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NSC

Final M74 link

Vol 19 No. 2 February 2011

New Terminal rises at Heathrow

New venue boosts Bluewater

Newbury's biggest development

Making history in Maidstone

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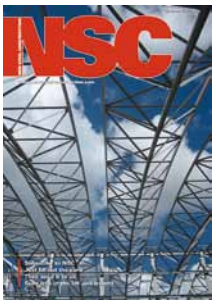
New Steel Construction keeps designers and contractors abreast of all major steel construction related developments and provides detailed technical information on key issues such as the introduction of the Eurocodes. NSC will be the first place most people hear about advances made by the extensive research 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'.

A recent development has been the introduction of Steel Industry Guidance Notes, SIGNS, with each issue of NSC, a loose leaf insert series aimed at students and designers new to steel construction. SIGNS provide essential introductory explanations of basic steel related design topics and point the way towards where more detailed, free, support can be accessed in the steel sector.

NSC is available free of charge each month to subscribers living in the UK or Ireland by simply filling in the reply paid card bound into this issue, or by contacting us by email, post or fax as described on the card.



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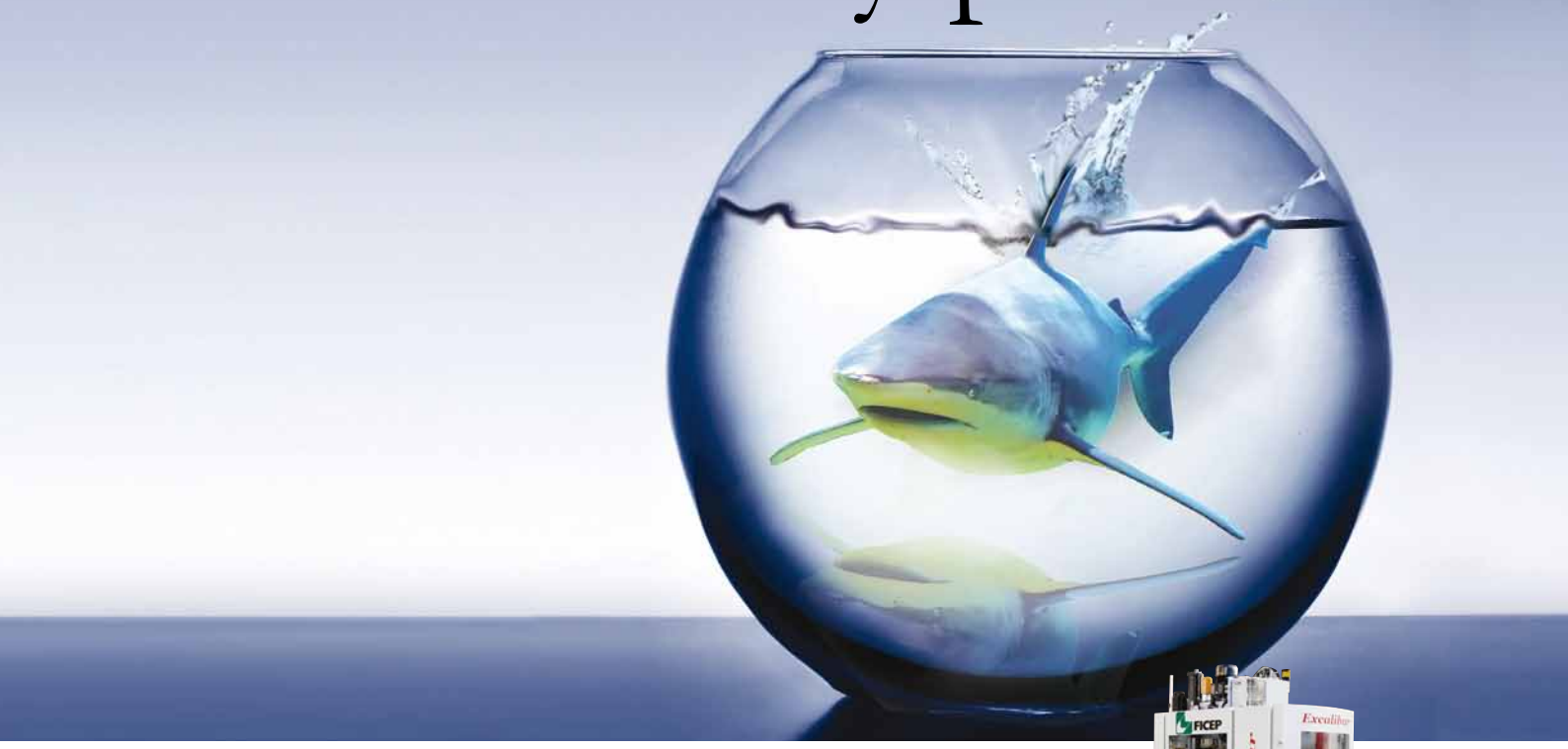
Cover Image
Heathrow Terminal 2
Main Client: BAA
Architect: Foster & Partners
Steelwork contractor:
Watson Steel Structures
Steel tonnage: 26,500t

February 2011 Vol 19 No 2

These and other steelwork articles can be downloaded from the New Steel Construction Website at *www.new-steel-construction.com*

Much smaller yet still incredibly powerful



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THE COMPLETE SOLUTION FOR FABRICATION AND STEEL CONSTRUCTION

Most sustainable stadium

Nick Barrett - Editor

The Olympic Park Legacy Company was meeting to decide on which of two competing bids to accept for the future of the centrepiece London Olympic stadium as NSC went to press. Few other structures can have generated so much controversy over what is to happen after its initial use is finished, even before its construction phase is over.

The stadium's architects, Populous, faced a tough challenge with a brief that called for a structure designed for a specific sporting event that was to be both temporary and permanent. It needed high sustainability credentials, which brought steel to the fore. The stadium might turn out to be a bit more temporary than originally envisaged; but this will allow steel to show some of its other advantages.

One of the competing bids involves demolition of the structure and reconstruction of a new stadium designed for permanent use as a football stadium, which would be quite different from the as yet to be completed stadium. The other involves reconfiguration of the structure. Which you personally prefer, if any, possibly comes down to which of two London football teams you support.

Both options, and others, are made feasible by the fact that the stadium is substantially made from structural steel and has demountability designed in. So it can, for example, easily be changed from 80,000 seats to 25,000 and the seats re-used elsewhere. The roof that covers some two thirds of the seats can be easily removed.

This was always part of the overall concept for the stadium, to prevent any 'white elephant' legacy. Being made in steel also means that it can be easily adapted for changing use in ways perhaps not originally considered. Or, if complete demolition is decided on, the process will be much easier than if reinforced concrete had been used more extensively, and the process will generate no waste from steel. It can all be either reused somewhere else or in the new stadium, or will be fed back into the steel production process where it will also perhaps be used in a new stadium.

As ODA project sponsor Ian Crockford explained in NSC last year, the stadium is not only the most sustainable ever built, it is also the most flexible. It is also the lightest, using 10,000t of structural steel as opposed to 40,000t in Bejing's Birds Nest Stadium.

Whatever the stadium's future turns out to be, its construction is turning out to be a major showcase for the sustainable, constructional use of steel; and its legacy use will show either how easily flexible steel structures can be adapted for changing uses, or how easily they can be removed to make way for another structure.

Steel looks like an Olympic winner before it even gets out of the starting blocks.

NSC

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CE Marking has arrived for structural steelwork

From 1 January this year CE Marking of fabricated structural steelwork, in accordance with BS EN 1090-1, came into force in the UK and the Republic of Ireland.

CE Marking has now entered an 18 month co-existence period when either it or national provisions can be used.

The steel construction sector already has the capability to provide CE Marked solutions for clients who need them, but the period of co-existence will allow steelwork contractors and other manufacturers of steelwork components to put into place the necessary certified Factory Production Control (FPC) and Welding Quality Management systems to comply with BS EN 1090-1, as well as to complete any non CE Marking contracts.

Steelwork contractors need to have their FPC systems assessed by a Notified Body, which is similar to a certification body. This can now be done by The Steel Construction Certification Scheme (SCCS) which has recently gained Notified Body status.

The Construction Products Directive (CPD) is being amended and one of the changes is to replace the CPD with the Construction Products Regulations (CPR). The main difference between a directive and a regulation is that a regulation is mandatory in all member states.

On 18th January the European Parliament voted in favour of the text for the Construction Products Regulations (CPR). This paves the way for the Regulations to be adopted in the spring 2011 and to become law in mid 2013.

This change will make CE Marking of construction products (including steel sections, structural bolts and fabricated steelwork) mandatory in all member states including the UK and the RoI after mid 2013.

Major distribution centre signals rail freight expansion

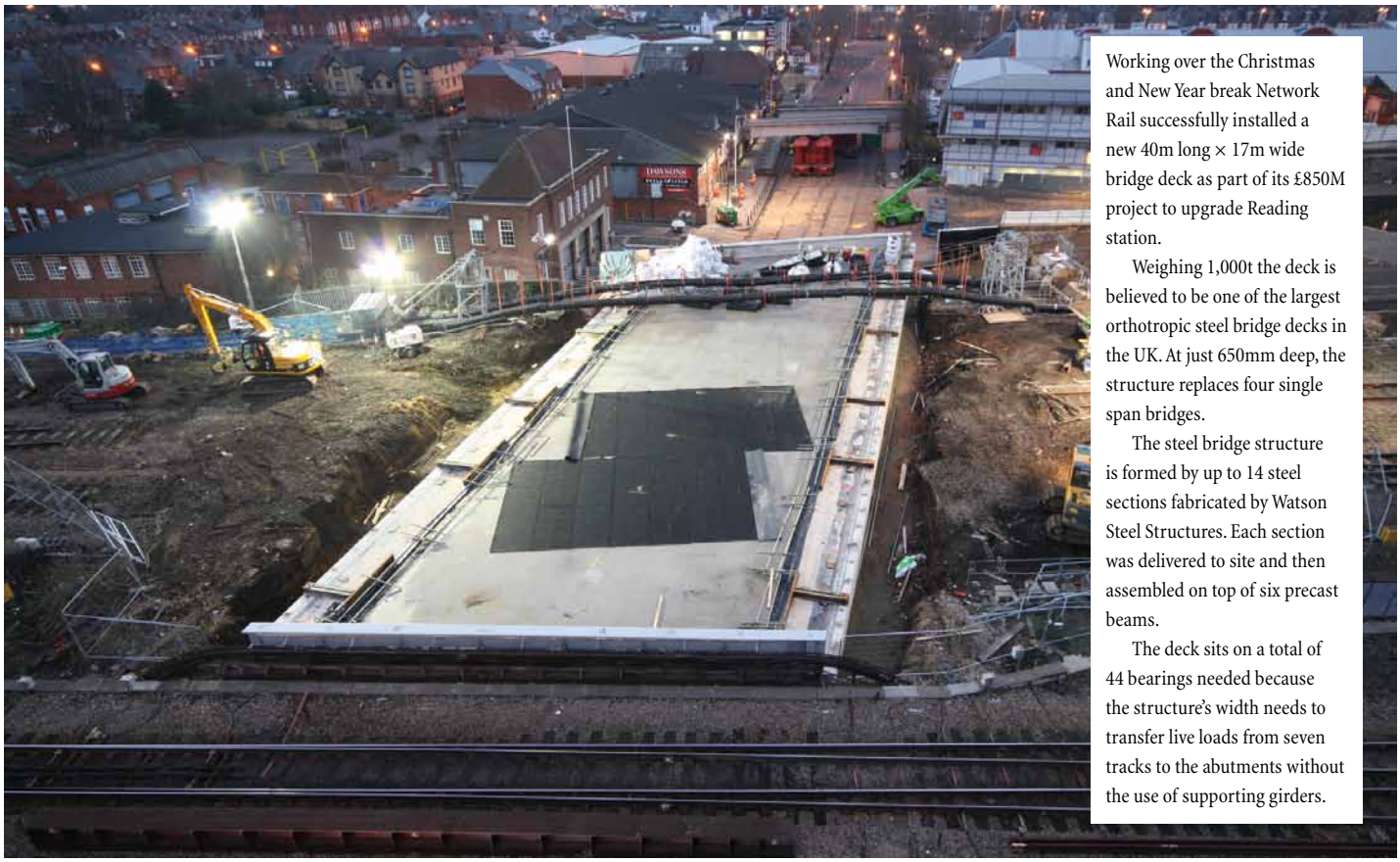
Steelwork erection is progressing on the latest distribution centre within the extended Daventry International Rail Freight Terminal (DIRFT II).

More than 2,500t of structural steelwork is being supplied and erected by Caunton Engineering, working on behalf of main contractor VolkerFitzpatrick.

The distribution centre measures 400m long × 200m wide, which equates to 51 bays and six spans. The structure also features 3,700m^2 of mezzanine floor along one elevation, which is supported externally by the portal frame columns and internally by columns spaced around a 16m × 16m grid.

Caunton's steelwork package also includes the erection of an adjacent three-storey 778 space car park.

Bridge slide completed at Reading station



Working over the Christmas and New Year break Network Rail successfully installed a new 40m long × 17m wide bridge deck as part of its £850M project to upgrade Reading station.

Weighing 1,000t the deck is believed to be one of the largest orthotropic steel bridge decks in the UK. At just 650mm deep, the structure replaces four single span bridges.

The steel bridge structure is formed by up to 14 steel sections fabricated by Watson Steel Structures. Each section was delivered to site and then assembled on top of six precast beams.

The deck sits on a total of 44 bearings needed because the structure's width needs to transfer live loads from seven tracks to the abutments without the use of supporting girders.

Tata Steel to sponsor green village at Ecobuild

Photo © Lynn Hilton (lynn @lynnhilton.com), courtesy of UK-GBC

This year's Ecobuild event, taking place at London's ExCel centre from March 1-3, will see Tata Steel sponsor the UK Green Building Council Village.

The exhibition is the world's biggest event for sustainable design, construction and the built environment. Ecobuild offers an unrivalled showcase of sustainable construction products and visitors will be able to get practical advice from real life experiences at over 100 seminars.

Paul King CEO of the UK Green Building Council said: "We are delighted that Tata Steel is a partner of the UK-GBC at Ecobuild, which further reinforces the company's commitment to our shared vision of creating a sustainable built environment in the UK and internationally."

Visit Tata Steel at UK Green Building Council Village (Stand N731) to find out how the ability to reuse and recycle steel makes it inherently sustainable and how the company continues to invest to make its products even more sustainable.

Tata Steel experts will be at the UK-GBC Village to introduce visitors to a number of sustainable steel products, for example the world's first zero carbon building envelope system Confidex Sustain®.

"Tata Steel is looking forward to working with the UK-GBC at the premier sustainability event of the year", said Alan Todd, General Manager Tata Steel Construction.

"The steel construction sector has invested heavily in sustainability related research such as Target Zero and Ecobuild provides a great opportunity to share the results with a wide audience."

To find out more about the Target Zero project visit *www.targetzero.info*, or to register your attendance at Ecobuild visit *www.ecobuild.co.uk*.

