 |
| Rowen Structures Ltd | 01773 860086 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | | Above £6,000,000* |
| S H Structures Ltd | 01977 681931 | | | | | | ● | ● | ● | ● | | | | | | ✓ | ● | Up to £3,000,000 |
| Severfield-Reeve Structures Ltd | 01845 577896 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | ● | Above £6,000,000 |
| Shipley Fabrications Ltd | 01400 231115 | | | ● | ● | ● | ● | | ● | ● | ● | | | | ● | | | Up to £200,000 |
| SIAC Butlers Steel Ltd | 00 353 57 862 3305 | | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | | | ✓ | ● | Above £6,000,000 |
| SIAC Tetbury Steel Ltd | 01666 502792 | | | ● | ● | ● | ● | | | | ● | ● | | | | ✓ | ● | Up to £3,000,000 |
| Snashall Steel Fabrications Co Ltd | 01300 345588 | | | ● | ● | | ● | | | | | | | | ● | | | Up to £1,400,000 |
| South Durham Structures Ltd | 01388 777350 | | | ● | ● | ● | | | | ● | ● | ● | | | ● | | | Up to £1,400,000 |
| Temple Mill Fabrications Ltd | 01623 741720 | | | ● | ● | ● | ● | | | | ● | ● | | | ● | | | Up to £200,000 |
| The AA Group Ltd | 01695 50123 | | | ● | ● | ● | ● | | | ● | ● | ● | | ● | ● | | ● | Up to £4,000,000 |
| Traditional Structures Ltd | 01922 414172 | | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | ● | | ✓ | ● | Up to £2,000,000 |
| Tubecon | 01226 345261 | | | | | | ● | ● | ● | ● | | | | ● | ● | ✓ | | Above £6,000,000* |
| W & H Steel & Roofing Systems Ltd | 00 353 56 444 1855 | | | ● | ● | ● | ● | ● | | | | | | ● | ● | | | Up to £4,000,000 |
| W I G Engineering Ltd | 01869 320515 | | | | ● | | | | | ● | | | | | ● | | | Up to £200,000 |
| Walter Watson Ltd | 028 4377 8711 | | | ● | ● | ● | ● | ● | | | | ● | | | | ✓ | | Up to £6,000,000 |
| Watson Steel Structures Ltd | 01204 699999 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ✓ | ● | Above £6,000,000 |
| Westbury Park Engineering Ltd | 01373 825500 | ● | | | ● | | ● | ● | ● | ● | ● | | | | ● | ✓ | | Up to £800,000 |
| William Haley Engineering Ltd | 01278 760591 | | | ● | ● | ● | | | ● | ● | ● | | | | | ✓ | ● | Up to £2,000,000 |
| William Hare Ltd | 0161 609 0000 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ✓ | ● | Above £6,000,000 |
| **Company name** | **Tel** | **C** | **D** | **E** | **F** | **G** | **H** | **J** | **K** | **L** | **M** | **N** | **Q** | **R** | **S** | **QM** | **SCM** | **Contract Value (1)** |

# 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 |
|---|---|
| Balfour Beatty Utility Solutions Ltd | 01332 661491 |
| Griffiths & Armour | 0151 236 5656 |
| Highways Agency | 08457 504030 |

| Company name | Tel |
|---|---|
| Roger Pope Associates | 01752 263636 |
| Sandberg LLP | 020 7565 7000 |
| SUM Ltd | 0113 242 7390 |

# Associate Members

Associate Members are those principal companies involved in the direct supply to all or some Members of components, materials or products. Associate 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
**SCM** Steel Construction Sustainability Charter
● = Gold, ● = Silver, ● = Member

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AceCad Software Ltd | 01332 545800 | | ● | | | | | | | | |
| Albion Sections Ltd | 0121 553 1877 | ● | | | | | | | | | |
| Andrews Fasteners Ltd | 0113 246 9992 | | | | | | | | | ● | |
| ArcelorMittal Distribution – Birkenhead | 0151 647 4221 | | | | | | | | ● | | |
| ArcelorMittal Distribution – Bristol | 01454 311442 | | | | | | | | ● | | |
| ArcelorMittal Distribution – South Wales | 01633 627890 | | | | | | | | ● | | |
| ArcelorMittal Distribution – Scunthorpe | 01724 810810 | | | | | | | | ● | | |
| Arro-Cad Ltd | 01283 558206 | | | ● | | | | | | | |
| ASD Interpipe UK Ltd | 0845 226 7007 | | | | | | | | ● | | |
| ASD metal services - Biddulph | 01782 515152 | | | | | | | | ● | | |
| ASD metal services - Bodmin | 01208 77066 | | | | | | | | ● | | |
| ASD metal services - Cardiff | 029 2046 0622 | | | | | | | | ● | | |
| ASD metal services - Carlisle | 01228 674766 | | | | | | | | ● | | |
| ASD metal services - Daventry | 01327 876021 | | | | | | | | ● | | |
| ASD metal services - Durham | 0191 492 2322 | | | | | | | | ● | | |
| ASD metal services - Edinburgh | 0131 459 3200 | | | | | | | | ● | | |