Safety award for steelwork contractor

Elland Steel Structures has been awarded a 'Highly Commended Certificate' in recognition of its commitment to health and safety, environmental performance, and supporting Morgan Sindall's project missions.

Bob Thorpe Elland Steel Chief Executive commented: "This is testament to the company's dedication and commitment to continually achieve high levels of performance in relation to health and safety, sustainability and the environment.

"A Continuous Improvement Programme is employed and robustly managed to ensure a target of zero incidents and accidents is achieved".

Bob Thorpe, Elland Steel Chief Executive (Left) receives the award from Morgan Sindall Construction North Managing Director Danny Murphy

New arrival for Barrett Steel's tubes division

Barrett Steel's Tubes Division has taken delivery of a sixth tube laser machine for its LaserTUBE cutting facility.

The company said the £1M laser further enhances LaserTubes' capability and capacity to respond quickly to customers requests as well as to continue offering new and innovative solutions in the processing of structural tubes, hollow sections and open sections.

The six lasers offer processing on a range of tubes and hollow sections, while 3D laser cutting is also undertaken.

AROUND THE PRESS

Construction News
13 January 2011
Modular steel frame boost for contractors
Steel specialists using the Corefast prefabricated steel lift core system are now able to manage the entire frame building programme without handing over the vital core construction package to concrete subcontractors.

New Civil Engineer
13 January 2011
All hands on deck
(Reading Station upgrade) Contractor Bam Nuttall's project manager Mark Hepburn says that a steel deck was chosen because it cold be designed to be slim enough to clear the road below while maintaining the vertical alignment of the railway.

Construction News
13 January 2011
Mobile crane drives M-way link
Engineers in Scotland have called on the services of one of Europe's largest mobile cranes to help lift steel bridge sections into place over the River Clyde in Glasgow.

Building Magazine
7 January 2011
Winging it
(Bombardier factory) "Ordering the steel early to get the building watertight before Christmas was one of the best decisions we made because the weather turned out to be so bad," says Martin Breheny, project director for Turner & Townsend.

The Guardian
16 December 2010
World Trade Centre reaches halfway mark
Steel construction has reached the halfway point for the World Trade Center building, also known as the Freedom Tower. After years of stalled development, steel at the building reached the 52nd story, more than 200m above ground.

SCCS gains UKAS accreditation

The Steel Construction Certification Scheme (SCCS) has achieved accreditation by UKAS against BS OHSAS 18001:2007. This was achieved at the end of an 18 month period of document preparation, assessor training and audits all overseen by UKAS. The new accreditation complements the existing BS EN ISO 9001:2008 and BS EN ISO 14001:2004.

SCCS is also accredited for National Highways Sector Schemes 19A (For corrosion protection of ferrous materials by industrial coatings) and 20 (For execution of steelwork in transportation infrastructure assets).

The SCCS was established in 1986 to meet the demand for a technically capable certification body specifically for companies engaged in design, manufacture and erection of structural steelwork and its associated products and services.

The scheme's objective is to secure high standards of excellence and quality of design, manufacturing and erection processes and associated construction procedures and practices in the steelwork construction industry through independent certification to specific standards.

Town centre revamp begins with steel

Forming part of a large town centre regeneration scheme, Rotherham Metropolitan Borough Council's new civic office building continues apace, with the steel frame now completed.

Working on behalf of main contractor GMI Construction, Billington Structures completed the steel erection late last year. With internal spans of up to 15m, the office building consists of three wings (four, five and six-storeys high) that are all connected together at a main reception and core area.

The structure, which has been constructed with locally sourced materials is set to achieve a BREEAM 'Very Good' rating, making it one of the greenest office buildings in the area.

The main client for the project is Evans Property Developments.

Steelwork providing a powerful frame

Located on the banks of the River Ouse at Newhaven, East Sussex, a new Energy Recovery Facility (ERF) is under construction.

The superstructure for this multi-million pound project comprises of an 800t structural steel frame accommodating a curved steel cladding. All steelwork for the job is being fabricated, supplied and erected by Graham Wood Structural.

Main contractor is Hochtief which is working in a consortium with Swiss process engineering company Von Roll Inova, to design and construct the facility.

When operational the ERF will take receipt of some 210,000t of municipal solid waste each year, to be incinerated in two conventional moving grate incinerators. The heat generated, harnessed in two vertical boilers, will generate steam to drive a turbine. This power will run the plant with the net surplus of approximately 16.5MW being exported to the National Grid.

Rail bridge arrives during Christmas break

A new steel composite rail bridge over the A46 Newark to Widmerpool Improvement Scheme was successfully slid into position during the recent festive break.

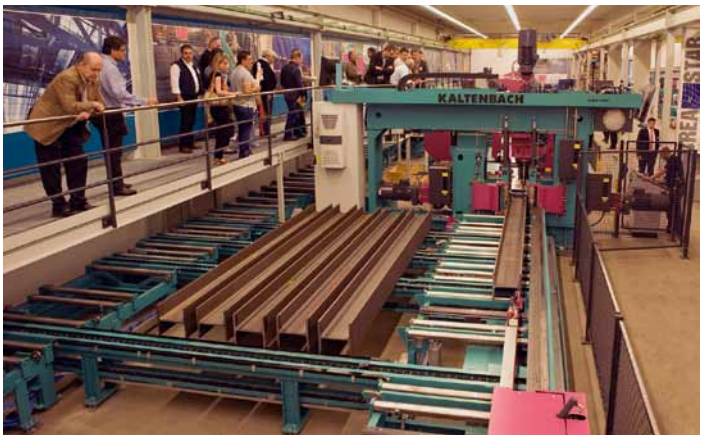
The rail line crosses the 28km road scheme at its centre point, so the operation was critical to the outcome of the entire project. During an 83 hour rail possession, beginning on Christmas Eve, an existing railway embankment was excavated, a 1,300t bridge was moved into place using two multi-wheeled hydraulic platforms and the track and signalling were replaced.

The 60m-long bridge was fabricated, supplied and erected by Mabey Bridge. Steel sections were brought to site in 20m-long lengths, and assembled - along with the cross members - on temporary trestles and bearings.

Once assembled, main contractor Balfour Beatty Civil Engineering installed the bridge's concrete deck. The entire structure was then transported the 40m from its assembly point to its final position during the rail possession.

The line was handed back three hours before the end of the allotted time.

Steel technology to be showcased



The Kaltenbach Group Headquarters, Lorrach, Southern Germany, will once again host the bi-annual IPS (International Partners-in-Steel) Event from 9-13 May.

The event is said to be the number one event of its kind in the world, for companies involved in the cutting technology, stock holding, fabricating and processing of steel, particularly for the construction sector.

This years main theme will be 'Logistic Processing Control' and the increasingly significant efficiency benefits that the latest steel processing technology and software systems bring to steel processing, especially for stockholders and steel fabricators.

Held in more than 3,000m^2 of exhibition space, with more than 40 renowned industry business partners, the event has historically attracted some 3,000 visitors from 40 countries. The 2011 event will be demonstrating some new, advanced efficiency, technology firsts in structural steel processing.

Visitors will have the opportunity to experience hands-on demonstrations and discuss with technical experts and their industry peers the latest trends and developments in steel processing.

Sustainability centre for London's Docklands

Work is now underway on the £30M Siemens Pavilion in east London, a structure which will kick-start a planned Green Enterprise District centred around the Royal Victoria Docks.

The steel framed building will comprise an exhibition and conference centre, and is set to be operational by early 2012.

Siemens plans to create an iconic building that will provide a permanent showcase for sustainable technologies and a destination for the public, customers and students to explore the innovations needed to achieve a low carbon society.

The architectural concept for the building shell, designed by Wilkinson Eyre, is based on two interlocking parallelogram forms with multiple triangular facets. Its crystalline geometry is said to draw inspiration from nature and responds to its special location contrasting with the curve of the O_2 Centre (Millennium Dome) beyond.

A palette of reflective and transparent materials on the facets, catch the light in different ways to create a dynamic composition on the waterfront. One of the crystals is a single volume containing the exhibition and the other contains offices and conference facilities on several levels.

The main contractor is ISG and it has appointed Rowecord Engineering as the project's steelwork contractor.

NEWS IN BRIEF

In order to share best practice the **BCSA** is developing a model purchase specification for steel sections and plate. This specification will include the CE Marking requirements, technical specifications for steel sections and quality management issues. It is anticipated the model specification will be announced at the BCSA's AGM in July.

Professor Roger Plank has been inaugurated as the 2011 President of the **Institution of Structural Engineers**. He is both active in research and consultancy work and held several positions as visiting professor and chaired a number of committees for the UK and European steel construction sector. He had a leading role in establishing the internationally renowned structural fire engineering research group.

SCI is continuing to work with the manufacturers of light steel construction products to assess the accuracy of published data, generate new Eurocode-compliant data and, where required, assist the manufacturer to optimise its products in terms of structural efficiency and performance.

AceCad has released in StruCad evolution a new cold rolled purlin and rail system. It has developed several new macros and a component library to facilitate the efficient and accurate detailing of these sections. Graphical User Interfaces have been provided for all of the connection macros. In developing these, AceCad said it has minimised the amount of data and parameters that the user has to change to generate all of the possible connection configurations making the macros simple and quick to use.

FICEP has supplied a Victory 11 CNC drilling line to a leading steel fabrication and welding specialist in Wiltshire. This drilling machine features a small footprint and is capable of counter sinking, tapping, pointing and remote control drilling.

SCI on the case for stainless steel

SCI, with sponsorship from Team Stainless, has produced a series of case studies showing a range of structural applications of stainless steel.

The projects include the Stonecutters Bridge in Hong Kong which opened in 2009. It is a cable stayed structure with a total length of 1,596m and a main span of 1,018m. The most striking features of the bridge are the twin tapered mono towers at each end supporting the 50m wide deck. These tapered towers rise to 295m above sea level.

In the UK, projects include the Thames Gateway Water Treatment Works, the first water desalination plant in Britain, which opened in 2010. It will treat water from the brackish waters of the River Thames, producing up to 140 million litres of clean, fresh water. Within the plant, saline river water passes through lamella clarifiers to remove solid particles. The clarifiers are large, open tanks containing a coarse filter medium that is supported by a grillage of 78 stainless steel I-beams.

Other case studies include: Cala Galdana Bridge in Menorca; Luxembourg Chamber of Commerce; Armada Platform Modules in the North Sea; and Siena Footbridge, Italy.

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Kingspan takes to the skies

A new £6M air traffic control centre at Jersey Airport has been clad with Benchmark's metallic façades and insulated panel products.

Benchmark is the architectural division of Kingspan and its products were specified as the ideal choice for this high profile project.

Local builders AC Mauger installed 850m^2 of Optimo in Spectrum Silver on the two storey main operations building. This is linked at both levels to the 39m high control tower, where 1200m^2 of Benchmark Metallic Façade ACM (Aluminium Composite Material) hook-on-cassettes in a metallic silver finish was installed to compliment the main building.

Graeme Hutchison, Assistant Director of Jersey Property Holdings Architects Section commented: "The Optimo system was selected to provide both the necessary thermal performance and the desired visual effect of a semi-matt finish to give a machine like quality. From a practical point of view rapid run off was essential to avoid unsightly staining due to the powerful effect of aviation fuel."

Laboratory specifies steel

As well as consisting of a predominantly steel framed structure, the Medical Research Council's new Laboratory of Molecular Biology in Cambridge has utilised 55t of Metsec light gauge steel C section side rails.

The Metsec product was used to take the secondary cladding on eight towers included in a £200m state-of-the-art new facility.

The striking new facility, designed by architects RMJM to support world class research and development, comprises two kinked laboratory blocks joined by a central atrium, which reflects the shape of a dividing chromosome.

Due to be completed in 2012, the unusually-shaped facility will replace an existing 50 year old building on the Cambridge Biomedical Campus. It will accommodate 440 scientists in 27,000m^2 of fully air conditioned space over three floors.

Kevin Jones, Sales Director for Metsec's Purlin Division said: "Due to the unusual shape of the towers, this job involved thousands of components and was therefore complex in terms of design. We worked with the installer, Varla UK, using our latest MetSPEC 12 design software to work out the detailing, which enabled accurate manufacture, costing and construction. The finished result will look very aesthetically pleasing, with the black clad plant towers on the roof being reminiscent of funnels on a ship and contrasting well with the glass clad building."

Main contractor for the project is BAM Construction and the steelwork contractor is Fisher Engineering.

Diary

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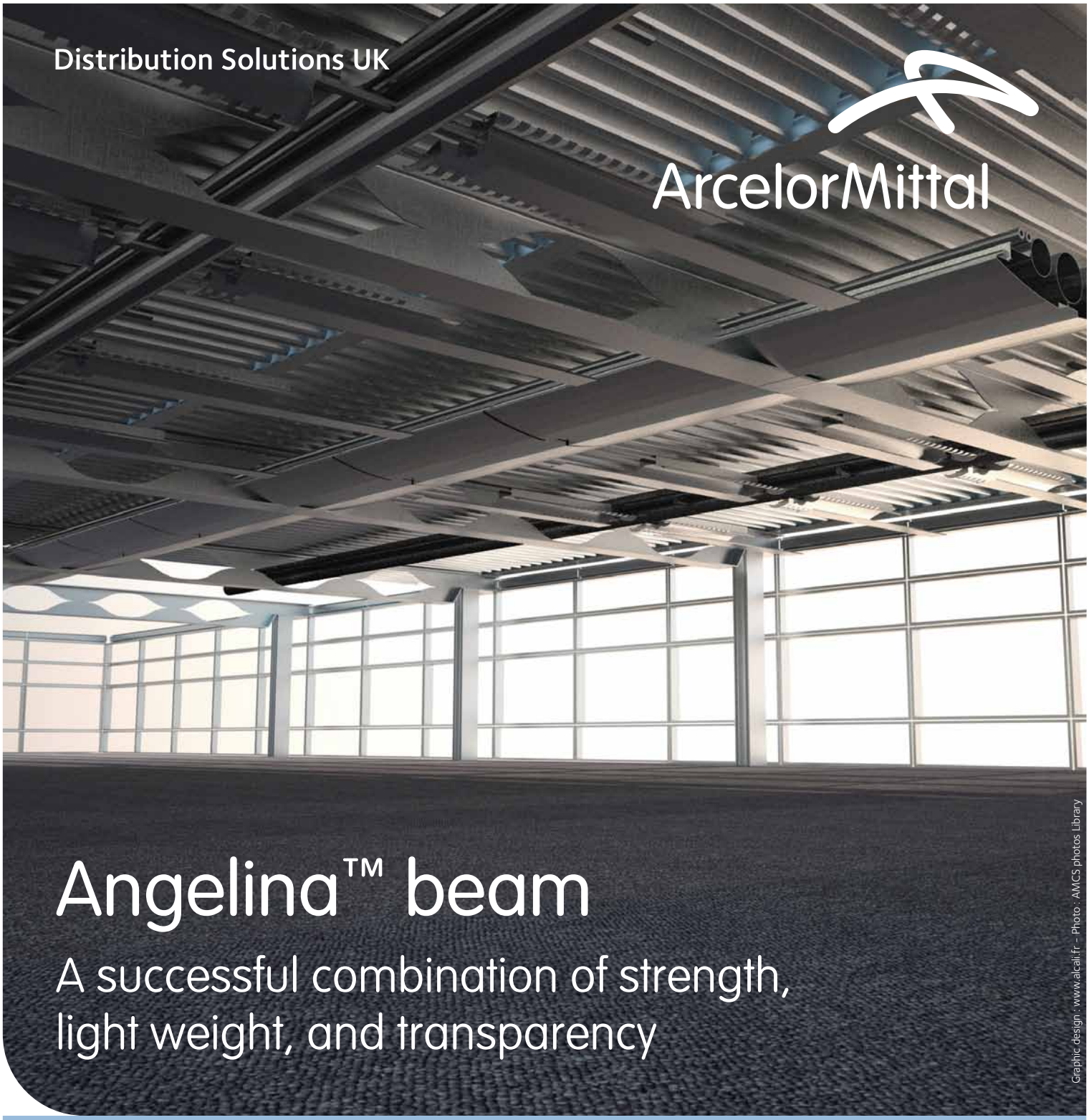
tel: 01344 636500 email: *education@steel-sci.com*

1 March 2011
Stability of steel framed buildings
Leeds

8 March 2011
Light Gauge Steel Design
Birmingham

15, 22 & 29 March 2011
On-line Steel building design to EC3
Internet

29-30 March 2011
Steel Bridge Design
Leeds



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Town centre boost for Newbury

The Parkway retail and residential development represents the largest ever construction scheme in Newbury town centre. NSC reports on a project set to transform the Berkshire market town.

FACT FILE
Parkway, Newbury, Berkshire
Main client: Standard Life Investments
Architect: BDP
Main contractor: Costain
Structural engineer: Cundall
Steelwork contractor: Caunton Engineering
Steel tonnage: 2,100t
Project value: £100M

A multi-million pound retail and residential development offering 27,000m² of shops and restaurant accommodation and including a large three-storey 9,000m² Debenhams anchor store, will turn Newbury into a regional shopping destination.

Known as Parkway, the scheme is being developed by Standard Life Investments assisted by the Shearer Property Group. They say it will meet the needs of an enlarged shopper population by creating a fresh and contemporary retail offer. The scheme will create a high quality setting for modern fashion and cosmopolitan eating. Its architecture is up-to-date and striking, but also sympathetic to the surrounding architectural heritage.

Bucking the trend which has seen very few new retail developments during the last few years, Parkway is scheduled to be ready for shoppers before Christmas 2011, while the residential portion of the project will be completed by May 2012. Consisting of eight blocks (A to H) the retail parts of the project are all steel framed.

Making the scheme more aesthetically pleasing to the eye, a 734 space two level underground car park lies beneath the majority of the project's footprint. On top of this the main two-storey retail development springs up off of a ground floor slab, and then above this, on a rooftop podium, there are 184 residential apartments and affordable houses focussed around a central landscaped piazza.

'This was a neglected part of town hidden between Newbury's main shopping thoroughfare - Northbrook Street - and Victoria Park," explains Costain Construction Manager Mick Long. "When we started on site in October 2008 we began with two years of demolition and enabling works."

Digging out the two-level 7m deep space

The Parkway project will significantly enlarge Newbury's town centre retail offering

Two steel framed lift towers provide access to the apartments

Importantly, the steel frame allows future tenants the flexibility to change the shops' internal configuration.

for the car park was a major exercise and involved installing a series of secant piles around the project's perimeter. This then enabled a large-scale dewatering programme to begin while the car park was excavated.

"The proximity of the River Kennet meant we were digging well below the local water table," adds Mr Long. "While construction work continued we were continually pumping the site, with the tension piles installed and weight of the basement and superstructure in place we can now allow the on-site pumps to be gradually decommissioned."

While the enabling works were being undertaken the steelwork for the entire project was procured at this early stage to secure materials and cost, and allow the steel erection programme to get an early start on the Debenhams store, as this structure's footprint is one of the few parts of the project which is not above the car park. Once begun, the programme was accelerated by means of the integration of various trades, managed by Caunton, such as the laying of metal decking, fixing perimeter edge protection, installing precast concrete stairs and the provision of offsite fire protection.

Like all of the steel framed blocks, Debenhams (Block E) is a stand-alone building, but this structure is based around a larger bespoke grid pattern of 10.2m × 12m. At 5.5m high, Debenhams also features a slightly higher floor to ceiling height than the rest of the project.

Steelwork contractor Caunton Engineering erected this block installing temporary CHS bracing along with the main structural steelwork. The bracing remained in place until the steelwork erection was complete and the concrete floors were cast. Once the floors were installed they, in combination with the Block's concrete lift cores, acted as a diaphragm.

"Caunton are ever mindful of the need for sustainability and the elimination of waste, so for example when we removed the temporary bracing from the Debenhams store it was returned to our facility in Moorgreen, Nottingham. We then reused it on the remainder of the project. Steelwork is of course in practice 100% recyclable," says Phil Ratcliffe, Caunton Engineering Contracts Manager.

While the Debenhams store was being erected two other smaller blocks were also begun. Block D, which sits adjacent to Debenhams, and Block C, which is split into halves and straddles one of the main entrances to the development.

Once the car park was completed and the ground floor slab cast the remainder, and the bulk, of the steel erection began. Based around an H-shaped street configuration the project's two biggest blocks sit within →

this shape. Marsh Lane and East Street form the uprights of the H and the aptly named Middle Street links them together. This part of the retail project is predominantly erected around a standard 8m x 8m grid pattern, chosen to match the car park column layout below.

"In this way we minimised transfer structures between the concrete car park and the steel framed retail zone," says Ian Krailing, Cundall Project Engineer. "As this standard grid is suitable for both uses."

The choice of a steel frame for the two levels of retail was down to speed, cost and flexibility. Once the car park and the ground level concrete slab were complete, the steel frame was erected relatively quickly via the site's four tower cranes. Importantly the steel frame allows future tenants the flexibility to change the shop's internal configuration.

Situated within the H-shape, Block F is the project's largest structure and also fronts the development and overlooks the main thoroughfare of Parkway as well as the adjacent Victoria Park.

In order to maximise the views over the park, Block F's main elevation has three mezzanine levels of apartments. This means the steel framed block has two-levels of retail over the majority of its footprint, while at the front the same height has been maximised with the incorporation of three floors of apartments. Above this, Block F then accommodates timber housing and apartments.

To highlight the development and to act as architectural landmarks along this main elevation, this block features two steel framed lift towers which also accommodate two or three apartments per level. One of these core towers is seven-storeys high and the other is five, and they were constructed with steel for ease of programme.

"Due to their height and bespoke arrangement on this project the towers were steel framed. This also enabled the towers to be erected at the same time as the main frame, and allowed the cladding to commence early," says Mr Krailing.

Caunton had three erection gangs on site during its peak period, and this meant utilising all of the site's tower cranes. While Block F was being erected, work also progressed on Block B, another large retail zone. Meanwhile, erection also began on Blocks A and G, two small retail zones which straddle a service yard; a yard which will not only be used by the Parkway scheme, but is also currently used by some existing adjacent stores.

This meant the entrance area had to be kept open during the day and a 16m long truss which spans the area, linking the two Blocks, had to be installed on a Sunday.

Middle Street links the other two thoroughfares within the development

The final piece of the steelwork jigsaw was the erection of Block H, a small structure consisting of three kiosks, situated on the site of a former pub.

Summing up Costain Project Director David Woodhouse says he has been impressed with Caunton from its first involvement at tender right through to completion.

"Caunton has always been proactive on the project, we made our mind up to go with them when we submitted our tender and they have worked well with us all the way through".

I am most impressed with their flexibility and ability to consistently achieve milestones. Other than the exhilarating speed that the steel frames have gone up at you would hardly know they were here."

Caunton Engineering completed the main frame steelwork programme during November.

"When we removed the temporary bracing from the Debenhams store it was returned to our facility in Nottingham. We then reused it on the remainder of the project."

Three residential mezzanine levels are located along the front of Block F

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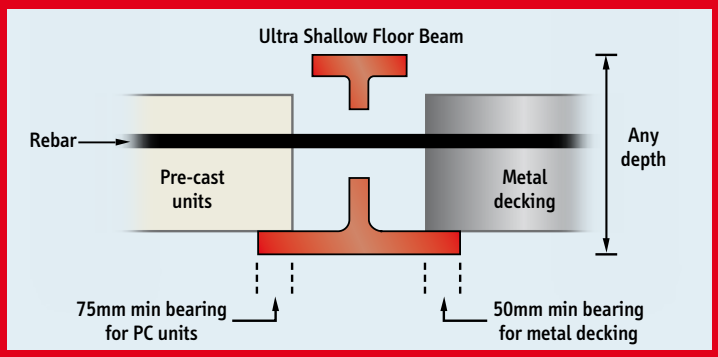

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Spanning river and rail

Crossing numerous electrified railway lines and the River Clyde respectively, the last two steel bridges for Glasgow's M74 project have now been erected. NSC reports.

FACT FILE
Auchenshuggle Bridge and Rutherglen Station Bridge, M74 Completion project, Glasgow
Main Client: Transport Scotland, Glasgow City Council, South Lanarkshire Council, Renfrewshire Council
Main Contractor: Interlink M74 JV, comprising Balfour Beatty, Morgan Est, Morrison Construction, Sir Robert McAlpine
Structural engineer: Jacobs/Atkins JV
Steelwork contractor: Cleveland Bridge
Overall project value: £445M
Steel tonnage: 3,796t

Glasgow's M74 Completion project will provide the Scottish city with an urban motorway ring road as well as a major economic boost. Programmed to open in June, the new six lane motorway covers a distance of 5 miles and will complete a loop by linking the existing M74 to the M8 at a point just west of the Kingston Bridge.

One of the main challenges associated with the project is the route through busy southern Glasgow. A number of businesses and factories have had to be relocated because of the works, while the motorway has to cross a number of major roads, railway lines and the River Clyde. This accounts for the number of bridges - 14 in total, underpasses and deep embankments which have had to be completed.

Four of the project's major bridges are steel structures, the M8 Eastbound Link Bridge (see NSC Nov/Dec 2009), the Port Eglinton Viaduct (see NSC February 2010), Rutherglen Station Bridge and the Auchenshuggle Bridge. The latter two structures were the final two steel elements of the project to be completed and both have now been erected.

The 1,956t, 186m-long Rutherglen Station Bridge spans a multitude of electrified railway lines and this meant detailed consultation and coordination was required with Network Rail. All steelwork had to be assembled in a nearby yard and then erected during 2.5 hour rail possessions that took place during 16 consecutive nights.

This bridge is formed from trapezoidal open top steel box girders which are curved in plan and elevation plus rotated transversely to form the bridge cross fall. The structure has four spans and was constructed with four lines of girders.

When it came to designing this bridge it quickly became apparent that the required girders, with widths across their top flanges of 5.5m, were going to be too wide to transport to site.

Although special transport orders may have been possible to transport these girders on part of their journey from steelwork contractor Cleveland Bridge's Darlington facility to Glasgow, they were just too big to fit through city streets.

It was decided that the girders would be fabricated as a whole box but split down the longitudinal centreline so that they could be transported as half boxes at under 3.5m, which would require minimal transport restrictions.

"Building the girders as half boxes in the factory was a much quicker and easier solution rather than building the girders from flat panels on site."

The designers then developed a part penetration weld, much smaller than a full butt weld to enable the two halves to be quickly welded together on site.

"Building the girders as half boxes in the factory was a much quicker and easier solution rather than building the girders from flat panels on site - it allowed greater control and accuracy in achieving the geometrical tolerances," says Stephen Osborne,Cleveland Bridge Project Manager. "When it came to assembly we'd also gained experience from doing a similar procedure with the much longer Port Eglinton Viaduct."

In total there were 54 half girder deliveries which were then site welded to form 27 full girders ranging in length from 16m to 33m.

The boxes were then assembled into longer lengths, typically consisting of two whole boxes, to create 16 lifts varying in lengths and weighing between 70t and 190t.

A heavy lift Gottwald AK-680-3 mobile crane, with a 107m long boom and 600t of superlift counterweight was used for these lifts at Rutherglen Station. Self Propelled Modular Transporters (SPMTs) were also used to transport the girders from the site assembly area to the crane pick up position.

For the 1,840t Auchenshuggle structure, Cleveland Bridge fabricated and transported the steelwork to site as full box girders in 35 loads, with a maximum transport length of 27m, width of 4m and a weight of 85t.

Seven 90m long girders form the Auchenshuggle Bridge

Rutherglen Station Bridge was erected during 16 night time rail posessions

Once the steelwork was on site it was assembled into seven 90m-long girders weighing up to 300t each. Because this bridge spans the Clyde it was necessary to erect it in the full 90m-long spans, to avoid - for economic, environmental and safety reasons - working in the river with intermediate propping.

"This bridge was challenging as we were dealing with much larger girders and cranes," says Mr Osborne. "The assembly took place on the bridge's approach road and took us approximately 10 weeks to complete. There were eight welded and 20 bolted splices to join the girders together requiring up to 1,250 bolts in each."

The girders were all erected over a seven day period, with one 300t girder being lifted into place each day. To cope with such loads this lifting procedure needed one of Europe's largest strut jib cranes, the Demag PC9600 which has a huge 2,000t capacity.

The crane was imported from its previous job in The Netherlands and delivered to crane operator Sarens UK depot in Middlesbrough. It was then transported to the Glasgow site in 100 truckloads and then took nine days to assemble.

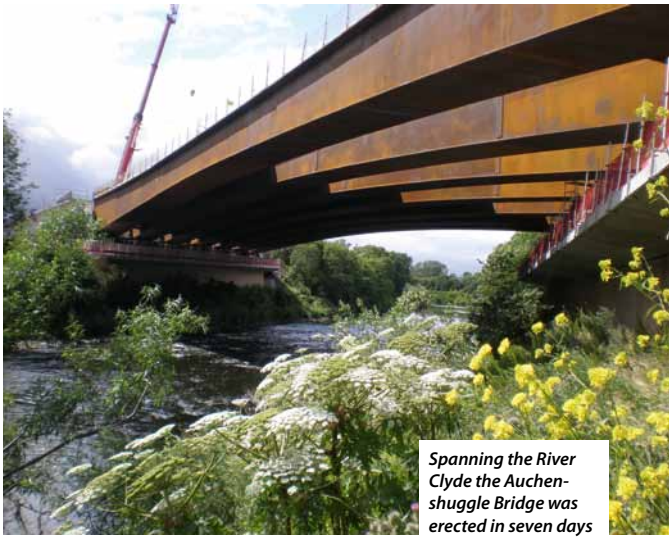
Each assembled girder had to be transported from the assembly yard to the crane pick-up point - using Self Propelled Modular Transporters (SPMTs) - a distance of nearly 50m.

Once in position beside the crane, each of the bridge's seven girders was then lifted into position landing on temporary works on the two abutment shelves. The crane's biggest lift was 314t at a 72m radius which required 900t of superlift counterweight.