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ASD metal services - Exeter | 01395 233366 | | | | | | | | ● | | |
| ASD metal services - Grimsby | 01472 353851 | | | | | | | | ● | | |
| ASD metal services - Hull | 01482 633360 | | | | | | | | ● | | |
| ASD metal services - London | 020 7476 0444 | | | | | | | | ● | | |
| ASD metal services - Norfolk | 01553 761431 | | | | | | | | ● | | |
| ASD metal services - Stalbridge | 01963 362646 | | | | | | | | ● | | |
| ASD metal services - Tividale | 0121 520 1231 | | | | | | | | ● | | |
| Austin Trumanns Steel Ltd | 0161 866 0266 | | | | | | | | ● | | |
| Ayrshire Metal Products (Daventry) Ltd | 01327 300990 | ● | | | | | | | | | |
| BAPP Group Ltd | 01226 383824 | | | | | | | | | ● | |
| Barnshaw Plate Bending Centre Ltd | 0161 320 9696 | ● | | | | | | | | | |
| Barrett Steel Ltd | 01274 682281 | | | | | | | | ● | | |
| BW Industries Ltd | 01262 400088 | ● | | | | | | | | | |
| Cellbeam Ltd | 01937 840600 | ● | | | | | | | | | |
| Cellshield Ltd | 01937 840600 | | | | | | | ● | | | |
| CMC (UK) Ltd | 029 2089 5260 | | | | | | | ● | | | |

# Steelwork contractors for bridgework

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
**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 | NHSS 19A | NHSS 20 | SCM | Contract Value (1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B&B Bridges Ltd | 01942 676770 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | | Up to £1,400,000 |
| Briton Fabricators Ltd | 0115 963 2901 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | | Up to £3,000,000 |
| Cairnhill Structures Ltd | 01236 449393 | ● | ● | ● | ● | | | ● | ● | ✓ | | | ● | Up to £2,000,000 |
| Cleveland Bridge UK Ltd | 01325 502277 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | ✓ | | ● | Above £6,000,000 |
| Four-Tees Engineers Ltd | 01489 885899 | ● | ● | ● | ● | | ● | ● | ● | ✓ | | | ● | Up to £2,000,000 |
| Kiernan Structural Steel Ltd | 00 353 43 334 1445 | ● | ● | ● | ● | | | ● | ● | ✓ | | | ● | Up to £800,000 |
| Mabey Bridge Ltd | 01291 623801 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | ✓ | ✓ | ● | Above £6,000,000 |
| Nusteel Structures Ltd | 01303 268112 | ● | ● | ● | ● | ● | | ● | ● | ✓ | ✓ | ✓ | | Up to £4,000,000 |
| Painter Brothers Ltd | 01432 374400 | ● | | ● | | | | | ● | ✓ | | | ● | Up to £6.000,000 |
| Rowecord Engineering Ltd | 01633 250511 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | ✓ | ✓ | ● | Above £6,000,000 |
| S H Structures Ltd | 01977 681931 | ● | | ● | ● | ● | | | ● | ✓ | | | ● | Up to £3,000,000 |
| SIAC Butlers Steel Ltd | 00 353 57 862 3305 | ● | ● | ● | ● | ● | | ● | ● | ✓ | | | ● | Above £6,000,000 |
| TEMA Engineering Ltd | 029 2034 4556 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | | Up to £1,400,000* |
| Varley & Gulliver Ltd | 0121 773 2441 | ● | | | | | | ● | ● | ✓ | | ✓ | | Up to £4,000,000 |
| Watson Steel Structures Ltd | 01204 699999 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | ● | Above £6,000,000 |
| **Non-BCSA member** | | | | | | | | | | | | | | |
| ABC Bridges Ltd | 0845 0603222 | ● | | | | | | | | ✓ | | | | Up to £100,000 |
| A G Brown Ltd | 01592 630003 | ● | | | | | | ● | ● | ✓ | | | | Up to £400,000 |
| Allerton Steel Ltd | 01609 774471 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | | Up to £1,400,000 |
| Cimolai Spa | 01223 350876 | ● | ● | ● | ● | ● | ● | | | ✓ | | | | Above £6,000,000 |
| Concrete & Timber Services Ltd | 01484 606416 | ● | ● | ● | | ● | ● | | ● | ✓ | | | ● | Up to £800,000 |
| Donyal Engineering Ltd | 01207 270909 | ● | | | | | | ● | ● | ✓ | ✓ | ✓ | ● | Up to £1,400,000 |
| Francis & Lewis International Ltd | 01452 722200 | | | | | | | ● | ● | ✓ | | | ● | Up to £2,000,000 |
| Harland & Wolff Heavy Industries Ltd | 028 9045 8456 | ● | ● | ● | ● | ● | | ● | ● | ✓ | | | | Up to £2,000,000 |
| Hollandia BV | 00 31 180 540540 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | | Above £6,000,000 |
| Interserve Project Services Ltd | 0121 344 4888 | | | | | | | ● | ● | ✓ | | | | Above £6,000,000 |
| Interserve Project Services Ltd | 020 8311 5500 | ● | ● | ● | ● | | ● | ● | ● | ✓ | | | | Up to £800,000* |
| Millar Callaghan Engineering Services Ltd | 01294 217711 | ● | | | | | | ● | | ✓ | | | | Up to £800,000 |
| P C Richardson & Co (Middlesbrough) Ltd | 01642 714791 | ● | | | | | | ● | ● | ✓ | | | | Up to £3,000,000* |
| The Lanarkshire Welding Company Ltd | 01698 264271 | ● | ● | ● | ● | ● | ● | ● | ● | ✓ | | | ● | Up to £2,000,000 |