As each lift was slightly different, the crane had to be disconnected at the end of each day and then its superlift reconfigured ready for the following day's lift. This was a long procedure and took up to eight hours each time.

Once all of the girders were in position, secondary bracing was installed at abutment diaphragm locations. The bridge structure was then aligned, levelled and the bearings grouted into position. Once the bearing grout had cured the bridge was jacked onto the permanent bearings and the temporary supports and restraints removed, completing the erection.

Four lines of box girders were erected for the Rutherglen bridge



Spanning the River Clyde the Auchenshuggle Bridge was erected in seven days

History centre takes shape with steel

A prominent site in the Kent county town of Maidstone is being transformed into an innovative library and history centre with the aid of a steel frame. NSC reports.

Impression of the completed building's cantilevered western façade

Steelwork has been completed for one of the most innovative library and history centres in the UK. Under construction in the Kent county town of Maidstone, the new facility is being purpose built to protect and house archive material, and to provide a 21st century library in the heart of Kent.

Known as the Kent History and Library Centre, it will house around 14km of historic local material, some of which dates back to 699 AD. The county has a wealth of documents, photographs, images, maps and records, but to make sure they survive for future generations they need to be kept in carefully controlled conditions. The project will also house a community history area, archive search room, digital studio and a large space for displays and events.

The steel frame for the library forms a central wedge at the front of the project

As part of the overall scheme, two eight-storey residential blocks have been constructed on behalf of housing and care provider, Housing 21 and West Kent Housing Association.

These two structurally independent buildings are located towards the back of the site overlooking the library.

Work started during March 2010, with main contractor Warings excavating an area for the partially subterranean archive facility and then piling the entire site. During the initial stages of the programme some archaeological digging was undertaken on what is a very historical site.

Until recently the site was owned by the Ministry of Defence and it was once occupied by the barracks of a cavalry unit dating back to the 1700s. Although the Army is still based nearby in the town, the project's site has been earmarked for development for sometime.

For insulation reasons and to keep the archive facility humidity free, this part of the building is basically a large partially submerged concrete box. The archive facility along with the two concrete framed residential blocks, were the first parts of the job to be built.

The steel frame has been erected with a combination of mobile crane (above) and MEWPS (below)

The concrete parts of the project were undertaken first to give as long as possible to let them dry-out. The front portion of the project - where the library sits - was initially used as a storage area for reinforcement.

That is one of the reasons why steel was chosen for the library. It suited the programme and once the concreting was completed and the area was no longer needed for storage, the steel frame was quick to erect.

As well as the speed of construction, Graham Bedford, Reuby and Stagg Director and Project Engineer, says: "Although the internal spans aren't that long, up to

The steelwork was delivered to the site in 20t loads that had been detailed into erectable quantities. Each phase was then erected almost immediately. . .

10m maximum, with these lengths, steel is the material of choice for economy and programme."

Erected by ACL Structures, the steel frame consists of a triangular wedge at the front of the site, measuring 35m along its two main elevations, west and south. The third elevation adjoins the concrete archive facility which sits between the library and residential blocks. This archive box also sits partially below the library as a basement level.

"The steel frame consists of a braced beam and column box," adds Mr Bedford. "However some stability is derived from the archive facility's concrete wall which the steelwork is tied into along the back elevation."

Essentially an 8m-high single storey structure, the library building also contains a T-shaped mezzanine level which has been erected along with the main frame. Constructed around a varying grid pattern, ACL Structures used a three man gang of erectors, plus one mobile crane operator to complete its programme.

The steelwork was delivered to site in 20t loads that had been detailed into erectable quantities. Each phase was then erected almost immediately from the trucks, making use of one mobile crane and three cherrypickers.

"As the concreting works had been completed before we started on site, we had a clear area in which to work and lay-down our steelwork," says Colin Grant ACL Structures' Contracts Manager. "This allowed us to work unhindered and complete the steel erection and metal decking on schedule."

The columns vary in member size from 203 sections to slightly larger 254 sections, all of which were brought to site in full lengths of up to 8m. Smaller 5m high columns have been erected towards the back of the library as this portion of the structure sits on top of the archive box slab.

Working in this area meant ACL had to be aware of the weight restrictions associated with the area's slab and so the company had to use a smaller and lighter cherrypicker for this part of the erection process.

The façade of the library will predominantly feature glazing, and one elevation – the west – features a 3.5m cantilever forming an architectural canopy. A row of glulam beams will be added to this façade, but these members, that will sit outside of the glazing line, will be purely architectural as only the steelwork supports the cantilever and the glazing.

The library will eventually be topped with a green sedum roof, helping the project gain its anticipated BREEAM 'Very Good' rating.

The Kent History and Library Centre is scheduled to open in early 2012.

FACT FILE

Kent History and Library Centre, Maidstone

Main Client: Kent County Council
Architect: Fluid
Main contractor: Warings
Structural engineer: Reuby and Stagg
Steelwork contractor: ACL Structures
Steel tonnage: 100t
Project Value: £12M

Cleaner seas for Sussex

To help Sussex beaches meet European environmental standards a new wastewater treatment works is under construction in the midst of the South Downs. NSC reports on the role steelwork is playing on this major project.

A wastewater treatment works (WTW) is under construction at Peacehaven, West Sussex, to treat effluent generated each day by the residents of nearby Brighton and its environs and bring the region into line with European standards.

At present, wastewater from the area receives basic treatment before being pumped out to sea through a 1.8km pipe. As a result, this is now the only area in Sussex, and among the last in Europe, that does not meet European environmental standards on wastewater treatment.

Part of Southern Water's £300M environmental improvement scheme, the overall project includes 11km of tunnels to transfer wastewater to the WTW and then cleaned wastewater from the new works to a new 2.5km long sea outfall pipe off Friars Bay.

Situated at Lower Hoddern Farm in Peacehaven, the WTW is a necessary and integral element of the project. Gravity and two underground pumping stations will aid the delivery of the wastewater to the facility.

Above ground level the most visible aspect of the project is the large steel framed structure that houses the WTW. Approximately the size of three football pitches, the complete structure is covered by a parabolic roof that rises to a maximum height of 18m and dips down to a height of 14m. The shape of the roof is not just an architectural feature, as it will be covered with sedum and on completion to be one of the largest green roofs in Europe.

"The shape of the roof also fits into the surrounding South Downs," explains Alan Faherty, Costain Project Engineer. "In this way the project will not stand out and will blend into the downland landscape."

The large steel structure is divided into two parts by a movement joint located along a steel covered canopy that connects the Sludge Recycling Centre (SRC) to the larger Pre-Treatment Building (PTB) part of the structure, an area which sits over the facility's deep shafts.

The covered canopy spans part of the width of the structure and consequently it is 70m long × 10m wide and formed with 12m high columns and 914 beams. There are also two rows of internal columns supporting this substantial part of the structure, which shelters parts of the process areas as well as linking the two buildings.

The larger PTB section of the overall structure is approximately 150m long x 55m wide and consists primarily of an open-plan space for the treatment works. The exception being one elevation which houses a small single-storey office and welfare area.

To create the necessary open plan area Bourne Steel has erected a series of roof trusses which span up to 30m between two rows of internal columns. The trusses vary in depth to create the curving roof, along with large box section purlins which span between the trusses. Because of the roof's unique shape, each purlin had to be individually set-out.

The trusses were brought to site in completed half sections. The two sections were then assembled into one truss on site, before each entire truss was erected by two crawler cranes.

The columns for the PTB are 12m-high CHS members and have been galvanized prior to erection. "The columns, and in fact all of the steelwork has had to be galvanized because of the marine environment, moisture content and the highly corrosive atmosphere which will be created within the

FACT FILE
Peacehaven Wastewater Treatment Works, West Sussex
Main client: Southern Water
Architect: 3D Reid
Main contractor: 4D, a joint venture between United Utilities, Costain and MWH
Structural engineer: MWH
Steelwork contractor: Bourne Steel
Steel tonnage: 2,450t
Project value: £300M

Long span trusses form the D-shaped SRC facility which will have a green sedum roof

Each part of the structure is different because of the various functions which will take place and the various plant equipment to be installed.

25m-long beams span a covered walkway in the middle of the Works

facility," says Rod Potts, Bourne Steel Project Manager.

On the other side of the canopy, the smaller SRC is approximately 75m × 120m and 20m high. This structure contains three mezzanine floors, mostly for plant equipment. Large columns support these levels as significant loads from the equipment will be exerted.

Again a large open area within the centre of this part of the structure has been formed with a series of 13 trusses. To take into account the SRC's D-shape and the curvature in the roof, each truss has been individually fabricated. They are all approximately 30t in weight, but vary in depth and length, with the longest truss being 30m-long.

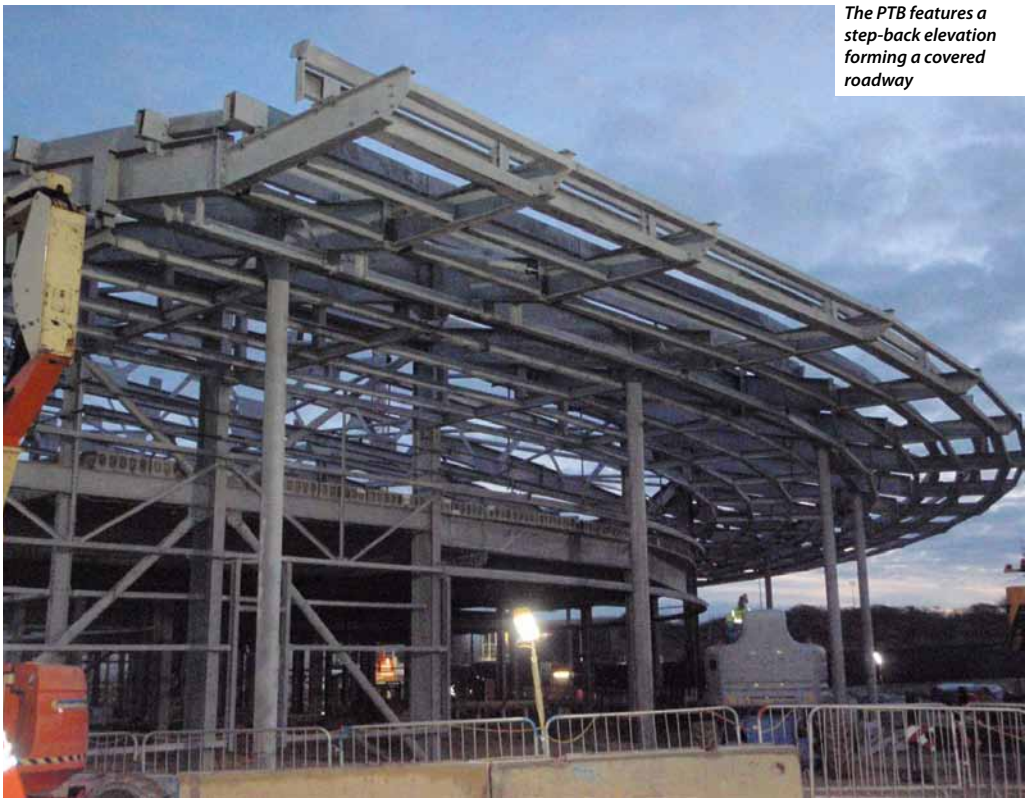
Bourne Steel has also erected dedicated crane beams to the roof trusses to support overhead travelling cranes.

"Each part of the structure is different because of the various functions which will take place and the various plant equipment to be installed. Because of this, there has been little or no repetition in the steelwork," says Chris Barnfather, Bourne Steel Project Designer.

An exception to this is the structure's bracing system for stability which is the same in both parts of the building and is derived from cross bracing located in all grid lines and elevations.

"The curvature of the roof makes the structure pull in one direction, so the bracing has to be very robust to resist the thrust from the roof," explains Mr Barnfather.

Works started at Peacehaven during July 2009 with completion scheduled for autumn 2012.



The PTB features a step-back elevation forming a covered roadway

Venue shows its metal

FACT FILE
Bluewater Events Venue, Kent
Client: Bluewater
Architect: Denton, Corker Marshall
Developer: Lend Lease
Main contractor: BAM Construction
Structural engineer: Waterman; BAM Design
Steelwork contractor: Robinson Steel Structures
Steel tonnage: 2,250t
Project value: £60M

Steelwork including long span trusses have been used to create the necessary open plan areas for the latest visitor attraction at Bluewater in Kent. Martin Cooper reports.

Bluewater is set to become the first major shopping location in the UK to incorporate an events venue for retail shows, leisure events and exhibitions.

The construction of the £60M, 5,200m² exhibition and events venue, is set to boost the prestige of one of Europe's largest retail and leisure destinations. As well as increasing the reasons to visit - Bluewater already boasts 330 shops, 50 bars and restaurants, 50 acres of parkland, seven lakes and attracts 28M visitors a year - the venue will become a focal point for leisure and entertainment in the area and further stimulate the ongoing regeneration of this part of Kent.

The development, by Lend Lease, includes a 3,000m² plaza, 4,000m² of restaurant space and will be integrated into the existing retail area via an entrance on Bluewater's main mall.

The close proximity to operating retail outlets and restaurants has meant the construction team has had to make a concerted effort to limit the noise and impact the project has on the general public.

Compounding the challenge, the site as well as bounding the existing shopping mall, is also situated between a 13-screen cinema and a functioning three-level car park.

"We've managed to keep the noise levels to a minimum by doing the noisiest work, such as cutting rebar and metal decking, before 10am," says BAM Construction Project Manager George Cuttle. "While the steel erection around areas abutting existing buildings has also been done before the cinema or retail zones have opened."

The venue is approximately 120m long by 46m wide. An area adjoining the existing mall will contain the entrance and the large open plaza, which will also house some restaurants. Extending outwards from the plaza and occupying nearly two-thirds of the footprint there are two exhibition halls. The lower or ground floor hall is slightly smaller than the first floor hall, as this hall shares its footprint with a service road running along one elevation.

The lower hall has a 5m floor to ceiling height, compared to an average of 12m for the upper hall. A series of 18m long plate girders were erected to form the main span for the lower hall. A notable feature of this hall is the intermediate columns that help span the service road and two outer grid lines.

There are no internal columns in the venue's larger first floor hall (which sits

Ten long span trusses form the venue's upper hall and its open plan design

directly above the ground floor hall). Here a series of ten roof trusses, up to 38m long and 2.7m deep, have been erected by Robinson Steel Structures to form the required open plan area.

These trusses were brought to site in three sections and lifted into place by two mobile cranes. One crane was used to lift two truss sections, which had been bolted together on site, while the second crane lifted the third section. Once lifted into place, the final bolting up was done while the two truss sections were being held aloft by the cranes.

The first trusses to be erected were the members closest to the new entrance area, abutting the existing shopping mall. In this way, Robinson was able to proceed with its steel erection working away from the mall and consequently always leaving room for its cranes.

"The first large truss to be erected was temporarily braced for stability, and not until two grid lines of trusses were up could the bracing be removed, as only then was the main steelwork frame self-supporting and

"We've managed to successfully limit the project's impact on the public and the construction of the entrance is being coordinated around functioning restaurants, most of which will remain open for the duration."

The Bullnose façade of the Events Venue

stable," says Peter Mills, Robinson's Project Manager.

Further steelwork has been erected into the larger upper hall, as it also contains two mezzanine levels, which will be used for plant equipment.

Overlooking the upper hall, a VIP suite or gallery beam has been created by erecting a 50m long by 5m wide steel box which bisects the entire venue. Supported on columns, this mezzanine-like level protrudes from either side of the building as an architectural feature.

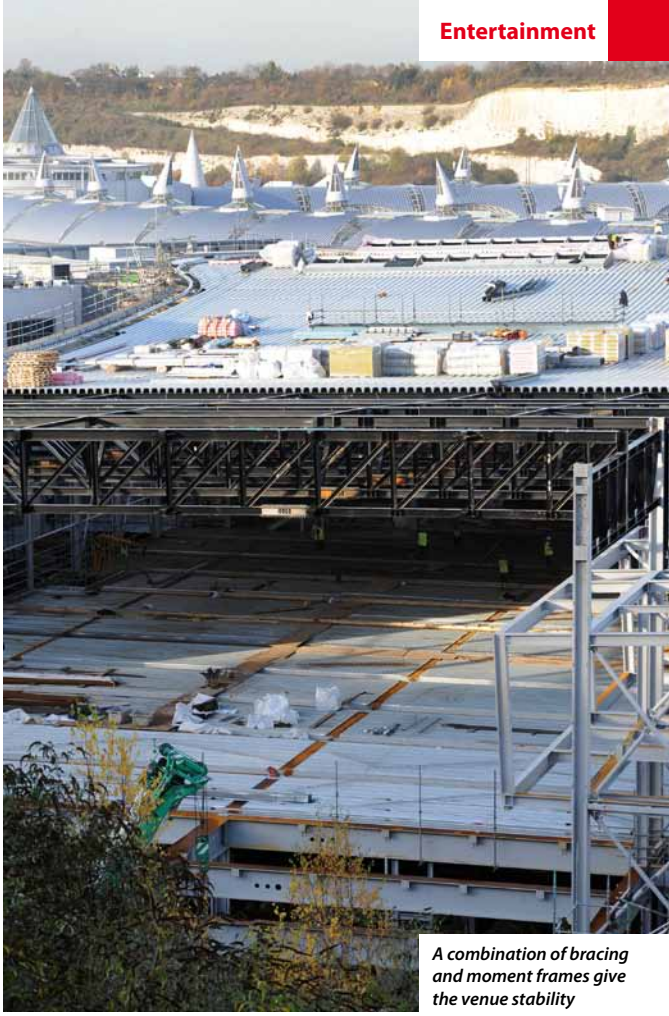
Stability for the steelwork is derived from moment frames within the plaza area, and here the extra loadings associated with such a large open space have been accounted for by large plate girder columns. Further down the structure within the halls, the steelwork has vertical bracing for stability.

Topping the venue is a curved roof, whose two troughs and hillocks culminate at a bullnose feature. The bullnose is hung from a roof truss and blends into a curved wall which slopes downwards and stops 5m above ground level. Beneath this area the venue's service yard for trucks is located.

This complex curved wall of steel has been erected from nine steel tubular ribs which have three splices each to account for the structure's curvature. The bullnose is braced in two directions; vertical bracing for snow loading from above and horizontal bracing for wind.

The venue's roof will eventually have a green sedum covering, at 3,000m^2 it will be one of the London areas largest. This late environmental addition to the project's design meant the steelwork had to be altered in order to accommodate the extra loadings.

"The original steelwork design had to beefed up to accommodate the green roof," explains Naresh Tailor, Engineer for BAM Design. "Most of the section sizes had to be increased in particular the long span trusses



A combination of bracing and moment frames give the venue stability

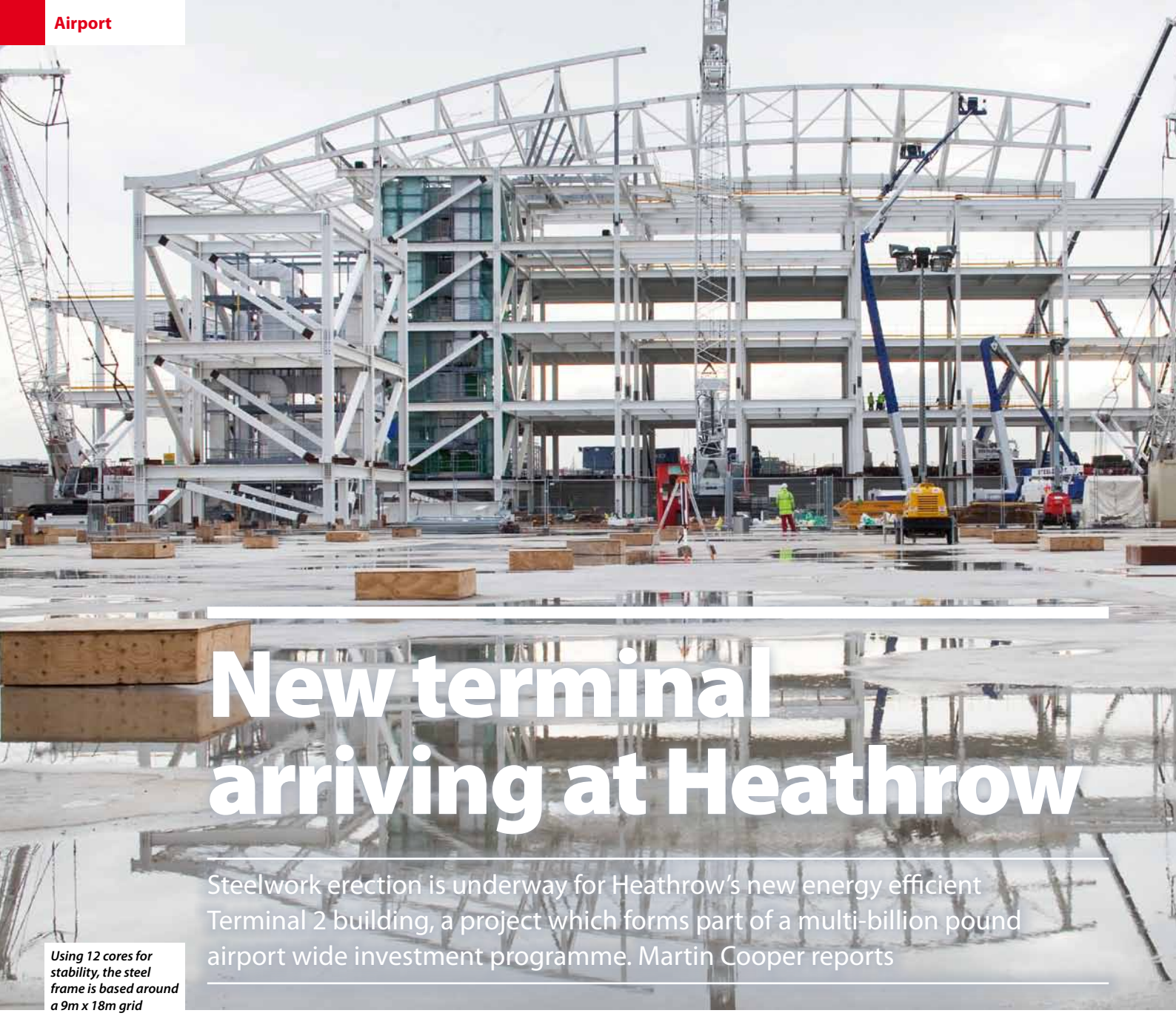
The venue is sandwiched between a cinema, a car park and the existing mall

located over the first floor hall."

The final phase of the steelwork programme begun in January. This entails punching through the existing glazed wall and connecting the new venue into the mall. Here in Bluewater's Water Circus, Robinson will connect the new steelwork to the old and create the venue's entrance area.

"The interface between the new development and the shopping centre is critical," sums up David Amaku, Lend Lease Site Representative. "We've managed to successfully limit the project's impact on the public and the construction of the entrance is being coordinated around functioning restaurants, most of which will remain open for the duration."

The Events Venue at Bluewater is scheduled to be completed in October and will open in late autumn.



New terminal arriving at Heathrow

Steelwork erection is underway for Heathrow's new energy efficient Terminal 2 building, a project which forms part of a multi-billion pound airport wide investment programme. Martin Cooper reports

Using 12 cores for stability, the steel frame is based around a 9m x 18m grid

FACT FILE
Heathrow Terminal 2
Main client: BAA
Architect: Foster & Partners
Main contractor: HETCo, a joint venture between Ferrovial Agroman and Laing O'Rourke
Structural engineer: Arup
Steelwork contractor: Watson Steel Structures
Steel tonnage: 26,500t

Passengers using any of Heathrow Airport's terminals cannot have failed to notice the large construction project on the site of the old Terminal 2 building. Here in the middle of one of the world's busiest airports, a new £2.2 billion Terminal 2 is under construction, a facility which will become the new home for Star Alliance airlines, handling an estimated 20m passengers annually.

Importantly, no matter how many travellers notice the work, the intention is that none will be inconvenienced by the construction of this brand new terminal building. Every effort is being taken by the construction team to ensure the job in no way affects the operations of the UK's largest airport.

Some of the measures undertaken have included the timing of deliveries, so they do not clash with peak traffic hours through the road tunnel that not only serves the site but also Terminals 1 and 3. Also, to avoid any interference to the airport's radar system, all of the cranes being used on site are limited to a maximum lifting height of 45m. There is an array of cranes currently being used, with 80t and 100t capacity mobiles lifting the main beam and column frame into place and 140t and 160t capacity crawlers lifting the roof trusses.

The completed new Terminal 2 will feature 180,000m^2 of floor space spread over three levels. The uppermost level will house departures and this floor is a double height space that will house intermediate mezzanines.

Undoubtedly a large structure with an approximate footprint of 180m × 230m, the new Terminal 2 will however produce much less carbon than the buildings it has replaced (the old Terminal 2 building and Queens Building). Large north-facing windows in the roof will allow natural light to flood the interior, reducing the need for artificial lighting without generating high levels of heat in the building. Solar gathering panels on the roof will further reduce dependency on energy supplies.

The roof which plays such an integral role in the structure's environmentally friendly credentials is formed with a series of steel trusses. These important steel elements are gradually being erected in phases along with the structure's main steel frame.

Steelwork contractor Watson Steel Structures will complete the Terminal 2 main frame this August, having started on site last August. Following on behind the groundworks contractor – who is preparing the concrete slab and podium, which accommodates a basement level – the steelwork erection programme is based around 12 cores.

The steel cores, formed from six columns to create two voids, are distributed evenly throughout the structure. They house staircases and M&E equipment, but also importantly they also provide the main steelwork with its stability. To keep the cores rigid 400mm x 400mm cross bracing link the steel columns together.

The steel cores are erected sequentially, and once complete an area of main frame

Vierendeel roof trusses are brought to site in 18m-long sections

Construction of the new Terminal 2 has not interfered with the airport's operations

To avoid any interference with the airport's radar system, cranes on site are limited to a maximum lifting height of 45m

and roof steelwork is then able to be erected around and over it. Steelwork ties into the cores, gaining stability, although temporary bracing is also needed in each area while the erection process is on-going. This temporary steelwork is then removed as each phase is completed and the steelwork has been tied into a core.

"For ease of programme the M&E contractor is able to install its plant equipment inside of each completed core prior to the main steelwork beginning," explains Watson Steel Structures' Project Director Tony Whitten. "In this way they can lift their heavy plant into the cores without having to negotiate 34m-high steelwork."

All of the steelwork is based around a regular grid of 9m × 18m, with these column spacings remaining constant throughout the building. Columns are brought to site in 18m lengths, with two members welded together onsite to form the structure's full height 34m high sections.

At roof level a series of Vierendeel trusses span east to west across the 18m wide void, →

Temporary bracing is installed along with the steel frame and removed once each area is tied into a core

The new terminal will become the new home for Star Alliance airlines and provide an estimated 20M passengers every year with a modern facility

while secondary trusses span in a north south direction.

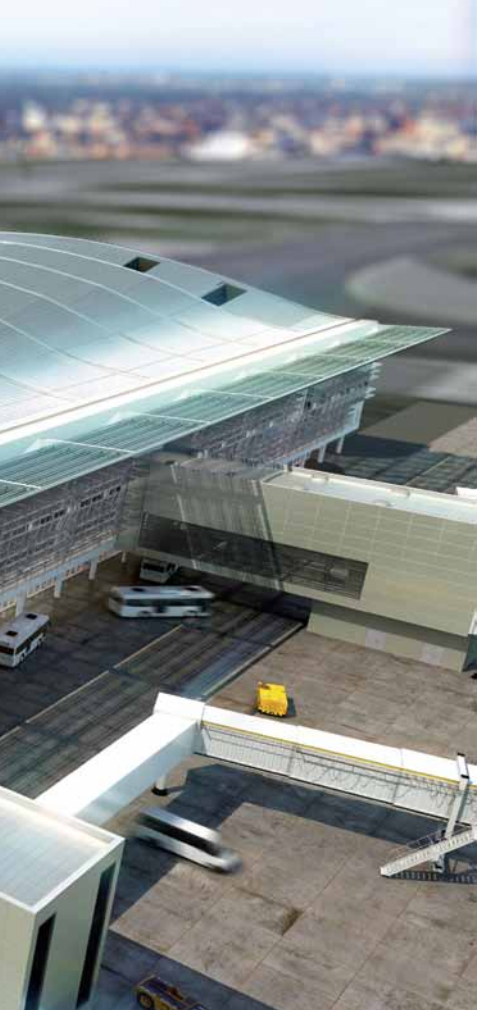
The Vierendeel trusses are made from fabricated box sections and brought to site in completed 18m long sections. As the roof of the terminal is wave-like with three hillocks and two valleys, the trusses vary in depth - up 5m deep maximum - to form the desired curvature.

The interconnecting secondary trusses are all one metre deep, but again are brought to site in 18m lengths, and span over two 9m bays.

"We have limited all steelwork to site to under 18m-long loads as longer lengths would entail out-of-hours deliveries through the airport tunnel," explains Mr Whitten. "The 18m figure also fits exactly with the structure's grid pattern."

The Vierendeels are made from fabricated box sections, apart from some of the vertical members which will remain exposed in the completed building. These steel members will support the environmentally important glazing for the north facing roof lights, so aesthetically pleasing CHS columns are used in these areas.

At the front of the terminal the roof steelwork extends out beyond the structure by a further 36m wide grid to form a canopy over the forecourt. The columns for this section of roof will remain fully exposed and again CHS members will be utilised as architectural features.



An array of cranes are being used, all of which are limited to a 45m high lifting restriction

The steel cores consist of two voids for stairs and M&E equipment

As part of the main steel programme, Steelcraft - Watson's specialist steel erection sister company - are also managing the installation of 130,000m^2 of metal decking. Once the terminal building structure has been completed, the company will also erect a total of six fixed links and nodes to the building, a steel framed baggage link to the adjacent Terminal 1 and a cooling station.