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Composite Profiles UK Ltd | 01202 659237 | ● | | | | | | | | | |
| Computer Services Consultants (UK) Ltd | 0113 239 3000 | | ● | | | | | | | | |
| Cooper & Turner Ltd | 0114 256 0057 | | | | | | | | ● | | |
| Cutmaster Machines UK Ltd | 01226 707865 | | | | | ● | | | | | |
| Daver Steels Ltd | 0114 261 1999 | ● | | | | | | | | | |
| Development Design Detailing Services Ltd | 01204 396606 | | | ● | | | | | | | |
| Easi-edge Ltd | 01777 870901 | | | | | | | ● | | | ● |
| Fabsec Ltd | 0845 094 2530 | ● | | | | | | | | | |
| FabTrol Systems UK Ltd | 01274 590865 | | ● | | | | | | | | |
| Ficep (UK) Ltd | 01924 223530 | | | | | ● | | | | | |
| FLI Structures | 01452 722200 | ● | | | | | | | | | ● |
| Forward Protective Coatings Ltd | 01623 748323 | | | | | | ● | | | | |
| Hadley Rolled Products Ltd | 0121 555 1342 | ● | | | | | | | | | ● |
| Hempel UK Ltd | 01633 874024 | | | | | | ● | | | | |
| Hi-Span Ltd | 01953 603081 | ● | | | | | | | | | ● |
| Highland Metals Ltd | 01343 548855 | | | | | | ● | | | | |
| Hilti (GB) Ltd | 0800 886100 | | | | | | | | ● | | |
| International Paint Ltd | 0191 469 6111 | | | | | | ● | | | | ● |
| Jack Tighe Ltd | 01302 880360 | | | | | | ● | | | | |
| Jamestown Cladding and Profiling | 00 353 45 434288 | ● | | | | | | | | | |
| Jotun Paints (Europe) Ltd | 01724 400000 | | | | | | ● | | | | |
| Kaltenbach Ltd | 01234 213201 | | | | | ● | | | | | |
| Kingspan Structural Products | 01944 712000 | ● | | | | | | | | | ● |
| Leighs Paints | 01204 521771 | | | | | | ● | | | | ● |

| Company name | Tel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lindapter International | 01274 521444 | | | | | | | | | ● | |
| Metsec plc | 0121 601 6000 | ● | | | | | | | | | ● |
| MSW | 0115 946 2316 | ● | | | | | | | | | |
| National Tube Stockholders Ltd | 01845 577440 | | | | | | | | ● | | |
| Northern Steel Decking Ltd | 01909 550054 | ● | | | | | | | | | |
| Panels & Profiles | 0845 308 8330 | ● | | | | | | | | | |
| John Parker & Sons Ltd | 01227 783200 | | | | | | | | ● | ● | |
| Peddinghaus Corporation UK Ltd | 01952 200377 | | | | | ● | | | | | |
| Peddinghaus Corporation UK Ltd | 00 353 87 2577 884 | | | | | ● | | | | | |
| PPG Performance Coatings UK Ltd | 01773 814520 | | | | | | ● | | | | |
| Prodeck-Fixing Ltd | 01278 780586 | ● | | | | | | | | | |
| Rainham Steel Co Ltd | 01708 522311 | | | | | | | | ● | | |
| Richard Lees Steel Decking Ltd | 01335 300999 | ● | | | | | | | | | ● |
| Structural Metal Decks Ltd | 01202 718898 | ● | | | | | | | | | ● |
| Studwelders Composite Floor Decks Ltd | 01291 626048 | ● | | | | | | | | | |
| Tata Steel | 01724 404040 | | | | ● | | | | | | |
| Tata Steel Distribution (UK & Ireland) | 01902 484100 | | | | | | | | ● | | |
| Tata Steel Service Centres Ireland | 028 9266 0747 | | | | | | | | ● | | |
| Tata Steel Service Centre Dublin | 00 353 1 405 0300 | | | | | | | | ● | | |
| Tata Steel Tubes | 01536 402121 | | | | ● | | | | | | |
| Tekla (UK) Ltd | 0113 307 1200 | | ● | | | | | | | | |
| Tension Control Bolts Ltd | 01948 667700 | | | | | | ● | | | ● | |
| Wedge Group Galvanizing Ltd | 01909 486384 | | | | | | ● | | | | |