The new Terminal 2 is expected to open in late 2012.

Bridges carbon calculator

The BCSA and Tata Steel have commissioned Atkins to create an easy to use spreadsheet tool for calculating the carbon footprint of typical steel composite bridges.

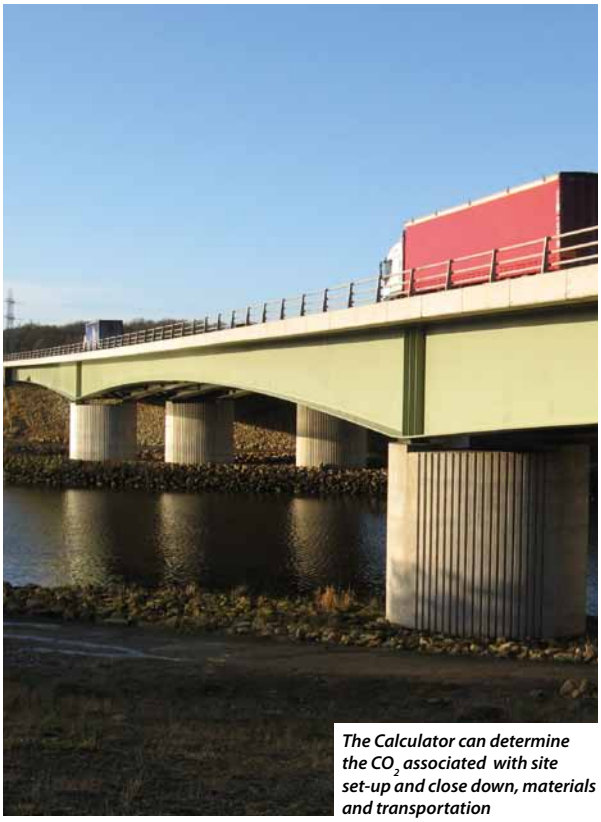
Sustainability or how best to achieve it, is now an important aspect for the entire construction industry. This is borne out by how much importance developers and contractors place on gaining a top BREEAM rating for their structures and buildings. A rating which not only judges a project on how it performs and functions after completion, but also on how it was built.

Running in conjunction with the overall issue of sustainability is the desire to limit carbon footprints, not just for entire companies but also for projects, large and small. This applies to the construction of bridges, but until recently there has not been a definitive way of calculating the carbon footprint of these structures.

Although many papers have been written on the subject, they have tended to use a variety of data sources and assumptions to quantify the carbon footprint of a bridge. This lack of a consistent approach is one of the main reasons why Tata Steel and the BCSA initially commissioned Atkins to create a spreadsheet tool for estimating the carbon footprint of typical steel composite bridges. The other main reason was to ensure that the correct parameters and assumptions were used for structural steelwork.

What was wanted was an easy to use tool that gave a good approximation of the CO_2 for the construction and maintenance of such bridges with the minimum of effort using preliminary design quantities.

"However, what we got was something far more in-depth," explains Chris Dolling, BCSA Manager, Technical Development. "The Carbon Calculator is simple to use, yet at the same time it



The Calculator can determine the CO_2 associated with site set-up and close down, materials and transportation

TATA STEEL / BCSA / ATKINS Carbon Footprint for Steel / Concrete Composite Bridges

Bridge Details		
Project Title	Steel Composite Bridge	
Job number	123	
Bridge Type	Road over	
Specify road classification	Urban_A	
Obstacles crossed	Road under	
Specify road classification	Urban_Minor	
Construction duration (weeks)	24	
Bridge length (m)	84	
Bridge width (m)	17.5	

TATA STEEL ATKINS BCSA

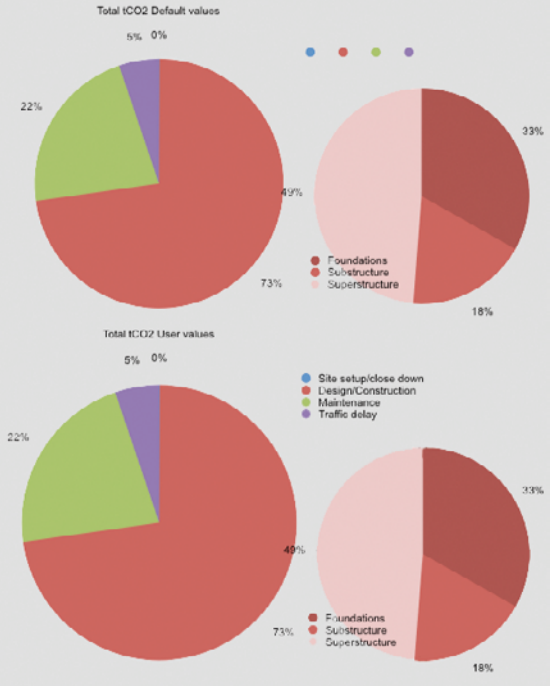
Drop down menu / Text entry

Site set up/close down			
		Total tCO_2eq Default values	Total tCO_2eq User values
Transportation of accomodation units		1.123	1.123

Design/Construction					
Bridge Element	Type	Material	Volume (m^3) / Tonnage (t) / Quantity (No.)	Total tCO_2 Default values	Total tCO_2 User values
Foundations	Foundations	Reinforced Concrete	Volume (m^3) 562	531.237	531.237
		Structural Steel	Tonnage (t)		
Sub-structure	Sub-structure	Reinforced Concrete	Volume (m^3) 283	289.845	289.845
Super-structure	Articulation	Bearings	Quantity (No.) 8	75.706	75.706
	Deck	Painted Structural Steel	Tonnage 222	267.626	267.626
		Weathering Structural Steel			
		Reinforced Concrete	Volume (m^3) 346	410.277	410.277
		Miscellaneous		27.334	27.334

Maintenance				
Maintenance Activity	Activity	Number	Total tCO_2 Default values	Total tCO_2 User values
Inspection of Structure	Principal inspections	19	5.531	5.531
	Interim inspections	41	11.911	11.911
Routine Maintenance	Maintenance	13	484.345	484.345

Traffic Delay				
Effects of traffic delay		Total tCO_2 emitted traffic management / road closure	Total tCO_2eq Default values	Total tCO_2eq User values
Full duration for construction and maintenance		114.509484	114.509	114.509
		Total CO_2	2219.445	2219.445



The easy to use spreadsheet showing information inputted on a composite bridge with helpful charts displaying CO_2 values

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This publication provides a comprehensive collection of tables of sections properties and member capacities for hot rolled, hot finished and cold formed sections, for use in design to BS 5950-1:2000.

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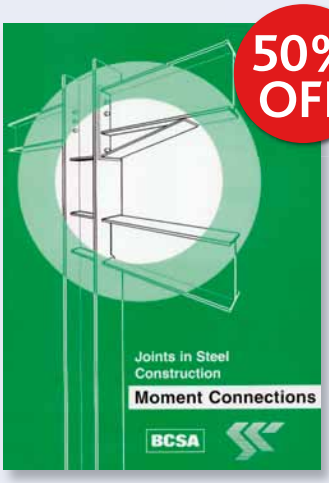

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This publication covers the range of structure steelwork connections and provides a guide to Moment Connections in steelwork

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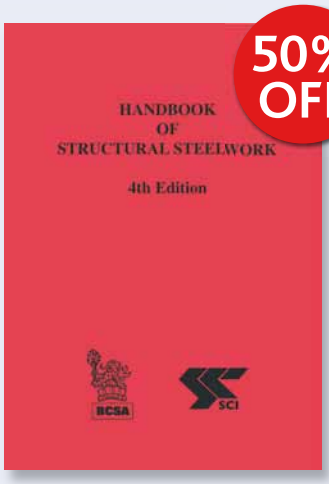

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Handbook of Structural Steelwork 4th Edition – P201

A practical guidance to the design of structural steel elements for buildings, this document contains three principal sections: general design guidance, design data and member capacity tables. Worked examples are presented where appropriate.

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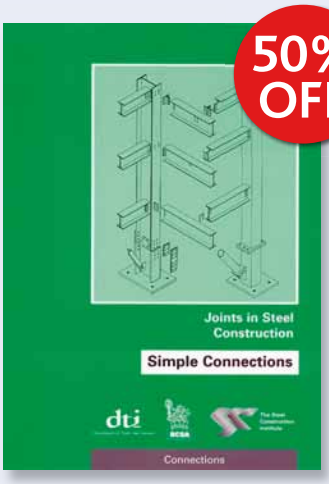

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Joints in Steel Construction: Simple Connections – P212

Design guidance is given for structural steelwork connections for use in buildings designed by the simple method i.e., braced frames where connections carry mainly shear and axial loads only.

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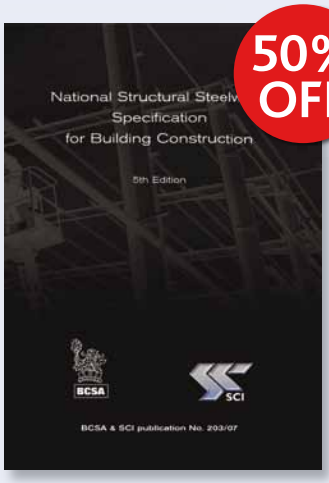

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Black Book - National Structural Steelwork Specification for Building Construction 5th Edition (NSSS) – P203

This specification covers the National Structural Steelwork Specification for building construction, and can be incorporated into all forms of contract covering the technical aspects of structural steelwork in buildings. The 5th edition bridges the gap between BS 5950-1 and the requirements given in the European standard BS EN 1090-2.

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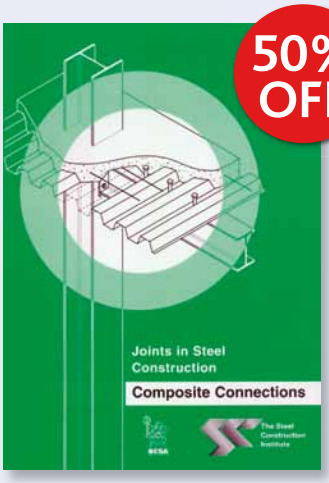

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Joints in Steel Construction: Composite Connections – P213

This publication provides a guide to composite, end plate and bolted connections suitable for use in semi-continuous braced frames. Both beam-to-beam and beam-to-column details are considered and guidance on frame design procedures is also given.

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The spreadsheet allows users to definitively calculate the carbon footprint of a typical steel composite bridge

is a comprehensive, complex spreadsheet tool which users can spend as little or as much time using as they wish."

Once the tool has been opened, the user is immediately shown a helpful User Guide which explains exactly what the tool is, and includes a flow chart that shows how to use the Calculator.

From here the user is directed to the Summary page where a worksheet allows you to quickly determine the CO_2 emissions for a bridge project.

At this simplest level, all you need to do is select what your bridge is carrying, what it is crossing, enter the length and width of the deck, estimate the construction duration, and then enter half a dozen basic quantities from a preliminary design. Having done that, the spreadsheet automatically calculates the carbon footprint of your bridge with a graphical breakdown showing the relative proportions due to construction, maintenance, and traffic delays. The construction element is further sub-divided to show the proportions for the deck, substructures and foundations

"This allows a bridge designer to see where the major CO_2 burdens are, allowing the focus of design development to be on the big issues in terms of reducing emissions," explains Mr Dolling.

Behind this simple 'Summary' is a huge amount of data and considered assumptions. If the user wishes, they can delve into all of the data and assumptions, amending them to suit any better information that they may have, or testing the effect of different design details. For example, is a ladder deck better than a multi-girder deck, or is a pair of column piers better than a leaf pier?

As a bridge design develops, the amount of available project specific information increases, so the carbon footprint calculation can be updated, becoming more and more accurate. The spreadsheet even allows the user to calculate an 'as built' estimation at the end of the project.

The Carbon Calculator is free to download from the BCSA website: *www.steelconstruction.org/bridgescarboncalculator*

Study shows steel has smaller footprint

Using the Carbon Calculator, Atkins has recently completed a comparison study for a three-span, 84m long bridge which has shown the steel composite option to have a smaller carbon footprint than the concrete alternative. Atkins based the concrete option on a real recently-constructed pre-tensioned, precast concrete beam bridge with spans of 24m, 36m and 24m carrying a road over another highway. The steel alternative was developed using software for the preliminary design of steel composite bridges to the Eurocodes. This software produced by Atkins for BCSA and Tata Steel last year is also free to download from the BCSA website. Preliminary quantities for the two alternative designs were run through the Carbon Calculator to provide two sets of answers. The results of this like-for-like comparison for the three span bridge showed that the steel composite bridge had a 25% smaller carbon footprint than the precast beam alternative. Whilst this cannot be quoted as a general conclusion, it shows both the potential for steel to be the optimal carbon solution in this span range and also the effectiveness of the preliminary design tool for optimising the design in terms of quantities.

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STEEL CONSTRUCTION

Plantasia- Oasis Park, Swansea

For: Swansea City Council in association with Citygrove developments

Plantasia - a tropical hothouse is the central feature of the retail shopping park at Swansea.

The 1600 sq m, £2.5m theatre of planting features three main areas. An arid zone at low level is designed for cactii, while a humid fern house is at the highest level, from where water cascades down into a central pond within the main tropical area containing palm trees and exotic plants.

The hothouse is designed to be walked around. Interconnecting paths weave between areas of planting to give exciting views from all levels. The structure, designed in tubular framing, supports a glass roof space and is surrounded by a moat to receive rainwater from the roof.

The concept of a tropical hothouse within a shopping park was the idea of Swansea City Council, and is thought to be the first of its kind.

Structural steelwork was chosen as the supporting medium of the hothouse because of the need to create a light structural framework. The function of the structure was to support the glazing system, withstand wind and snow pressures, and carry the sophisticated mechanical and electrical services. A steelwork structure provided an aesthetically pleasing and cost effective solution. To this end, a solution based on tubular multiple battened columns was evolved.

The basic truncated pyramid shape of the building is inherently stable. Overall stability was provided by a series of tripods along the walls which also gave support to the lattice girders.

Detailing of the lattice shapes and connections was very important and therefore carefully considered with the fabricators. It was essential that the structure of the building enhanced the planting layout and not detract from it. This aspect of the design benefitted greatly from the use of rectangular and circular hollow sections.

The high temperatures and high humidity levels of a tropical environment required a substantial level of corrosion protection. The chosen protection scheme was to galvanise the steel and overcoat with a three coat paint system including a micaceous iron oxide barrier and two finishing coats of silicone alkyd enamel, all applied at the fabrication workshops.

Maintenance generally was a difficult problem, but was solved using catwalks and a mobile platform that travels along the walkways. Painting maintenance will be carefully planned by Swansea City Horticulturalists to coincide with general plant maintenance.

One of the features of the hothouse design – Plantasia, was the close liaison between all members of the design team, including landscape architect TACP, and Swansea District Council, which was necessary to evolve the design. Considerable research was required into the work carried out at Kew Gardens, and the lessons learned were utilised at Swansea.

The final design and its construction satisfied the client, the builder and the designers.

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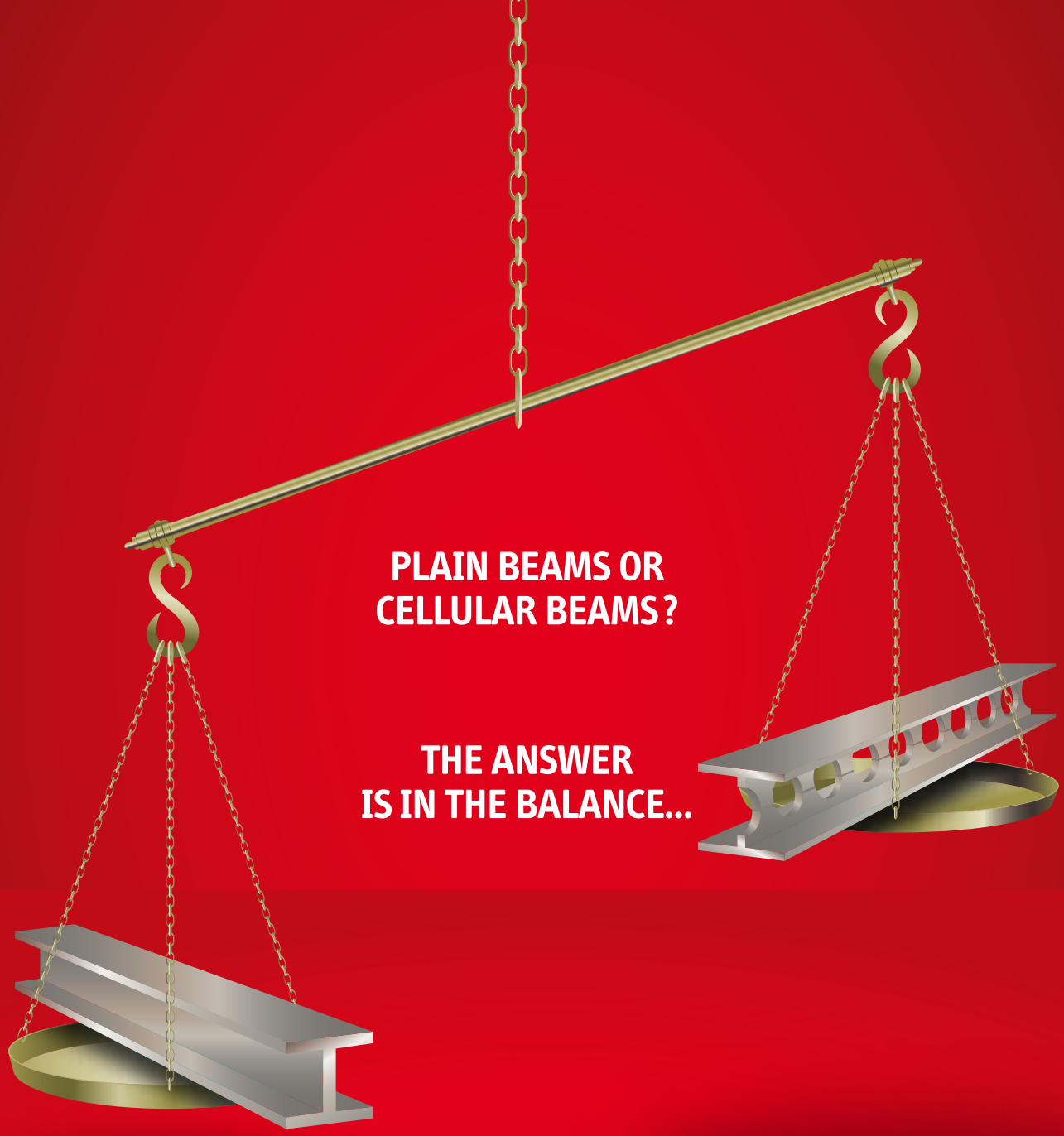
Judges Comments:

This striking steel framed and glazed pyramidal building stands in stark contrast to the rather dull surrounding built environment and demonstrates how steel can be configured imaginatively and economically to provide a unique environment, in this case for a state of the art tropical hothouse, giving the local community an exciting and much appreciated amenity.



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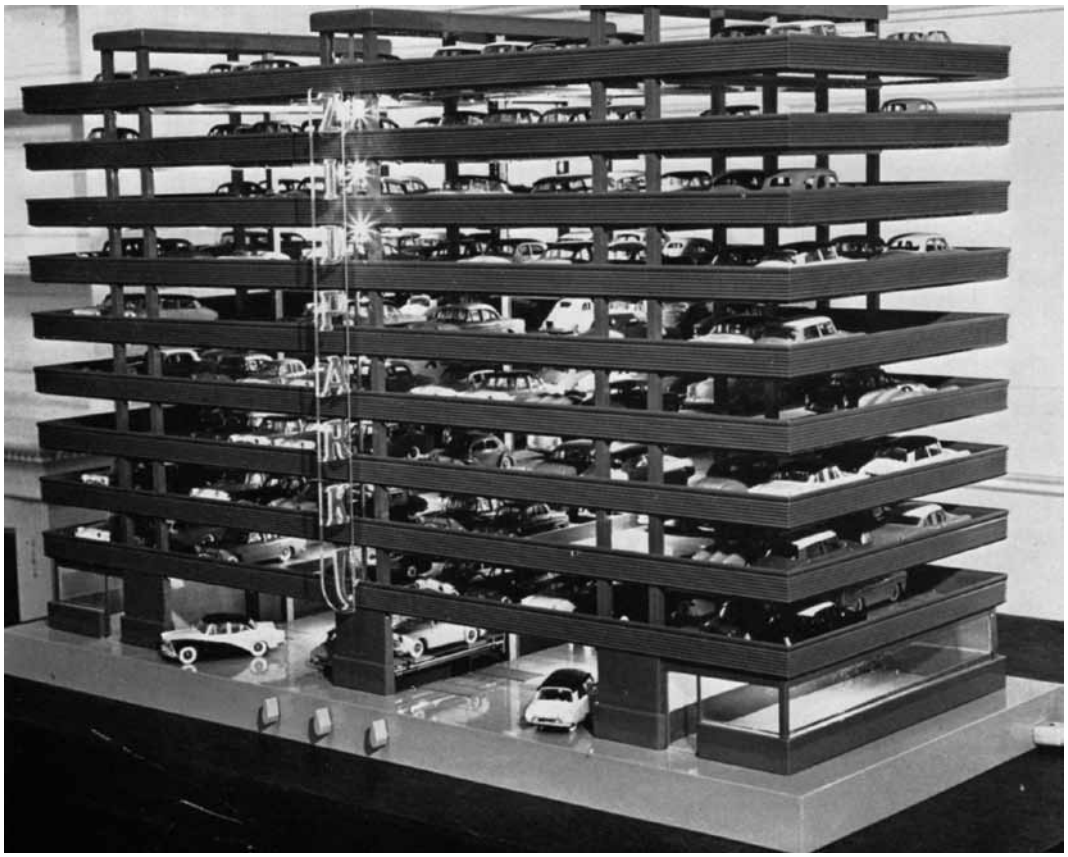
Multi–Storey Car Parks

Scale model of the first Zidpark to be built in Britain on a 52,000 sq ft area between Upper Thames Street, London, and the Thames



THE ZIDPARK

The first multi-storey, fully automatic car park in Britain is being erected on a Thames-side city site. This is the Zidpark, which will be electrically operated on the push-button system and is claimed to absorb cars off the adjoining streets at an estimated rate of 250 in half an hour.

In the Zidpark system the cars are moved mechanically on to a steel berth which is lifted automatically to a suitable position and then stored, again mechanically. The Zidpark is planned to accommodate 464 cars on eight floors (it will be a seven storey structure with basement) and there will be 16 lifts. With additional covered facilities at ground floor level, there will be parking for over 500 cars in all. Four hundred tons of structural steel are being used in its construction, quite apart from that used in the lifts.

Cars are moved sideways onto conveyors of cross bars rotated by endless chains as well as upwards by the lifts. Each of the car berths has two synchronised conveyors for the front and rear wheels respectively.

Transport of the car to its parking berth and subsequent removal is automatic – neither the attendant nor the driver need accompany it. All movement flows from control panels at the ground floor level.

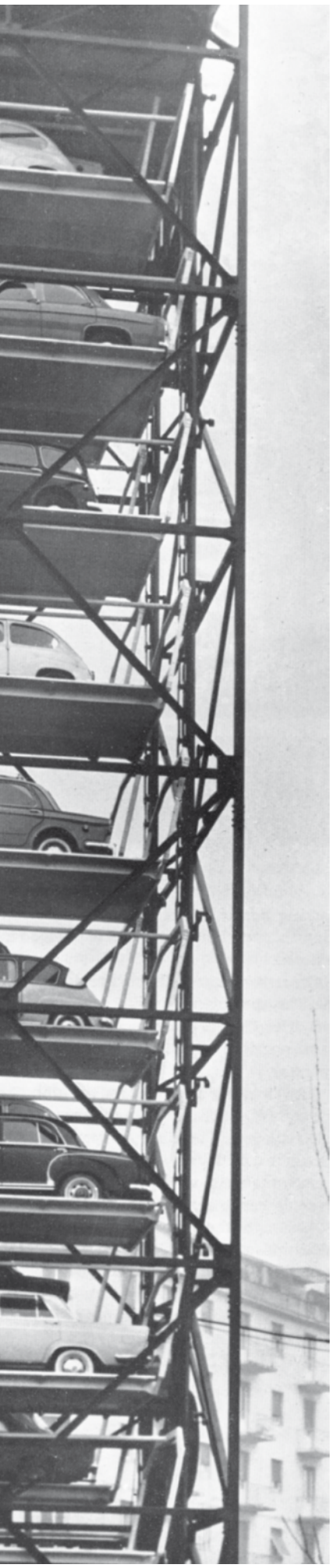
The park is divided into sections, each section having a lift and serving four spaces on each floor level. They layout of the control panels corresponds to that of the parking berths. A hole, with a numbered plug, represents each parking berth and is plugged in as each space is selected.

On arrival a car is directed to the conveyors adjoining the lifts, the engine is stopped, the brake is applied and the driver leaves after receiving a numbered counter corresponding to the numbered plug selected by the operator.

The operator the inserts the numbered plug into the control panel and the car is taken automatically to the selected berth. There is a similar process in reverse when the car is called for but, if when de-parking the operator has to obtain the car from an inner position he transfers an outer car to a vacant space which is always left free.

Although the first Zidpark is to be housed in a rectangular building, the system does not require a rigid layout and can be applied to sites of varying shapes and sizes and the existing buildings.

It is expected that the car park will be in operation by early 1961. The architects are C. Edmund Wilford & Son, F/A.R.I.B.A., of London, W.1.



The Butterley 'Big Wheel'.

THE BUTTERLEY SIMM WULPA CAR LIFT

The design of one highly original type of stacking car park is based on the familiar 'Big Wheel' of the fun-fair. It has card carrying platforms instead of gondolas and the cars travel up or down perpendicularly instead of in a circle.

The device, known as the Butterley Simm Wulpa Car Lift, has been invented by a Swiss engineer and is now being made in Britain.

The car park is a skeleton steel structure, 90 ft high, and will accommodate 20 cars, while taking up no more ground space than that which is normally required for three vehicles. The width of the structure is 24 ft and the length 20 ft.

The motorist drives onto a platform, gets out, puts a coin in the slot and presses a button. The platform carrying the car then moves to one side while an empty platform takes its place ready for the next arrival. When the motorist returns, he presses another button, numbered according to the platform on which his car rests, and the vehicle is brought gently to ground level within one or two minutes.

The movement of the lifts is so arranged that the car park will not operate as long as anyone is within range of any of the cabins. When the park is full, the mechanism stops with no parking cabin standing in the entry.

The unit can be built to accommodate two cars on each platform to give a capacity of 40 cars. These 40 car units, which are 90 ft high can be set up almost anywhere, adapted for enclosure in any shape of building and moved quickly if needed.

One of these car parks is already in service in Milan. Six more are to be installed in Milan, and two in Rome.

Steel Building Design: Worked Examples for Students (UK Version)

This publication offers a general overview of design to the Eurocodes and introduces the contents of BS EN 1993 (Eurocode 3) and BS EN 1994 (Eurocode 4) that relate to the design of structural steelwork and steel and Composite structures respectively.

This publication includes:

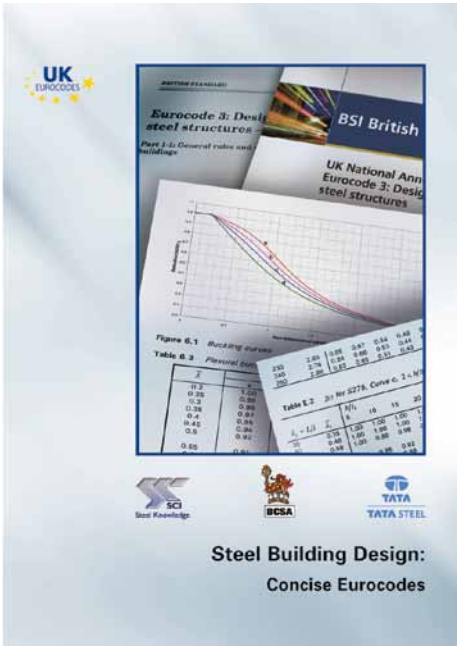
- An introduction to Eurocode terminology and the structure of the Eurocode system
- Twelve worked examples, including values of parameters and design options given in UK National Annexes
- Templates for practical design including frame stability, typical members and connections, chosen to represent realistic design situations
- An invaluable resource for student and practicing engineers alike when undertaking Eurocode designs in the UK.

The publication has been produced with the assistance of structural design lecturers, who were responsible for writing and checking the majority of the original worked examples presented in Section 6. It does not present structural theory or explain detailed design rules.

Catalogue number	**P387**
ISBN number	978-1-85942-191-8
Authors	M E Brettle BEng, D G Brown BEng CEng MICE
Pagination	99 pp
Pages	A4 Paperback
Publication date	2009

Price: £30.00 (BCSA and SCI Member Price £15.00)

Steel Building Design: Concise Eurocodes



This guide cuts through the apparent complexity of the Eurocodes for steel design, and provides the designer with a digestible approach to common tasks. Guidance is presented on design routes, with references to Eurocode clauses. Formulae are converted into look-up tables and design tips are highlighted. The compilation includes the related provision in the UK National Annexes and appropriate non-contradictory complementary information.

This publication includes:

- A brief review of the basis of structural design and guidance on the principal actions and combinations of action that need to be considered in orthodox building structures
- Rules for global analysis, bending and axial resistance
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- An outline of the rules for composite construction from Eurocode 4
- Appendices giving guidance on selection of the most critical combination of actions, simplified expressions for interaction factors for combined bending and axial force, and a simplified approach for the lateral torsional buckling resistance of unrestrained lengths of beams.

Catalogue number	**P362**
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Authors	M E Brettle BEng, D G Brown BEng CEng MICE
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AD 354
Resistance of bolted connections in tension, for design to BS EN 1993-1-8

This Advisory Desk Note provides a simple method of determining the design tension resistance of bolted connections in accordance with BS EN 1993-1-5:2005 that avoids the need to evaluate prying forces. The method is based on the simple method provided in BS 5950-1:2000.