StruM.I.S® evolution

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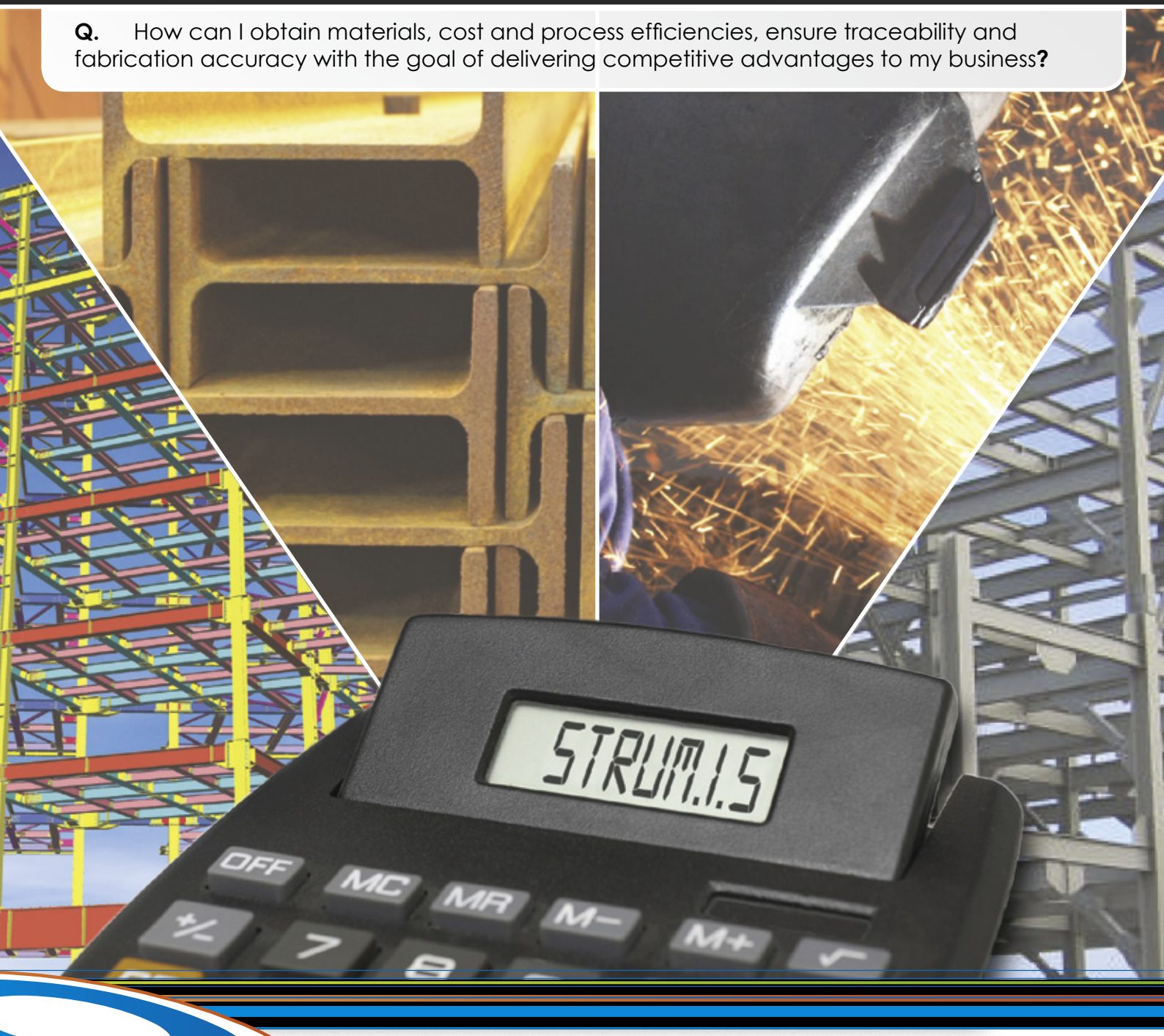


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