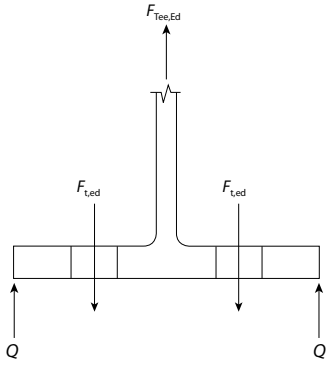
The design tension resistance ($F_{t,Rd}$) of individual fasteners is given by BS EN 1993-1-8, Table 3.4. However, in a tension connection, Clause 3.11 requires that the fasteners should be designed to resist a design tensile force ($F_{t,Ed}$) that includes any force due to prying action (see Figure 1 below). Clause 6.2.4 provides rules (in Table 6.2) for T-stub flanges that implicitly account for prying forces.

In contrast, BS 5950-1 has two approaches to verify the tension capacity of connections using bolts – the more exact method of clause 6.3.4.3, which corresponds to the Eurocode method and which also requires the consideration of the prying force, and the simple method of clause 6.3.4.2. The simple method of BS 5950-1 utilises a reduced "nominal tension capacity" (equal to 0.8 × the tension capacity) that is verified against a tensile force that excludes prying force; this means that, in certain circumstances, designers need not calculate the prying force.

This Advisory Desk recommends that, for verifying resistance of a bolted tension connection when designing to BS EN 1993-1-8, as an alternative to the 'exact method' of Table 6.2, the following simple approach may be adopted, provided that the cross-centres (gauge) of the bolt lines are not greater than 55% of the flange width or end plate width (see Figure 2):

- Calculate the design forces in individual fasteners, neglecting prying force
- Take the tensile resistances of the individual fasteners as $0.8F_{t,Rd}$, where $F_{t,Rd}$ is given by Table 3.4.

In addition, the bending resistance of the connected part should also be verified. For this simple approach, if the connected part is designed assuming double curvature bending, the moment resistance per unit length should be taken as $f_y t_p^2/6\gamma_{M0}$, where t_p and f_y are the thickness and yield strength, respectively, of the connected part.



$F_{t,ed}$ is the design tensile force on the fastener

$\frac{F_{Tee,Ed}}{2} + Q$

Q is the prying force

Figure 1. Prying action

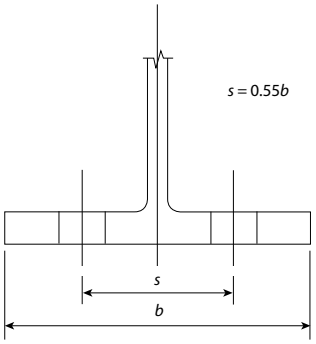


Figure 2. Limiting cross-centres for the simple method

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New and revised codes & standards

From BSI Update January 2011

BS EN PUBLICATIONS

BS EN ISO 148-1:2010
Metallic materials. Charpy pendulum impact test. Test method
Supersedes BS EN 10045-1:1990

NEW WORK STARTED

EN 1090-2:2008/A1
Execution of steel structures and aluminium structures. Technical requirements for the execution of steel structures

EN 10025-1
Hot rolled products of structural steels. General technical delivery conditions
Will supersede BS EN 10025-1:2004

EN 10025-2
Hot rolled products of structural steels. Technical delivery conditions for non-alloy structural steels
Will supersede BS EN 10025-2:2004

EN 10025-3
Hot rolled products of structural steels. Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels.
Will supersede BS EN 10025-3:2004

EN 10025-4
Hot rolled products of structural steels. Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels.
Will supersede BS EN 10025-4:2004

EN 10025-5
Hot rolled products of structural steels. Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
Will supersede BS EN 10025-5:2004

EN 10025-6
Hot rolled products of structural steels. Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition
Will supersede BS EN 10025-6:2004+A1:2009

EN 10149-1
Specification for hot-rolled flat products made of high yield strength steels for cold forming. General delivery conditions.
Will supersede BS EN 10149-1:1996

EN 10149-2
Specification for hot-rolled flat products made of high yield strength steels for cold forming. Delivery conditions for thermomechanically rolled steels
Will supersede BS EN 10149-2:1996

EN 10149-3
Specification for hot-rolled flat products of high yield strength steels for cold forming. Delivery conditions for normalized or normalized rolled steels.
Will supersede BS EN 10149-3:1996

CEN EUROPEAN STANDARDS

EN 1090-1:-
Execution of steel structures and aluminium structures. Requirements for conformity assessment of structural components
CORRIGENDUM 1: November 2010 to EN 1090-1:2009

EN 10029:2010
Hot-rolled steel plates 3mm thick or above. Tolerances on dimensions and shape

EN 10051:2010
Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels. Tolerances on dimensions and shape

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 Directory General, BCSA, 4 Whitehall Court, London SW1A 2ES
Tel: 020 7839 8566 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

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	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 £3,000,000
Adstone Construction Ltd	01905 794561			●	●	●											Up to £1,400,000
Advanced Fabrications Poyle Ltd	01753 531116				●		●	●	●	●	●				●	✓	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	01924 264121												●				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
B&B Group Ltd	01942 676770	●		●	●	●	●	●		●	●	●		●		✓	Up to £1,400,000
B D Structures Ltd	01942 817770			●	●	●	●				●			●			Up to £1,400,000
Ballykine Structural Engineers Ltd	028 9756 2560			●	●	●	●	●				●				✓	Up to £1,400,000
Barnshaw Section Benders Ltd	01902 880848												●			✓	Up to £800,000
Barrett Steel Buildings Ltd	01274 266800			●	●	●	●									✓	Up to £6,000,000
Barretts of Aspley Ltd	01525 280136			●	●	●				●	●			●	●		Up to £3,000,000
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
Browne Structures Ltd	01283 212720				●			●							●		Up to £400,000
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 £1,400,000
Crown Structural Engineering Ltd	01623 490555			●	●	●	●		●		●			●		✓	Up to £800,000
D H Structures Ltd	01785 246269				●						●						Up to £40,000
Discain Project Services Ltd	01604 787276				●					●	●				●	✓	Up to £1,400,000
Duggan Steel Ltd	00 353 29 70072		●	●	●	●	●	●			●					✓	Up to £6,000,000
Elland Steel Structures Ltd	01422 380262		●	●	●	●	●	●	●	●	●	●		●		✓	Up to £6,000,000
Emmett Fabrications Ltd	01274 597484			●	●	●	●							●			Up to £1,400,000
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
GME Structures Ltd	01939 233023			●	●		●	●		●	●			●	●		Up to £400,000
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 £4,000,000
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 £4,000,000
Hescott Engineering Company Ltd	01324 556610			●	●	●	●			●				●	●		Up to £4,000,000
Company name	**Tel**	**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**Q**	**R**	**S**	**QM**	**Contract Value (1)**

Company name	Tel	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	QM	Contract Value (1)
Hills of Shoeburyness Ltd	01702 296321									●	●				●		Up to £1,400,000
J Robertson & Co Ltd	01255 672855									●	●				●		Up to £200,000
James Killelea & Co Ltd	01706 229411		●	●	●	●	●					●		●			Up to £6,000,000*
Leach Structural Steelwork Ltd	01995 640133			●	●	●	●	●			●						Up to £1,400,000
Lowe Engineering (Midland) Ltd	01889 563244									●	●			●	●	✓	Up to £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
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 £1,400,000
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 (Fire Escapes) Ltd	0113 307 6730									●					●		Up to £1,400,000
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
Robinson Steel Structures	01332 574711		●	●	●	●	●		●	●	●	●		●	●	✓	Above £6,000,000
Rowecord Engineering Ltd	01633 250511	●	●	●	●	●	●	●	●	●	●	●	●	●	●	✓	Above £6,000,000
Rowen Structures Ltd	01773 860086		●	●	●	●	●	●	●	●	●	●		●			Above £6,000,000*
RSL (South West) Ltd	01460 67373			●	●		●				●						Up to £1,400,000
S H Structures Ltd	01977 681931						●	●	●	●							Up to £2,000,000
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 £4,000,000*
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 £400,000
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	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

Company name	Tel
Roger Pope Associates	01752 263636
Highways Agency	08457 504030

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

Company name	Tel	1	2	3	4	5	6	7	8	9
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 – Birmingham	0121 561 6800								●	
ArcelorMittal Distribution – Bristol	01454 311442								●	
ArcelorMittal Distribution – Manchester	0161 703 9073								●	
ArcelorMittal Distribution – Mid Glamorgan	01443 812181								●	
ArcelorMittal Distribution – Scunthorpe	01724 810810								●	
ArcelorMittal Distribution – Wolverhampton	01902 365200								●	
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								●	

Company name	Tel	1	2	3	4	5	6	7	8	9
ASD metal services - Durham	0191 492 2322								●	
ASD metal services - Edinburgh	0131 459 3200								●	
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 General Steels	01274 682281								●	
Barrett Tubes Division	0121 601 5050								●	
Cellbeam Ltd	01937 840600	●								
Cellshield Ltd	01937 840600							●		

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:

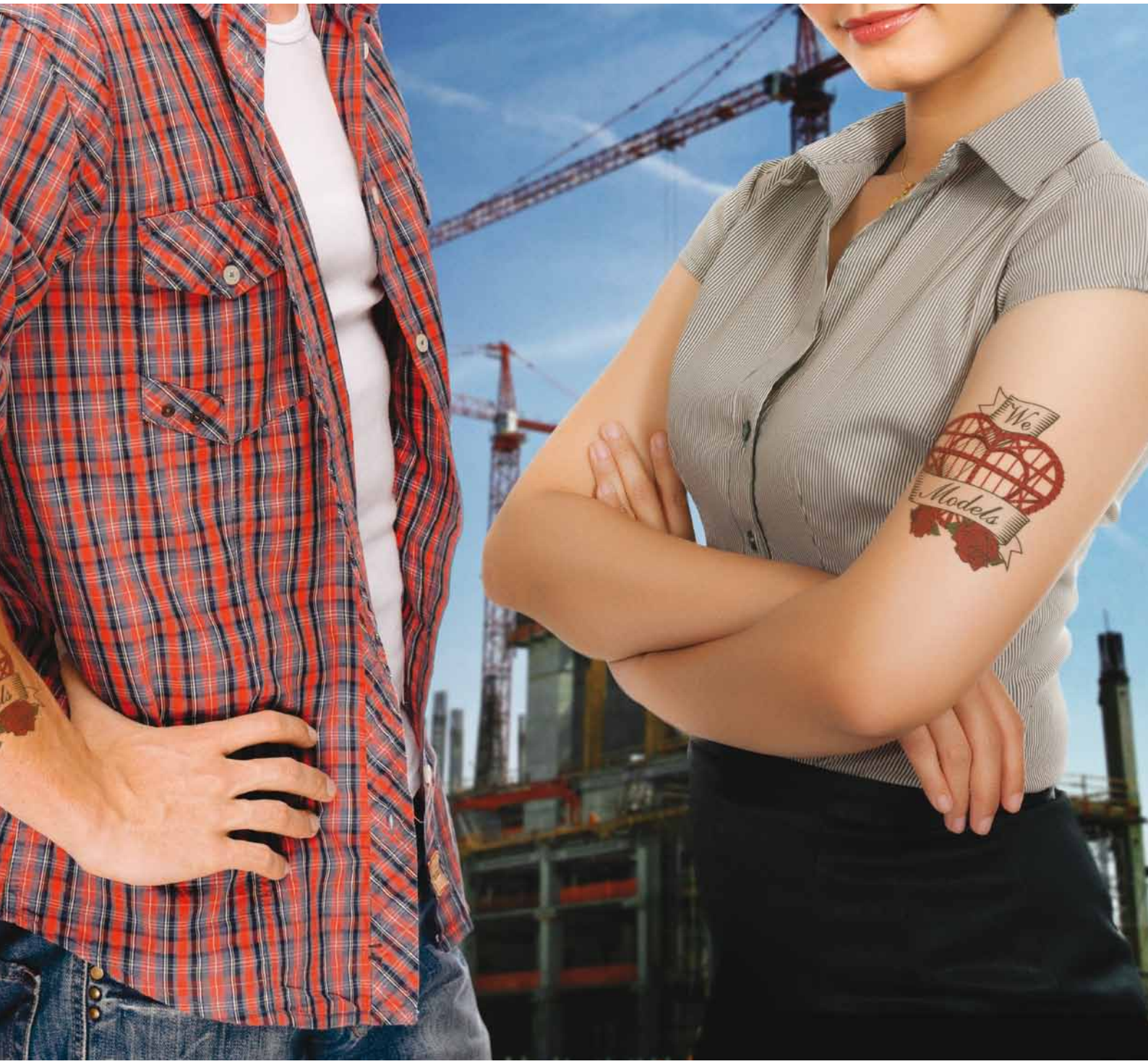
FG Footbridge and sign gantries
PG Bridges made principally from plate girders
TW Bridges made principally from trusswork
BA Bridges with stiffened complex platework (eg in decks, box girders or arch boxes)
CM Cable-supported bridges (eg cable-stayed or suspension) and other major structures (eg 100 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

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	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
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
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 £800,000
Allerton Steel Ltd	01609 774471	●	●	●	●	●	●	●	●	✓	Up to £1,400,000
Carver Engineering Services Ltd	01302 751900	●	●	●	●		●	●	●	✓	Up to £2,000,000
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 £800,000
Four-Tees Engineers Ltd	01489 885899	●	●	●	●		●	●	●	✓	Up to £2,000,000
Francis & Lewis International Ltd	01452 722200							●	●	✓	Up to £2,000,000
Harland & Wolff Heavy Industries Ltd	028 9045 8456	●	●	●	●	●		●	●	✓	Up to £6,000,000
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 £400,000*
Millar Callaghan Engineering Services Ltd	01294 217711	●						●		✓	Up to £800,000
N Class Fabrication & Installation	01733 558989	●	●	●	●			●		✓	Up to £800,000
P C Richardson & Co (Middlesbrough) Ltd	01642 714791	●						●	●	✓	Up to £3,000,000*

Company name	Tel	1	2	3	4	5	6	7	8	9
CMC (UK) Ltd	029 2089 5260							●		
Composite Metal Flooring Ltd	01495 761080	●								
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						●			
Kaltenbach Ltd	01234 213201					●				
Kingspan Structural Products	01944 712000	●								
Leighs Paints	01204 521771						●			
Lindapter International	01274 521444									●
Metsec plc	0121 601 6000	●								

Company name	Tel	1	2	3	4	5	6	7	8	9
MSW Structural Floor Systems	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					●				
PMR Fixers	01335 347629	●								
PP Protube Ltd	01744 818992	●								
PPG Performance Coatings UK Ltd	01773 837300						●			
Prodeck-Fixing Ltd	01278 780586	●								
Rainham Steel Co Ltd	01708 522311								●	
Richard Lees Steel Decking Ltd	01335 300999	●								
Schöck Ltd	0845 241 3390	●								
Site Coat Services Ltd	01476 577473						●			
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						●			



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